**ORAL ARGUMENT NOT YET SCHEDULED**

**UNITED STATES COURT OF APPEALS**
**FOR THE DISTRICT OF COLUMBIA CIRCUIT**

---

**Case No. 21-1048**
**Consolidated with Case Nos. 21-1055, 21-1056, 21-1179, 21-1227, 21-1229, 21-1230, 21-1231**

---

DON'T WASTE MICHIGAN, *et al.*,
Petitioners,
v.
UNITED STATES NUCLEAR REGULATORY COMMISSION
and the UNITED STATES OF AMERICA,
Respondents,

INTERIM STORAGE PARTNERS, LLC,
Intervenor.

---

Petition for Review of Final Order of the
United States Nuclear Regulatory Commission

---

# CORRECTED DEFERRED JOINT APPENDIX - VOLUME I OF IV

---

Allan Kanner
Annemieke Tennis
**Kanner & Whiteley, L.L.C.**
701 Camp Street
New Orleans, Louisiana 70130
(504) 524 - 5777
a.kanner@kanner-law.com
a.tennis@kanner-law.com
*Attorneys for Petitioners Fasken Land & Minerals, Ltd. and Permian Basin Land & Royalty Owners*

Monica Renee Perales
6101 Holiday Hill Road
Midland, Texas 79707
(432) 687-1777
monicap@forl.com
*Attorney for Petitioners Fasken Land & Minerals, Ltd. and Permian Basin Land & Royalty Owners*

Diane Curran
**Harmon, Curran, Spielberg, & Eisenberg, L.L.P.**
1725 DeSales Street N.W., Suite 500
Washington, D.C. 20036
(240) 393-9285
dcurran@harmoncurran.com
*Attorney for Petitioner Beyond Nuclear*

Mindy Goldstein
**Turner Environmental Law Clinic**
**Emory University School of Law**
1301 Clifton Road
Atlanta, Georgia 30322
(404) 727-3432
magolds@emory.edu
*Attorney for Petitioner Beyond Nuclear*

Terry J. Lodge, Esq.
316 N. Michigan St., Suite 520
Toledo, Ohio 43604-5627
(419) 205-7084
tjlodge50@yahoo.com
lodgelaw@yahoo.com
*Attorney for Petitioners Don't Waste Michigan, Citizens' Environmental Coalition, Citizen for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mother for Peace, Sustainable Energy and Economic Development (SEED) Coalition, and Leona Morgan*

Wallace L. Taylor
4403 1st Ave. S.E., Suite 402
Cedar Rapids, Iowa 52402
(319) 366-2428
wtaylorlaw@aol.com
*Attorney for Petitioner Sierra Club*

Todd Kim
Justin D. Heminger
**Environment and Natural Resources Division**
**U.S. Department of Justice**
Post Office Box 7415
Washington, D.C. 20044
(202) 514-5442
justin.heminger@usdoj.gov
*Attorneys for Respondents*

Marian L. Zobler
Andrew P. Averbach
**Office of the General Counsel**
**U.S. Nuclear Regulatory Commission**
11555 Rockville Pike
Rockville, MD 20852
(301) 415-1956
andrew.averbach@nrc.gov
*Attorneys for Respondents*

Brad Fagg
Timothy P. Matthews
Ryan K. Lighty
**Morgan, Lewis & Bockius LLP**
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 739-3000
brad.fagg@morganlewis.com
timothy.matthews@morganlewis.com
ryan.lighty@morganlewis.com
*Attorneys for Intervenor*
*Interim Storage Partners, LLC*

# INDEX TO CORRECTED APPENDIX


| Tab | Document | Page |
|---|---|---|
| | ***Volume I*** | |
| **1** | **C.I. 2**[1]**,** License Application; Withdrawal of Notice of Opportunity to Request a Hearing, 82 FR 33521 (July 20, 2017) | **JA0001** |
| **2** | **C.I. 3,** Revised License Application; Opportunity to Request a Hearing and to Petition for Leave to Intervene; Order Imposing Procedures, 83 FR 44070 (August 29, 2018) | **JA0004** |
| **3** | **C.I. 22**, Beyond Nuclear, Inc.'s Motion to Dismiss Licensing Proceedings for HI-STORE Consolidated Interim Storage Facility and WCS Consolidated Interim Storage Facility (Sept. 14, 2018) | **JA0010** |
| **4** | **C.I. 39,** excerpts, Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Oct. 3, 2018) | **JA0038** |
| **5** | **C.I. 49,** Order of the Secretary, *Holtec International and Interim Storage Partners LLC*, Docket Nos. 72-1051 and 72-1050 (Oct. 29, 2018) | **JA0039** |
| **6** | **C.I. 51,** excerpts, Petition of Permian Basin Land and Royalty Organization and Fasken Land and Minerals for Intervention and Request for Hearing (Oct. 29, 2018) | **JA0044** |


[1] "C.I. _" refers to the "Record ID" number associated with each document listed in the Amended Certified Index of Record that the NRC filed on December 14, 2021 (Doc. # 1926657). A Record ID number followed by a period indicates that the document is part of a "package" including more than one document. The number following the period indicates the document within the package to which the cited material corresponds (*i.e.*, C.I. 261.1 is the first document within the package for Record ID 290).

| | | |
|---|---|---|
| **7** | **C.I. 57**, excerpts, Petition to Intervene and Request for Adjudicatory Hearing by Sierra Club (Nov. 13, 2018) | **JA0045** |
| **8** | **C.I. 59,** excepts, Expert Declarations for Sierra Club in Support of Petition to Intervene and Request for Hearing (Nov. 13, 2018) | **JA0065** |
| **9** | **C.I. 60,** excerpts, Exhibits for Sierra Club in Support of Petition to Intervene and Request for Hearing (Nov. 13, 2018) | **JA0075** |
| **10** | **C.I. 61,** excerpts, Petition of Don't Waste Michigan, etc. to Intervene and Request for Hearing (Nov. 13, 2018) | **JA0077** |
| **11** | **C.I. 68,** Expert Declaration Report of Robert Alvarez (Nov. 13, 2018) | **JA0089** |
| **12** | **C.I. 69,** James Ballard Expert Report and CV (Nov. 13, 2018) | **JA0099** |
| **13** | **C.I. 70,** Gordon Thompson Expert Report and CV (Nov. 13, 2018) | **JA0189** |
| **14** | **C.I. 126,** Memorandum and Order (Ruling on Petitions for Intervention and Requests for Hearing), LBP-19-7, 90 N.R.C. 31 (2019) | **JA0355** |
| **15** | **C.I. 143,** Sierra Club's Amended Contention 13 (Sept. 13, 2019) | **JA0444** |
| **16** | **C.I. 172,** excerpts, Motion of Intervenor Sustainable Energy and Economic Development Coalition for Leave to File Late-Filed Contention and Contention 17 (Oct. 23, 2019) | **JA0449** |
| **17** | **C.I. 178,** Memorandum and Order (Ruling on Motion to Dismiss and Motion to Amend Contention 13), LBP-19-9, 90 N.R.C. 181 (2019) | **JA0450** |

| | | |
|---|---|---|
| **18** | **C.I. 185,** Memorandum and Order (Ruling on Motion for Leave to File Late-Filed Contention and Terminating Proceeding), LBP-19-11, 90 N.R.C. 358 (2019) | **JA0465** |
| **19** | **C.I. 207,** Order (Extending Time to Intervene, Request a Hearing, and File New Contentions) Based on the Draft Environmental Impact Statement (May 22, 2020) | **JA0477** |
| **20** | **C.I. 208,** Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion to Reopen the Record (July 6, 2020) | **JA0481** |
| **21** | **C.I. 209,** Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners' Motion for Leave to File New and/or Amended Contention (July 7, 2020) | **JA0492** |
| **22** | **C.I. 210,** Exhibit 1 to Fasken and PBLRO's Motion for Leave to File New and/or Amended Contention - Declaration of Tommy E. Taylor (July 7, 2020) | **JA0523** |
| **23** | **C.I. 211,** Exhibit 2 to Fasken and PBLRO's Motion for Leave to File New and/or Amended Contention - Facts Petitioners Intend to Rely on to Support New and Amended Contentions (July 7, 2020) | **JA0529** |
| **24** | **C.I. 215,** Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners' Combined Reply to NRC Staff's and Interim Storage Partners LLC's Oppositions to Motion for Leave to File New Contention and Motion to Reopen The Record (Aug. 7, 2020) | **JA0545** |
| **25** | **C.I. 218,** Commission Memorandum and Order, CLI-20-13, 92 N.R.C. 457 (2020) | **JA0558** |
| **26** | **C.I. 221,** Commission Memorandum and Order, CLI-20-14, 92 N.R.C. 463 (2020) | **JA0564** |
| **27** | **C.I. 222,** Commission Memorandum and Order, CLI-20-15, 92 N.R.C. 491 (2020) | **JA0592** |

| | | |
|---|---|---|
| **28** | **C.I. 224,** Memorandum and Order (Denying Motions to Reopen and for Leave to File), LBP-21-2, 93 N.R.C. 104 (2021) | **JA0612** |
| ***Volume II*** | | |
| **29** | **C.I. 225,** Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners' Combined Notice of Appeal and Petition for Review of Atomic Safety Licensing Board's Denial of Motion for Leave to File New Contention No. 5 and Motion to Reopen the Record (Feb. 23, 2021) | **JA0626** |
| **30** | **C.I. 230,** Commission Memorandum and Order, CLI-21-9, 93 N.R.C. 244 (2021) | **JA0653** |
| **31** | **C.I. 261.2,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, License Application (Rev. 2) (July 19, 2018) | **JA0661** |
| **32** | **C.I. 261.3,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Environmental Report (Rev. 2), Ch. 1 & 2 (July 19, 2018) | **JA0665** |
| **33** | **C.I. 261.4,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Environmental Report (Rev. 2), Ch. 3 (July 19, 2018) | **JA0670** |
| **34** | **C.I. 261.5,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Environmental Report (Rev. 2), Ch. 4 (July 19, 2018) | **JA0689** |
| **35** | **C.I. 261.6,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Environmental Report (Rev. 2), Ch. 7 (July 19, 2018) | **JA0714** |
| **36** | **C.I. 261.7,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Environmental Report (Rev. 2), Attachments (July 19, 2018) | **JA0715** |

| | | |
|---|---|---|
| **37** | **C.I. 261.10,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Safety Analysis Report (Rev. 2), Ch. 11 (July 19, 2018) | **JA0728** |
| **38** | **C.I. 261.22,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Safety Analysis Report (Rev. 2), Ch. 1 (July 19, 2018) | **JA0729** |
| **39** | **C.I. 261.23,** excerpts, Application Revision 2, SAR Revision 2, and ER Revision 2, Safety Analysis Report (Rev. 2), Ch. 2 (July 19, 2018) | **JA0737** |
| **40** | **C.I. 290.1,** Applicant response to request for additional information (May 31, 2019) | **JA0738** |
| **41** | **C.I. 290.3,** excerpts, Applicant response to request for additional information, Enclosure 3 (May 31, 2019) | **JA0743** |
| **42** | **C.I. 307,** excerpts, Summary Report of Environmental Impact Statement 04/06/2017 Public Scoping Meeting (Oct. 31, 2019) | **JA0749** |
| **43** | **C.I. 318.3,** excerpts, ER Revision 3, Ch. 3 & 4 (Feb. 17, 2020) | **JA0758** |
| **44** | **C.I. 324,** Federal Register Notice (Includes directions on How to Comment on Draft EIS), 85 FR 27449 (May 8, 2020) | **JA0787** |
| **45** | **C.I. 327,** Draft Environmental Impact Statement (May 31, 2020) | **JA0789** |
| **46** | **C.I. 331,** excerpts, Applicant submittal of supplemental information (July 21, 2020) | **JA1273** |
| **47** | **C.I. 353,** excerpts, Applicant submittal of supplemental information (January 27, 2021) | **JA1275** |

| | | |
|---|---|---|
| ***Volume III*** | | |
| **48** | **C.I. 355,** Final Environmental Impact Statement (July 31, 2021) | **JA1277** |
| ***Volume IV*** | | |
| **49** | **C.I. 359,** NRC Staff's Record of Decision (September 13, 2021) | **JA1961** |
| **50** | **C.I. 360.2,** Materials License for ISP, License Preamble, Issuance of Material License NM-2515 (September 13, 2021) | **JA1967** |
| **51** | **C.I. 360.3,** Materials License for ISP, Materials License SNM-2515 (September 13, 2021) | **JA1969** |
| **52** | **C.I. 360.4,** excerpts, Materials License for ISP, Technical Specifications (September 13, 2019) | **JA1972** |
| **53** | **C.I. 360.5,** excerpts, Materials License for ISP, Final Safety Evaluation Report (September 13, 2021) | **JA1974** |
| **54** | **C.I. 360.7,** Materials License for ISP, Record of Decision (September 13, 2021) | **JA1995** |
| **55** | **C.I. 1616,** Comments from James C. Kenney, New Mexico Environment Department (Nov. 3, 2020) | **JA2001** |
| **56** | **C.I. 1643,** Comments from Terry Lodge, Don't Waste Michigan, et. al. (Nov. 3, 2020) | **JA2010** |
| **57** | **C.I. 1723,** Comments from Marvin Resnikoff, Radioactive Waste Management Associates (Oct. 2, 2020) | **JA2037** |
| **58** | **C.I. 1724,** Comments from Marvin Resnikoff, Radioactive Waste Management Associates (Oct. 7, 2020) | **JA5052** |

| | | |
|---|---|---|
| **59** | **C.I. 1787,** Comments from Wallace Taylor, Sierra Club (Nov. 2, 2020) | **JA2071** |
| **60** | Interim Storage Partners, LLC; WCS Consolidated Interim Storage Facility; Issuance of Materials License and Record of Decision, **86 Fed. Reg. 51926** (Sept. 21, 2021) | **JA2303** |
| **61** | **D. Curran Letter to V.M. McCree,** WCS Licensing Application for Spent Fuel Storage Facility in Andrews County, TX (Oct. 27, 2016) | **JA2306** |
| **62** | **Gordon Thompson,** Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security (2003) | **JA2311** |
| **63** | **NWTRB Report,** excerpts, Geological Repositories: Performance Monitoring & Retrievability of Emplaced High-Level Radioactive Waste & Spent Fuel | **JA2318** |
| **64** | **NWTRB Report,** excerpts, Preparing for Nuclear Waste Transportation (2019) | **JA2332** |
| **65** | **NUREG-1567** excerpts, Standard of Review Plan for Spent Fuel Dry Storage Facilities (March 2000) | **JA2335** |
| **66** | **NUREG-1748** excerpts, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs | **JA2337** |
| **67** | **NUREG-2125** excerpts, Spent Fuel Transportation Risk Assessment (January 2014) | **JA2343** |
| **68** | **NUREG-2157** excerpts, Continued Storage Generic Environmental Impact Statement (September 2014) | **JA2346** |
| **69** | **C.I. 1,** (Jan. 30, 2017) License Application; Opportunity to Request a Hearing and to Petition for Leave to Intervene, 82 FR 8773 | **JA2371** |

| | | |
|---|---|---|
| **70** | **C.I. 236.1,** excerpts, Application, SAR Revision 2, and ER Revision 2, License Application (Rev. 2) (July 19, 2018) | **JA2375** |
| **71** | **C.I. 261.2,** excerpts, Waste Control Specialists, LLC, Spent Fuel Storage Facility License Application (April 28, 2016) | **JA2386** |

**CERTIFICATE OF SERVICE**

On this 4th day of August, 2022 a true and correct copy of the foregoing was filed with the Clerk's Office of the United States Court of Appeals for the District of Columbia Circuit, which currently provides electronic service on the counsel of record.

*/s/ Allan Kanner*
Allan Kanner

# Tab 1

identify additional opportunities for improving customers' experience.

**Swarnali Haldar,**

*Executive for Information Services/CIO.*

[FR Doc. 2017–15212 Filed 7–19–17; 8:45 am]

BILLING CODE 7515–01–P

## NATIONAL SCIENCE FOUNDATION

### Proposal Review Panel for Materials Research; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation (NSF) announces the following meeting:

*Name and Committee Code:* Proposal Review Panel for Materials Research—Partnership for Research and Education in Materials, University of Puerto Rico at Humacao (UPRH) (#1203) Site Visit

*Date and Time:* August 17, 2017; 8:00 a.m.–6:00 p.m.; August 18, 2017; 8:00 a.m.–12:00 p.m.

*Place:* University of Puerto Rico at Humacao, PR 908, Humacao, 00792 Puerto Rico.

*Type of Meeting:* Part-Open.

*Contact Person:* Dr. Jose Caro, Program Director, Partnership for Research and Education in Materials, PREM. Division of Materials Research, Room 1065, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230; Telephone (703) 292–4914.

*Purpose of Meeting:* NSF site visit to provide advice and recommendations concerning further NSF support for the Center.

**Agenda**

*Thursday, August 17, 2017*

7:15 a.m. Bus leaves Hotel in Palmas del Mar, Humacao to UPRH
7:45 a.m.–8:15 a.m. Continental Breakfast Executive Session for Site Visit Team. (Closed)
8:15 a.m.–8:30 a.m. Break
8:30 a.m.–8:45 a.m. Welcome and Overview by Administration
8:45 a.m.–9:30 a.m. PI's Overview of PREM
9:30 a.m.–9:45 a.m. Q&A for PI's and Administrator's Overviews
9:45 a.m.–10:15 a.m. Partner Institutions Interactions Q&A
10:15 a.m.–10:30 a.m. Break
10:30 a.m.–12:00 a.m. Research Presentations/Q&A
12:00 p.m.–12:15 p.m. Q&A for Science Presentations
12:15 p.m.–1:15 p.m. Lunch with students and post docs (no faculty).
1:15 p.m.–2:15 p.m. Facilities Overview and Visit
2:15 p.m.–2:45 p.m. Visiting Team with University Management (Closed)
2:45 p.m.–4:00 p.m. Poster Session with refreshments
4:00 p.m.–5:00 p.m. Executive session—SV Team only (Closed)
5:00 p.m.–5:45 p.m. SV Team meets with PREM Management Team
5:45 p.m. Adjourn
6:00 p.m. Bus leaves from Natural Sciences Building for dinner
6:30 p.m. Dinner (Panel and Faculty): El Makito Restaurant, Naguabo,PR
9:00 p.m. Bus leaves Restaurant to Hotel (Approximate time)

*Friday, August 18, 2017*

7:00 a.m. Bus leaves hotel to UPRH
7:30 a.m.–8:00 a.m. Continental Breakfast
8:00 a.m.–9:30 a.m. Education and Outreach Activities
9:30 a.m.–9:45 a.m. Q&A for Educational and Outreach Presentations
9:45 a.m.–10:00 a.m. Break
10:00 a.m.–11:45 a.m. Executive Sessions for Site Visit Team only (Closed)
11:45 a.m.–12:00 p.m. NFS Debriefing with PREM PI
12:00 p.m. End of Site Visit
12:00 p.m. Working Lunch for Site Visit Team

*Reason for Closing:* The work being reviewed during closed portions of the site visit will include information of a proprietary or confidential nature, including technical information; financial data, such as salaries and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: July 17, 2017.

**Crystal Robinson,**

*Committee Management Officer.*

[FR Doc. 2017–15264 Filed 7–19–17; 8:45 am]

BILLING CODE 7555–01–P

## NATIONAL SCIENCE FOUNDATION

### Sunshine Act Meeting; National Science Board

The National Science Board, pursuant to NSF regulations (45 CFR part 614), the National Science Foundation Act, as amended (42 U.S.C. 1862n–5), and the Government in the Sunshine Act (5 U.S.C. 552b), hereby gives notice of the scheduling of a teleconference for the transaction of National Science Board business, as follows:

**TIME AND DATE:** Closed teleconference of the Committee on Strategy of the National Science Board, to be held Tuesday, July 25, 2017 from 10:30 a.m. to 12:00 Noon. EDT.

**PLACE:** This meeting will be held by teleconference at the National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230.

**STATUS:** Closed.

**MATTERS TO BE CONSIDERED:** Committee Chair's opening remarks; Review and discussion of the FY 2019 budget submission to the Office of Management and Budget; Committee Chair's closing remarks.

**CONTACT PERSON FOR MORE INFORMATION:** Point of contact for this meeting is: Kathy Jacquart, 4201 Wilson Blvd., Arlington, VA 22230. Telephone: (703) 292–8000.

You may find meeting information and updates (time, place, subject matter or status of meeting) at *http://www.nsf.gov/nsb/notices/.*

Dated: July 17, 2017.

**Chris Blair,**

*Executive Assistant to the NSB Office.*

[FR Doc. 2017–15309 Filed 7–18–17; 11:15 am]

BILLING CODE 7555–01–P

## NUCLEAR REGULATORY COMMISSION

**[Docket No. 72–1050; NRC–2016–0231]**

### Waste Control Specialists LLC's Consolidated Interim Spent Fuel Storage Facility Project

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** License application; withdrawal of notice of opportunity to request a hearing.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is withdrawing the notice of opportunity to request a hearing for Waste Control Specialists LLC's application to construct and operate a Consolidated Interim Storage Facility (CISF) for spent nuclear fuel at WCS's facility in Andrews County, Texas.

**DATES:** July 20, 2017.

**ADDRESSES:** Please refer to Docket ID NRC–2016–0231 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- *Federal Rulemaking Web site:* Go to *http://www.regulations.gov* and search for Docket ID NRC–2016–0231. Address questions about NRC dockets to Carol Gallagher; telephone: 301–415–3463;

email: *Carol.Gallagher@nrc.gov.* For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.

- *NRC's Agencywide Documents Access and Management System (ADAMS):* You may obtain publicly-available documents online in the ADAMS Public Documents collection at *http://www.nrc.gov/reading-rm/adams.html.* To begin the search, select ''*ADAMS Public Documents*'' and then select ''*Begin Web-based ADAMS Search.*'' For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1–800–397–4209, 301–415–4737, or by email to *pdr.resource@nrc.gov.* For the convenience of the reader, the ADAMS accession numbers are provided in a table in the ''Availability of Documents'' Section II of this document.
- *NRC's PDR:* You may examine and purchase copies of public documents at the NRC's PDR, Room O1–F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

**FOR FURTHER INFORMATION CONTACT:** John-Chau Nguyen, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; telephone: 301–415–0262; email: *John-Chau.Nguyen@nrc.gov.*

**SUPPLEMENTARY INFORMATION:**

## I. Background

By letter dated April 28, 2016, as supplemented on July 20, August 19, August 31, September 27, October 7, November 16, December 16, December 22, 2016, and March 16, 2017, WCS submitted an application for a specific license pursuant to part 72 of title 10 of the *Code of Federal Regulations* (10 CFR), ''Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.'' In its letter, WCS requested authorization to store up to 5,000 metric tons of uranium for a period of 40 years in a CISF.

In addition, by letter dated July 21, 2016, WCS requested that the NRC initiate its environmental impact statement (EIS) process for the WCS CISF license application as soon as practicable. By letter dated October 7, 2016, the NRC informed WCS of its decision to start the EIS process in advance of making a decision on docketing the application. On November 14, 2016 (81 FR 79531), the NRC published a notice in the **Federal Register** announcing its intent to prepare an EIS and to open the scoping period for the EIS.

By letter dated January 26, 2017, the NRC informed WCS of its decision to accept the application and proceed with the technical review. Subsequently, on January 30, 2017 (82 FR 8773), the NRC published a notice in the **Federal Register** announcing the acceptance for docketing and opportunity to request a hearing and to petition for leave to intervene of the WCS application.

By letter dated March 16, 2017, WCS submitted Revision 1 to its license application. By letter dated April 18, 2017, WCS requested that the NRC temporarily suspend all safety and environmental review activities as well as public participation activities associated with WCS' license application. On April 19, 2017, WCS and the NRC staff jointly requested that the Commission withdraw the hearing notice, explaining that a new **Federal Register** notice to provide a fresh opportunity for interested persons to request a hearing would be issued if review of the application resumes. On May 10, 2017, the NRC staff granted WCS' request to temporarily suspend all safety and environmental review activities as well as public participation activities associated with its license application. On June 22, 2017, the Commission granted WCS's and the NRC staff's request and further directed that the NRC staff to publish a **Federal Register** notice withdrawing the opportunity to request a hearing on this license application and directed the NRC staff to publish a new notice of opportunity to request a hearing in the **Federal Register** if WCS requests that the NRC staff resume its review of WCS's application.

## II. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

| Document | ADAMS Accession No. |
|---|---|
| WCS submittal of CISF license application, with Environmental Report | ML16132A533 |
| WCS letter with schedule for response to NRC request for supplemental information | ML16193A314 |
| WCS initial submittal in response to NRC request for supplemental information | ML16229A537 |
| WCS submittal of supplemental security information | ML16235A467 |
| WCS request for NRC to begin EIS process as soon as practicable | ML16229A340 |
| WCS second submittal in response to NRC request for supplemental information | ML16265A454 |
| WCS submittal of additional supplemental security information | ML16280A300 |
| NRC response to WCS request to begin EIS process as soon as practicable | ML16285A317 |
| WCS third submittal in response to NRC request for supplemental information | ML16287A527 |
| WCS fourth submittal in response to NRC request for supplemental information | ML16330A116 |
| WCS fifth submittal in response to NRC request for supplemental information | ML16356A346 |
| WCS sixth submittal in response to NRC request for supplemental information | ML17018A292 |
| NRC letter accepting application for review | ML17018A168 |
| WCS license application Revision 1 submittal | ML17082A007 |
| WCS request NRC to temporarily suspend all safety and environmental review activities | ML17110A206 |
| NRC granting WCS request to temporarily suspend all safety and environmental review activities | ML17129A314 |

Dated at Rockville, Maryland, this 13th day of July 2017.

For the Nuclear Regulatory Commission.

**John McKirgan,**

*Chief, Spent Fuel Licensing Branch, Division of Spent Fuel Management, Office of Nuclear Material Safety and Safeguards.*

[FR Doc. 2017–15239 Filed 7–19–17; 8:45 am]

**BILLING CODE 7590–01–P**

## SECURITIES AND EXCHANGE COMMISSION

**[Release No. 34–81146; File No. SR–NYSEMKT–2017–44]**

## Self-Regulatory Organizations; NYSE MKT LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change To Amend Rule 7.38E To Specify the Ranking of an Odd Lot Order That Has a Display Price That Is Better Than Its Working Price

July 14, 2017.

Pursuant to Section 19(b)(1) [1] of the Securities Exchange Act of 1934 (the ''Act'') [2] and Rule 19b–4 thereunder,[3] notice is hereby given that on June 30, 2017, NYSE MKT LLC (the ''Exchange'' or ''NYSE MKT'') filed with the Securities and Exchange Commission (the ''Commission'') the proposed rule change as described in Items I and II below, which Items have been prepared by the self-regulatory organization. The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

### I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

The Exchange proposes to amend Rule 7.38E (Odd and Mixed Lots) to specify the ranking of an odd lot order that has a display price that is better than its working price. The proposed rule change is available on the Exchange's Web site at *www.nyse.com,* at the principal office of the Exchange, and at the Commission's Public Reference Room.

### II. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, the self-regulatory organization included statements concerning the purpose of, and basis for, the proposed rule change and discussed any comments it received on the proposed rule change. The text of those statements may be examined at the places specified in Item IV below. The Exchange has prepared summaries, set forth in sections A, B, and C below, of the most significant parts of such statements.

*A. Self-Regulatory Organization's Statement of the Purpose of, and the Statutory Basis for, the Proposed Rule Change*

1. Purpose

The Exchange proposes to amend Rule 7.38E (Odd and Mixed Lots) to specify the ranking of an odd lot order that has a display price that is better than its working price.

Rule 7.38E provides that the working price of an odd lot order will be adjusted both on arrival and when resting on the Exchange Book based on the limit price of the order as follows:

- If the limit price of an odd lot order is equal to or worse than the contra-side PBBO, it will have a working price equal to the limit price.
- If the limit price of an odd lot order is better than the contra-side PBBO, it will have a working price equal to the contra-side PBBO.
- If the PBBO is crossed, the odd lot order will have a working price equal to the same-side PBB or PBO.

By moving the working price, an odd lot order to buy (sell) will not trade at a price above (below) the PBO (PBB), or if the PBBO is crossed, above (below) the PBB (PBO). In either case, if the odd lot order is ranked Priority 2—Display Orders,[4] its display price would not change when its working price is adjusted.

Exchange rules are currently silent regarding how a resting odd lot order that has a display price that is better than its working price would be ranked for trading at that working price.[5] This scenario would only occur if a resting odd lot order is displayed at a price, and then an Away Market PBBO crosses that display price. In that limited scenario, pursuant to Rule 7.38E(b)(1) described above, the working price of the odd-lot order would be adjusted to a price inferior to the display price, but it would remain displayed at the now crossed price.

The Exchange proposes to specify that in such case, the ranking and priority category applicable to such an order at its display [sic], *i.e.,* the price it is displayed and Priority 2—Display Orders, would govern its ranking for purposes of a trade at its different, inferior working price.[6] This ranking would differ from the Exchange's general rule that an order is ranked based on its working price.[7] However, the Exchange believes that if the display price of an order is better than its working price, such order has already demonstrated a public willingness to trade at a more aggressive price because it continues to be published in a market data feed at the more aggressive display price.[8] In such case, the order should receive the benefit of the ranking (both price and priority category) associated with its better display price when determining how that order would be traded at its working price. In other words, an odd-lot order with a better display price than its working price would not be ranked based on its working price, including that it would not be assigned Priority 3—Non-Display Orders at its working price.

The Exchange further believes that if an odd-lot order is assigned a new working price that is worse than its display price, such order should not be assigned a new working time. In other words, when trading at its working price, its time ranking would be based on the working time associated with its display price.[9] Maintaining the original working time of such order would ensure that it maintains its original ranking, even if it trades at a different price.

To effect this change, the Exchange proposes to amend Rule 7.38E(b)(1) to provide that an odd-lot order ranked Priority 2—Display Orders would not be assigned a new working time if its working price is adjusted under Rule 7.38E(b)(1). In addition, if the display price of an odd lot order to buy (sell) is above (below) its working price, it would be ranked based on its display price.[10]

[1] 15 U.S.C.78s(b)(1).

[2] 15 U.S.C. 78a.

[3] 17 CFR 240.19b–4.

[4] As described in Rule 7.36E(e)(2), Priority 2—Display Orders are non-marketable Limit Orders with a displayed working price.

[5] Pursuant to Rule 7.38E(b)(1), on arrival, an odd lot order's working price may be adjusted consistent with the terms of the order. However, an arriving odd-lot order would not be assigned a working price that would be inferior to the price at which the arriving odd lot order would be displayed.

[6] As described in Rule 7.36E(c), an order is ranked based on price, priority category, and time. Such ranking is only applicable once an order is resting on the Exchange Book.

[7] Rule 7.36E(d) provides that all orders are ranked based on the working price of the order. Rule 7.36E(e)(3) generally provides that non-marketable orders for which the working price is not displayed have third priority behind Market Orders and non-marketable Limit Orders that are displayed at their working price. This proposed rule change would be an exception to these rules.

[8] *See* Rule 7.36E(b)(1) (odd-lot sized orders are considered displayed for ranking purposes).

[9] Rule 7.36E(f)(2) provides that an order is assigned a new working time any time the working price of the order changes. This proposed rule change would be an exception to this general rule.

[10] For example, assume the PBBO is 10.07 × 10.10 and the Exchange receives orders ranked Priority

Continued

# Tab 2

construction permit for the RPF even if the 10 CFR 70.21(f) timing requirement has not been met. The NRC is considering issuing the requested exemption. The proposed action would not significantly: (a) Affect probabilities of evaluated accidents; (b) affect margins of safety; (c) affect the effectiveness of programs contained in licensing documents; (d) increase effluents; (e) increase occupational radiological exposures; or (f) affect operations or decommissioning activities of the RPF. The reason the environment would not be significantly affected is because the requested exemption affects only the timing of construction and does not affect the previous evaluation regarding the environmental impacts of constructing and operating the NWMI RPF, as described in the Environmental Impact Statement for Construction Permit for the Northwest Medical Isotopes Radioisotope Production Facility, Final Report (NUREG–2209). The impacts of connected 10 CFR part 70 actions at the RPF were evaluated in NUREG–2209. On the basis of the EA included in Section II of this document, and incorporated herein by reference, the NRC has determined not to prepare an EIS for the proposed action. The related environmental documents are: (a) NWMI Exemption request dated December 17, 2017, as supplemented on March 12, 2018 (ADAMS Accession Nos. ML17362A040 and ML18088A175); (b) NWMI Preliminary Safety Analyses Report, Chapter 19, ''Environmental Report,'' Corvallis, OR, revision OA dated June 2015, (ADAMS Accession Nos. ML15210A123, ML15210A128, ML15210A129, and ML15210A131; and (c) NUREG–2209, ''Environmental Impact Statement for the Construction Permit for the Northwest Medical Isotopes Radioisotope Production Facility,'' issued in May 2018 (ADAMS Accession No. ML17130A862).

This FONSI and other related environmental documents may be examined, and/or copied for a fee, at the NRC's PDR, located at One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. Publicly-available records are also accessible online in the ADAMS Public Documents collection at *http://www.nrc.gov/reading-rm/adams.html.* Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC's PDR reference staff by telephone at 1–800–397–4209 or 301–415–4737, or by email to *pdr.resource@nrc.gov.*

Dated at Rockville, Maryland this 24th day of August, 2018.

For the Nuclear Regulatory Commission.

**Brian W. Smith,**

*Deputy Director, Division of Fuel Cycle Safety, Safeguards, and Environmental Review, Office of Nuclear Material Safety and Safeguards.*

[FR Doc. 2018–18757 Filed 8–28–18; 8:45 am]

BILLING CODE 7590–01–P

## NUCLEAR REGULATORY COMMISSION

**[Docket No. 72–1050; NRC–2016–0231]**

## Interim Storage Partner's Waste Control Specialists Consolidated Interim Storage Facility

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Revised license application; opportunity to request a hearing and to petition for leave to intervene; order imposing procedures.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) received a request from Interim Storage Partners, a joint venture between Waste Control Specialists, LLC (WCS) and Orano CIS, LLC by letters dated June 8, 2018, and July 19, 2018, to resume NRC staff review of a license application for the WCS Consolidated Interim Storage Facility (CISF) in Andrews County, Texas. By letter dated April 18, 2017, the previous applicant, WCS, asked NRC to temporarily suspend all safety and environmental review activities.

**DATES:** A request for a hearing or petition for leave to intervene must be filed by August 29, 2018. Any potential party as defined in section 2.4 of title 10 of the *Code of Federal Regulations* (10 CFR), who believes access to Sensitive Unclassified Non-Safeguards Information (SUNSI) is necessary to respond to this notice must request document access by September 10, 2018.

**ADDRESSES:** Please refer to Docket ID NRC–2016–0231 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- *Federal Rulemaking Website:* Go to *http://www.regulations.gov* and search for Docket ID NRC–2016–0231. Address questions about NRC dockets to Jennifer Borges; telephone: 301–287–9127; email: *Jennifer.Borges@nrc.gov.* For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.
- *NRC's Agencywide Documents Access and Management System (ADAMS):* You may obtain publicly-available documents online in the ADAMS Public Documents collection at *http://www.nrc.gov/reading-rm/adams.html.* To begin the search, select ''*Begin Web-based ADAMS Search.*'' For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1–800–397–4209, 301–415–4737, or by email to *pdr.resource@nrc.gov.* For the convenience of the reader, the ADAMS accession numbers are provided in a table in the ''Availability of Documents'' section of this document.
- *NRC's PDR:* You may examine and purchase copies of public documents at the NRC's PDR, Room O1–F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

**FOR FURTHER INFORMATION CONTACT:** John-Chau Nguyen, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; telephone: 301–415–0262; email: *John-Chau.Nguyen@nrc.gov.*

**SUPPLEMENTARY INFORMATION:**

### I. Introduction

The NRC received, by letter dated April 28, 2016, an application from WCS for a specific license pursuant to 10 CFR part 72, ''Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.'' WCS proposed to construct a Consolidated Interim Storage Facility (CISF) on its approximately 60.3 square kilometer (14,900 acre) site in western Andrews County, Texas. WCS currently operates facilities on this site that process and store Low-Level Waste and Mixed Waste (*i.e.,* waste that is considered both hazardous waste and Low-Level Waste). The facility also disposes of both hazardous waste and toxic waste.

On January 30, 2017, the NRC published two notices in the **Federal Register**: (1) A notice describing the closing date for the scoping period for the Environmental Impact Statement (EIS), and dates, times, and locations of scoping meetings wherein the NRC received oral comments as part of the EIS scoping process (82 FR 8771); and (2) a notice of its acceptance of the WCS application and an opportunity to request a hearing and petition for leave to intervene (82 FR 8773). On March 16, 2017 (82 FR 14039), the NRC published a notice in the **Federal Register** of an extension to the scoping period and

additional public meetings. On April 4, 2017, and in a corrected notice dated April 10, 2017, the NRC published in the **Federal Register** (82 FR 16435; 82 FR 17297) an order granting all petitioners an extension of time until May 31, 2017, to file hearing requests on WCS's license application. On July 20, 2017 (82 FR 33521), the NRC published a notice in the **Federal Register** that WCS had asked NRC to temporarily suspend all safety and environmental review activities. The July 20, 2017, notice in the **Federal Register** withdrew the notice of opportunity to request a hearing for WCS's application and explained that the NRC staff would publish a notice in the **Federal Register** if WCS requested that the NRC staff resume its review of WCS's application.

By letters dated June 8, 2018, and July 19, 2018, NRC received a request from Interim Storage Partners (ISP), a joint venture between WCS and Orano CIS, LLC to resume NRC staff review of the license application for the WCS Consolidated Interim Storage Facility (CISF) in Andrews County, Texas. ISP provided Revision 2 of the License Application, including a revised Safety Analysis Report and Environmental Report. In its June 8, 2018, letter, ISP stated that the Physical Security Plan and Safeguards Contingency Plan submitted with Revision 1 of its License Application remain applicable to the current application. The NRC staff has determined that Revision 1 of the Emergency Plan also remains applicable to the current application. Though ISP is the new owner, the name of the proposed facility remains the WCS CISF.

An NRC administrative completeness review found the revised application acceptable for a technical review. Prior to issuing the license, the NRC will need to make the findings required by the Atomic Energy Act of 1954, as amended (AEA), and the NRC's regulations. The NRC's findings will be documented in a safety evaluation report and an EIS.

## II. Opportunity To Request a Hearing and Petition for Leave To Intervene

Within 60 days after the date of publication of this notice, any persons (petitioner) whose interest may be affected by this action may file a request for a hearing and petition for leave to intervene (petition) with respect to the action. Petitions shall be filed in accordance with the Commission's ''Agency Rules of Practice and Procedure'' in 10 CFR part 2. Interested persons should consult a current copy of 10 CFR part 2. The NRC's regulations are accessible electronically from the NRC Library on the NRC's website at *http://www.nrc.gov/reading-rm/doc-collections/cfr/*. A copy of the regulations is also available at the NRC's Public Document Room, located at One White Flint North, Room O1–F21, 11555 Rockville Pike (first floor), Rockville, Maryland 20852. If a petition is filed, the Commission or a presiding officer will rule on the petition and, if appropriate, a notice of a hearing will be issued.

As required by 10 CFR 2.309(d), the petition should specifically explain the reasons why intervention should be permitted with particular reference to the following general requirements for standing: (1) The name, address, and telephone number of the petitioner; (2) the nature of the petitioner's right under the Act to be made a party to the proceeding; (3) the nature and extent of the petitioner's property, financial, or other interest in the proceeding; and (4) the possible effect of any decision or order which may be entered in the proceeding on the petitioner's interest.

In accordance with 10 CFR 2.309(f), the petition must also set forth the specific contentions which the petitioner seeks to have litigated in the proceeding. Each contention must consist of a specific statement of the issue of law or fact to be raised or controverted. In addition, the petitioner must provide a brief explanation of the bases for the contention and a concise statement of the alleged facts or expert opinion which support the contention and on which the petitioner intends to rely in proving the contention at the hearing. The petitioner must also provide references to the specific sources and documents on which the petitioner intends to rely to support its position on the issue. The petition must include sufficient information to show that a genuine dispute exists with the applicant or licensee on a material issue of law or fact. Contentions must be limited to matters within the scope of the proceeding. The contention must be one which, if proven, would entitle the petitioner to relief. A petitioner who fails to satisfy the requirements at 10 CFR 2.309(f) with respect to at least one contention will not be permitted to participate as a party.

Those permitted to intervene become parties to the proceeding, subject to any limitations in the order granting leave to intervene. Parties have the opportunity to participate fully in the conduct of the hearing with respect to resolution of that party's admitted contentions, including the opportunity to present evidence, consistent with the NRC's regulations, policies, and procedures.

Petitions must be filed no later than 60 days from the date of publication of this notice. Petitions and motions for leave to file new or amended contentions that are filed after the deadline will not be entertained absent a determination by the presiding officer that the filing demonstrates good cause by satisfying the three factors in 10 CFR 2.309(c)(1)(i) through (iii). The petition must be filed in accordance with the filing instructions in the ''Electronic Submissions (E-Filing)'' section of this document.

A State, local governmental body, Federally-recognized Indian Tribe, or agency thereof, may submit a petition to the Commission to participate as a party under 10 CFR 2.309(h)(1). The petition should state the nature and extent of the petitioner's interest in the proceeding. The petition should be submitted to the Commission no later than 60 days from the date of publication of this notice. The petition must be filed in accordance with the filing instructions in the ''Electronic Submissions (E-Filing)'' section of this document, and should meet the requirements for petitions set forth in this section. Alternatively, a State, local governmental body, Federally-recognized Indian Tribe, or agency thereof may participate as a non-party under 10 CFR 2.315(c).

If a hearing is granted, any person who is not a party to the proceeding and is not affiliated with or represented by a party may, at the discretion of the presiding officer, be permitted to make a limited appearance pursuant to the provisions of 10 CFR 2.315(a). A person making a limited appearance may make an oral or written statement of his or her position on the issues but may not otherwise participate in the proceeding. A limited appearance may be made at any session of the hearing or at any prehearing conference, subject to the limits and conditions as may be imposed by the presiding officer. Details regarding the opportunity to make a limited appearance will be provided by the presiding officer if such sessions are scheduled.

## III. Electronic Submissions (E-Filing)

All documents filed in NRC adjudicatory proceedings, including a request for hearing and petition for leave to intervene (petition), any motion or other document filed in the proceeding prior to the submission of a request for hearing or petition to intervene, and documents filed by interested governmental entities that request to participate under 10 CFR 2.315(c), must be filed in accordance with the NRC's E-Filing rule (72 FR 49139; August 28, 2007, as amended at 77 FR 46562; August 3, 2012). The E-Filing process requires participants to

submit and serve all adjudicatory documents over the internet, or in some cases to mail copies on electronic storage media. Detailed guidance on making electronic submissions may be found in the Guidance for Electronic Submissions to the NRC and on the NRC website at *http://www.nrc.gov/site-help/e-submittals.html.* Participants may not submit paper copies of their filings unless they seek an exemption in accordance with the procedures described below.

To comply with the procedural requirements of E-Filing, at least 10 days prior to the filing deadline, the participant should contact the Office of the Secretary by email at *hearing.docket@nrc.gov,* or by telephone at 301–415–1677, to (1) request a digital identification (ID) certificate, which allows the participant (or its counsel or representative) to digitally sign submissions and access the E-Filing system for any proceeding in which it is participating; and (2) advise the Secretary that the participant will be submitting a petition or other adjudicatory document (even in instances in which the participant, or its counsel or representative, already holds an NRC-issued digital ID certificate). Based upon this information, the Secretary will establish an electronic docket for the hearing in this proceeding if the Secretary has not already established an electronic docket.

Information about applying for a digital ID certificate is available on the NRC's public website at *http://www.nrc.gov/site-help/e-submittals/getting-started.html.* Once a participant has obtained a digital ID certificate and a docket has been created, the participant can then submit adjudicatory documents. Submissions must be in Portable Document Format (PDF). Additional guidance on PDF submissions is available on the NRC's public website at *http://www.nrc.gov/site-help/electronic-sub-ref-mat.html.* A filing is considered complete at the time the document is submitted through the NRC's E-Filing system. To be timely, an electronic filing must be submitted to the E-Filing system no later than 11:59 p.m. Eastern Time on the due date. Upon receipt of a transmission, the E-Filing system time-stamps the document and sends the submitter an email notice confirming receipt of the document. The E-Filing system also distributes an email notice that provides access to the document to the NRC's Office of the General Counsel and any others who have advised the Office of the Secretary that they wish to participate in the proceeding, so that the filer need not serve the document on those participants separately. Therefore, applicants and other participants (or their counsel or representative) must apply for and receive a digital ID certificate before adjudicatory documents are filed so that they can obtain access to the documents via the E-Filing system.

A person filing electronically using the NRC's adjudicatory E-Filing system may seek assistance by contacting the NRC's Electronic Filing Help Desk through the ''Contact Us'' link located on the NRC's public website at *http://www.nrc.gov/site-help/e-submittals.html,* by email to *MSHD.Resource@nrc.gov,* or by a toll-free call at 1–866–672–7640. The NRC Electronic Filing Help Desk is available between 9 a.m. and 6 p.m., Eastern Time, Monday through Friday, excluding government holidays.

Participants who believe that they have a good cause for not submitting documents electronically must file an exemption request, in accordance with 10 CFR 2.302(g), with their initial paper filing stating why there is good cause for not filing electronically and requesting authorization to continue to submit documents in paper format. Such filings must be submitted by: (1) First class mail addressed to the Office of the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, Attention: Rulemaking and Adjudications Staff; or (2) courier, express mail, or expedited delivery service to the Office of the Secretary, 11555 Rockville Pike, Rockville, Maryland 20852, Attention: Rulemaking and Adjudications Staff. Participants filing adjudicatory documents in this manner are responsible for serving the document on all other participants. Filing is considered complete by first-class mail as of the time of deposit in the mail, or by courier, express mail, or expedited delivery service upon depositing the document with the provider of the service. A presiding officer, having granted an exemption request from using E-Filing, may require a participant or party to use E-Filing if the presiding officer subsequently determines that the reason for granting the exemption from use of E-Filing no longer exists.

Documents submitted in adjudicatory proceedings will appear in the NRC's electronic hearing docket which is available to the public at *https://adams.nrc.gov/ehd,* unless excluded pursuant to an order of the Commission or the presiding officer. If you do not have an NRC-issued digital ID certificate as described above, click cancel when the link requests certificates and you will be automatically directed to the NRC's electronic hearing dockets where you will be able to access any publicly available documents in a particular hearing docket. Participants are requested not to include personal privacy information, such as social security numbers, home addresses, or personal phone numbers in their filings, unless an NRC regulation or other law requires submission of such information. For example, in some instances, individuals provide home addresses in order to demonstrate proximity to a facility or site. With respect to copyrighted works, except for limited excerpts that serve the purpose of the adjudicatory filings and would constitute a Fair Use application, participants are requested not to include copyrighted materials in their submission.

## IV. Availability of Documents

The documents identified in this **Federal Register** notice are accessible to interested persons in ADAMS under the accession numbers identified in the table below.

| Title | ADAMS accession No. |
|---|---|
| WCS CISF License Application, Revision 2, with Safety Analysis Report and Environmental Report | ML18206A595 |
| WCS CISF Physical Security Plan, Revision 1, and Safeguards Contingency Plan, and Guard Training and Qualification Plan (redacted). | ML17075A289 |
| WCS submittal of Supplemental Security Information (redacted) | ML16235A467 |
| WCS submittal of Supplemental Security Information (redacted) | ML16280A300 |
| WCS CISF Emergency Plan, Rev. 1 | ML17082A054 |

**V. Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information for Contention Preparation**

A. This Order contains instructions regarding how potential parties to this proceeding may request access to documents containing sensitive unclassified information (including Sensitive Unclassified Non-Safeguards Information (SUNSI) and Safeguards Information (SGI)). Requirements for access to SGI are primarily set forth in 10 CFR parts 2 and 73. Nothing in this Order is intended to conflict with the SGI regulations.

B. Within 10 days after publication of this notice of hearing and opportunity to petition for leave to intervene, any potential party who believes access to SUNSI or SGI is necessary to respond to this notice may request access to SUNSI or SGI. A ''potential party'' is any person who intends to participate as a party by demonstrating standing and filing an admissible contention under 10 CFR 2.309. Requests for access to SUNSI or SGI submitted later than 10 days after publication will not be considered absent a showing of good cause for the late filing, addressing why the request could not have been filed earlier.

C. The requestor shall submit a letter requesting permission to access SUNSI, SGI, or both to the Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, Attention: Rulemakings and Adjudications Staff, and provide a copy to the Associate General Counsel for Hearings, Enforcement and Administration, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001. The expedited delivery or courier mail address for both offices is: U.S. Nuclear Regulatory Commission, 11555 Rockville Pike, Rockville, Maryland 20852. The email address for the Office of the Secretary and the Office of the General Counsel are *Hearing.Docket@nrc.gov* and *RidsOgcMailCenter.Resource@nrc.gov* respectively.[1] The request must include the following information:

(1) A description of the licensing action with a citation to this **Federal Register** notice;

(2) The name and address of the potential party and a description of the potential party's particularized interest that could be harmed by the action identified in C.(1);

(3) If the request is for SUNSI, the identity of the individual or entity requesting access to SUNSI and the requestor's basis for the need for the information in order to meaningfully participate in this adjudicatory proceeding. In particular, the request must explain why publicly available versions of the information requested would not be sufficient to provide the basis and specificity for a proffered contention; and

(4) If the request is for SGI, the identity of each individual who would have access to SGI if the request is granted, including the identity of any expert, consultant, or assistant who will aid the requestor in evaluating the SGI. In addition, the request must contain the following information:

(a) A statement that explains each individual's ''need to know'' the SGI, as required by 10 CFR 73.2 and 10 CFR 73.22(b)(1). Consistent with the definition of ''need to know'' as stated in 10 CFR 73.2, the statement must explain:

(i) Specifically why the requestor believes that the information is necessary to enable the requestor to proffer and/or adjudicate a specific contention in this proceeding;[2] and

(ii) The technical competence (demonstrable knowledge, skill, training, or education) of the requestor to effectively utilize the requested SGI to provide the basis and specificity for a proffered contention. The technical competence of a potential party or its counsel may be shown by reliance on a qualified expert, consultant, or assistant who satisfies these criteria.

(b) A completed Form SF–85, ''Questionnaire for Non-Sensitive Positions,'' for each individual who would have access to SGI. The completed Form SF–85 will be used by the Office of Administration to conduct the background check required for access to SGI, as required by 10 CFR part 2, subpart C, and 10 CFR 73.22(b)(2), to determine the requestor's trustworthiness and reliability. For security reasons, Form SF–85 can only be submitted electronically through the electronic questionnaire for investigations processing (e-QIP) website, a secure website that is owned and operated by the Office of Personnel Management. To obtain online access to the form, the requestor should contact the NRC's Office of Administration at 301–415–3710.[3]

(c) A completed Form FD–258 (fingerprint card), signed in original ink, and submitted in accordance with 10 CFR 73.57(d). Copies of Form FD–258 may be obtained by writing the Office of Administrative Services, Mail Services Center, Mail Stop P1–37, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, or by email to *MAILSVC.Resource@nrc.gov.* The fingerprint card will be used to satisfy the requirements of 10 CFR part 2, subpart C, 10 CFR 73.22(b)(1), and Section 149 of the Atomic Energy Act of 1954, as amended, which mandates that all persons with access to SGI must be fingerprinted for an FBI identification and criminal history records check.

(d) A check or money order payable in the amount of $324.00[4] to the U.S. Nuclear Regulatory Commission for each individual for whom the request for access has been submitted.

(e) If the requestor or any individual(s) who will have access to SGI believes they belong to one or more of the categories of individuals that are exempt from the criminal history records check and background check requirements in 10 CFR 73.59, the requestor should also provide a statement identifying which exemption the requestor is invoking and explaining the requestor's basis for believing that the exemption applies. While processing the request, the Office of Administration, Personnel Security Branch, will make a final determination whether the claimed exemption applies. Alternatively, the requestor may contact the Office of Administration for an evaluation of their exemption status prior to submitting their request. Persons who are exempt from the background check are not required to complete the SF–85 or Form FD–258; however, all other requirements for access to SGI, including the need to know, are still applicable.

**Note:** Copies of documents and materials required by paragraphs C.(4)(b), (c), and (d) of this Order must be sent to the following address: U.S. Nuclear Regulatory Commission, Attn: Personnel Security Branch, Mail Stop TWFN–03–B46M, 11555 Rockville Pike, Rockville, MD 20852.

[1] While a request for hearing or petition to intervene in this proceeding must comply with the filing requirements of the NRC's ''E-Filing Rule,'' the initial request to access SUNSI and/or SGI under these procedures should be submitted as described in this paragraph.

[2] Broad SGI requests under these procedures are unlikely to meet the standard for need to know; furthermore, NRC staff redaction of information from requested documents before their release may be appropriate to comport with this requirement. These procedures do not authorize unrestricted disclosure or less scrutiny of a requestor's need to know than ordinarily would be applied in connection with an already-admitted contention or non-adjudicatory access to SGI.

[3] The requestor will be asked to provide his or her full name, social security number, date and place of birth, telephone number, and email address. After providing this information, the requestor usually should be able to obtain access to the online form within one business day.

[4] This fee is subject to change pursuant to the Office of Personnel Management's adjustable billing rates.

These documents and materials should *not* be included with the request letter to the Office of the Secretary, but the request letter should state that the forms and fees have been submitted as required.

D. To avoid delays in processing requests for access to SGI, the requestor should review all submitted materials for completeness and accuracy (including legibility) before submitting them to the NRC. The NRC will return incomplete packages to the sender without processing.

E. Based on an evaluation of the information submitted under paragraphs C.(3) or C.(4) above, as applicable, the NRC staff will determine within 10 days of receipt of the request whether:

(1) There is a reasonable basis to believe the petitioner is likely to establish standing to participate in this NRC proceeding; and

(2) The requestor has established a legitimate need for access to SUNSI or need to know the SGI requested.

F. For requests for access to SUNSI, if the NRC staff determines that the requestor satisfies both E.(1) and E.(2) above, the NRC staff will notify the requestor in writing that access to SUNSI has been granted. The written notification will contain instructions on how the requestor may obtain copies of the requested documents, and any other conditions that may apply to access to those documents. These conditions may include, but are not limited to, the signing of a Non-Disclosure Agreement or Affidavit, or Protective Order setting forth terms and conditions to prevent the unauthorized or inadvertent disclosure of SUNSI by each individual who will be granted access to SUNSI.[5]

G. For requests for access to SGI, if the NRC staff determines that the requestor has satisfied both E.(1) and E.(2) above, the Office of Administration will then determine, based upon completion of the background check, whether the proposed recipient is trustworthy and reliable, as required for access to SGI by 10 CFR 73.22(b). If the Office of Administration determines that the individual or individuals are trustworthy and reliable, the NRC will promptly notify the requestor in writing. The notification will provide the names of approved individuals as well as the conditions under which the SGI will be provided. Those conditions may include, but are not limited to, the signing of a Non-Disclosure Agreement or Affidavit, or Protective Order[6] by each individual who will be granted access to SGI.

H. Release and Storage of SGI. Prior to providing SGI to the requestor, the NRC staff will conduct (as necessary) an inspection to confirm that the recipient's information protection system is sufficient to satisfy the requirements of 10 CFR 73.22. Alternatively, recipients may opt to view SGI at an approved SGI storage location rather than establish their own SGI protection program to meet SGI protection requirements.

I. Filing of Contentions. Any contentions in these proceedings that are based upon the information received as a result of the request made for SUNSI or SGI must be filed by the requestor no later than 25 days after receipt of (or access to) that information. However, if more than 25 days remain between the petitioner's receipt of (or access to) the information and the deadline for filing all other contentions (as established in the notice of hearing or opportunity for hearing), the petitioner may file its SUNSI or SGI contentions by that later deadline.

J. Review of Denials of Access.

(1) If the request for access to SUNSI or SGI is denied by the NRC staff either after a determination on standing and requisite need, or after a determination on trustworthiness and reliability, the NRC staff shall immediately notify the requestor in writing, briefly stating the reason or reasons for the denial.

(2) Before the Office of Administration makes a final adverse determination regarding the trustworthiness and reliability of the proposed recipient(s) for access to SGI, the Office of Administration, in accordance with 10 CFR 2.336(f)(1)(iii), must provide the proposed recipient(s) any records that were considered in the trustworthiness and reliability determination, including those required to be provided under 10 CFR 73.57(e)(1), so that the proposed recipient(s) have an opportunity to correct or explain the record.

(3) The requestor may challenge the NRC staff's adverse determination with respect to access to SUNSI or with respect to standing or need to know for SGI by filing a challenge within 5 days of receipt of that determination with: (a) The presiding officer designated in this proceeding; (b) if no presiding officer has been appointed, the Chief Administrative Judge, or if he or she is unavailable, another administrative judge, or an Administrative Law Judge with jurisdiction pursuant to 10 CFR 2.318(a); or (c) if another officer has been designated to rule on information access issues, with that officer.

(4) The requestor may challenge the Office of Administration's final adverse determination with respect to trustworthiness and reliability for access to SGI by filing a request for review in accordance with 10 CFR 2.336(f)(1)(iv).

(5) Further appeals of decisions under this paragraph must be made pursuant to 10 CFR 2.311.

K. Review of Grants of Access. A party other than the requestor may challenge an NRC staff determination granting access to SUNSI whose release would harm that party's interest independent of the proceeding. Such a challenge must be filed within 5 days of the notification by the NRC staff of its grant of access and must be filed with: (a) The presiding officer designated in this proceeding; (b) if no presiding officer has been appointed, the Chief Administrative Judge, or if he or she is unavailable, another administrative judge, or an Administrative Law Judge with jurisdiction pursuant to 10 CFR 2.318(a); or (c) if another officer has been designated to rule on information access issues, with that officer.

If challenges to the NRC staff determinations are filed, these procedures give way to the normal process for litigating disputes concerning access to information. The availability of interlocutory review by the Commission of orders ruling on such NRC staff determinations (whether granting or denying access) is governed by 10 CFR 2.311.[7]

L. The Commission expects that the NRC staff and presiding officers (and any other reviewing officers) will consider and resolve requests for access to SUNSI or SGI, and motions for protective orders, in a timely fashion in order to minimize any unnecessary delays in identifying those petitioners who have standing and who have propounded contentions meeting the specificity and basis requirements in 10 CFR part 2. The attachment to this Order summarizes the general target schedule for processing and resolving requests under these procedures.

[5] Any motion for Protective Order or draft Non-Disclosure Affidavit or Agreement for SUNSI must be filed with the presiding officer or the Chief Administrative Judge if the presiding officer has not yet been designated, within 30 days of the deadline for the receipt of the written access request.

[6] Any motion for Protective Order or draft Non-Disclosure Agreement or Affidavit for SGI must be filed with the presiding officer or the Chief Administrative Judge if the presiding officer has not yet been designated, within 180 days of the deadline for the receipt of the written access request.

[7] Requestors should note that the filing requirements of the NRC's E-Filing Rule (72 FR 49139; August 28, 2007, as amended at 77 FR 46562; August 3, 2012) apply to appeals of NRC staff determinations (because they must be served on a presiding officer or the Commission, as applicable), but not to the initial SUNSI/SGI request submitted to the NRC staff under these procedures.

*It is so ordered.*

Dated at Rockville, Maryland, this 24th of August, 2018.

For the Nuclear Regulatory Commission.

**Rochelle C. Bavol, Acting,**

*Secretary of the Commission.*

**Attachment 1—General Target Schedule for Processing and Resolving Requests for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information in This Proceeding**

| Day | Event/activity |
|---|---|
| 0 | Publication of **Federal Register** notice of hearing and opportunity to petition for leave to intervene, including order with instructions for access requests. |
| 10 | Deadline for submitting requests for access to Sensitive Unclassified Non Safeguards Information (SUNSI) and/or Safeguards Information (SGI) with information: Supporting the standing of a potential party identified by name and address; describing the need for the information in order for the potential party to participate meaningfully in an adjudicatory proceeding; demonstrating that access should be granted (*e.g.,* showing technical competence for access to SGI); and, for SGI, including application fee for fingerprint/background check. |
| 60 | Deadline for submitting petition for intervention containing: (i) Demonstration of standing; (ii) all contentions whose formulation does not require access to SUNSI and/or SGI (+25 Answers to petition for intervention; +7 requestor/petitioner reply). |
| 20 | U.S. Nuclear Regulatory Commission (NRC) staff informs the requestor of the staff's determination whether the request for access provides a reasonable basis to believe standing can be established and shows (1) need for SUNSI or (2) need to know for SGI. (For SUNSI, NRC staff also informs any party to the proceeding whose interest independent of the proceeding would be harmed by the release of the information.) If NRC staff makes the finding of need for SUNSI and likelihood of standing, NRC staff begins document processing (preparation of redactions or review of redacted documents). If NRC staff makes the finding of need to know for SGI and likelihood of standing, NRC staff begins background check (including fingerprinting for a criminal history records check), information processing (preparation of redactions or review of redacted documents), and readiness inspections. |
| 25 | If NRC staff finds no ''need,'' no ''need to know,'' or no likelihood of standing, the deadline for requestor/petitioner to file a motion seeking a ruling to reverse the NRC staff's denial of access; NRC staff files copy of access determination with the presiding officer (or Chief Administrative Judge or other designated officer, as appropriate). If NRC staff finds ''need'' for SUNSI, the deadline for any party to the proceeding whose interest independent of the proceeding would be harmed by the release of the information to file a motion seeking a ruling to reverse the NRC staff's grant of access. |
| 30 | Deadline for NRC staff reply to motions to reverse NRC staff determination(s). |
| 40 | (Receipt +30) If NRC staff finds standing and need for SUNSI, deadline for NRC staff to complete information processing and file motion for Protective Order and draft Non-Disclosure Affidavit. Deadline for applicant/licensee to file Non-Disclosure Agreement for SUNSI. |
| 190 | (Receipt +180) If NRC staff finds standing, need to know for SGI, and trustworthiness and reliability, deadline for NRC staff to file motion for Protective Order and draft Non-disclosure Affidavit (or to make a determination that the proposed recipient of SGI is not trustworthy or reliable). Note: Before the Office of Administration makes a final adverse determination regarding access to SGI, the proposed recipient must be provided an opportunity to correct or explain information. |
| 205 | Deadline for petitioner to seek reversal of a final adverse NRC staff trustworthiness or reliability determination under 10 CFR 2.336(f)(1)(iv). |
| A | If access granted: Issuance of a decision by a presiding officer or other designated officer on motion for protective order for access to sensitive information (including schedule for providing access and submission of contentions) or decision reversing a final adverse determination by the NRC staff. |
| A + 3 | Deadline for filing executed Non-Disclosure Affidavits. Access provided to SUNSI and/or SGI consistent with decision issuing the protective order. |
| A + 28 | Deadline for submission of contentions whose development depends upon access to SUNSI and/or SGI. However, if more than 25 days remain between the petitioner's receipt of (or access to) the information and the deadline for filing all other contentions (as established in the notice of opportunity to request a hearing and petition for leave to intervene), the petitioner may file its SUNSI or SGI contentions by that later deadline. |
| A + 53 | (Contention receipt +25) Answers to contentions whose development depends upon access to SUNSI and/or SGI. |
| A + 60 | (Answer receipt +7) Petitioner/Intervenor reply to answers. |
| >A + 60 | Decision on contention admission. |

[FR Doc. 2018–18758 Filed 8–28–18; 8:45 am]

BILLING CODE 7590–01–P

## NUCLEAR WASTE TECHNICAL REVIEW BOARD

### Senior Executive Service Performance Review Board

**AGENCY:** U.S. Nuclear Waste Technical Review Board.

**ACTION:** Notice of Performance Review Board membership.

**SUMMARY:** This notice announces the membership of the Nuclear Waste Technical Review Board (NWTRB) Senior Executive Service (SES) Performance Review Board (PRB).

**DATES:** August 27, 2018.

**FOR FURTHER INFORMATION CONTACT:** Neysa M. Slater-Chandler by telephone at 703–235–4480, or via email at *slater-chandler@nwtrb.gov,* or via mail at 2300 Clarendon Blvd., Suite 1300, Arlington, VA 22201.

**SUPPLEMENTARY INFORMATION:** 5 U.S.C. 4314(c)(1) through (5) requires each agency to establish, in accordance with regulations prescribed by the Office of Personnel Management, one or more SES Performance Review Boards.

The PRB shall review and evaluate the initial summary rating of a senior executive's performance, the executive's response, and the higher-level official's comments on the initial summary rating. In addition, the PRB will review

# Tab 3

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

| | | |
|---|---|---|
| In the Matter of: | ) | |
| | ) | |
| Holtec International | ) | Docket No. 72-1051 |
| | ) | |
| (HI-STORE Consolidated Interim Storage Facility | ) | |
| | ) | |
| In the Matter of: | ) | |
| | ) | |
| Interim Storage Partners | ) | Docket No. 72-1050 |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | |
| | ) | |

**BEYOND NUCLEAR, INC.'S MOTION TO DISMISS LICENSING PROCEEDINGS FOR HI-STORE CONSOLIDATED INTERIM STORAGE FACILITY AND WCS CONSOLIDATED INTERIM STORAGE FACILITY FOR VIOLATION OF THE NUCLEAR WASTE POLICY ACT**

**Table of Contents**

Table of Authorities .....iv

**I. Introduction** .....1

**II. The Issues Raised by This Motion Lie Outside the Scope of the Pending Licensing Proceedings and Therefore Should be Considered in a Separate Proceeding** .....2

**III. Beyond Nuclear has Standing to Bring this Motion** .....2

A. Beyond Nuclear's Standing is Established through Radiological Injury .....3

B. Beyond Nuclear Has Standing Pursuant to Traditional Standing Doctrine .....4

C. Beyond Nuclear Has Standing Pursuant to the Proximity Presumption .....8

**IV. Statutory Framework** .....11

A. Nuclear Waste Policy Act .....11

B. Administrative Procedure Act .....12

**V. Factual Background** .....13

A. History of Spent Fuel Storage and Policy in the U.S. .....13

B. Holtec License Application for Holtec CISF .....15

C. ISP License Application for WCS CISF .....17

**VI. The NRC May not Issue Licenses to Holtec and ISP because They Assume Federal Ownership of Spent Fuel During Storage and Transportation in Violation of the NWPA** .....19

**VII. Conclusion** .....22

**Table of Authorities**

Cases

*Duke Power Co. v. Carolina Environmental Study Group*, 438 U.S. 59 (1978).....4

*Hunt v. Washington State Apple Advert. Comm'n*, 432 U.S. 333 (1977).....2

*Indiana Mich. Power Co. v. DOE*, 88 F.3d 1272 (D.C. Cir. 1996).....11, 13, 19

*Kelley v. Selin*, 42 F.3d 1501 (6th Cir. 1995).....7, 9

*Maine Yankee Atomic Power Co. v. United States*, 225 F.3d 1336 (Fed. Cir. 2000).....13

*Nat'l Ass'n of Regulatory Util. Comm'rs v. U.S. Dep't of Energy*,
736 F.3d 517 (D.C. Cir. 2013).....12, 13, 14

*Nuclear Energy Institute v. EPA*, 373 F.3d 1251, 1257 (D.C. Cir. 2004).....10

Administrative Decisions

*Armed Forces Radiobiology Research Inst.* (Cobalt-60 Storage Facility),
ALAB-682, 16 NRC 150 (1982).....4, 9

*Cfc Logistics, Inc.*, LBP-03-20, 58 NRC 311 (2003).....9

*Consumers Energy Co.* (Big Rock Point Indep. Spent Fuel
Storage Installation), CLI-07-19, 65 NRC 423 (2007).....9

*Duke Cogema Stone & Webster* (Savannah River Mixed Oxide
Fuel Fabrication Facility), LBP-01-35, 54 NRC 403 (2001).....3, 5, 6

*Exelon Generation Co. LLC & PSEG Nuclear, LLC*
(Peach Bottom Atomic Power Station, Units 2 & 3),
CLI-05-26, 62 NRC 577 (2005).....9

*Ga. Inst. of Tech.* (Georgia Tech Research Reactor) CLI-95-12, 42 NRC 111 (1995).....9

*Louisiana Energy Servs., L.P.* (Claiborne Enrichment Ctr.),
CLI-98-3, 47 N.R.C. 77 (1998).....7

*Pac. Gas & Electric Co.* (Diablo Canyon Power Plant Indep.
Spent Fuel Storage Installation) LBP-07-14, 56 NRC 413 (2002).....4, 9

*Private Fuel Storage, LLC* (Independent Spent Fuel Storage
Installation), LBP-98-7, 47 NRC 142 (1997).....9

*Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-02-29, 56 NRC 390 (2002) .....20, 21

*Tennessee Valley Auth.* (Sequoyah Nuclear Plant, Units 1 & 2; Watts Bar Nuclear Plant, Unit 1), LBP-02-14, 56 NRC 15 (2002) .....8

*U.S. Army Installation Command* (Schofield Barracks, Oahu, Hawaii, & Pohakuloa Training Area, Island of Hawaii, Hawaii), LBP-10-4, 71 NRC 216 (2010).....4

*Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61 (1996).....3

Statutes

The Administrative Procedure Act
5 U.S.C. § 706(2)(A) and (C) .....1, 12, 22

Nuclear Waste Policy Act of 1982, as amended
42 U.S.C. § 10131.....12, 19
42 U.S.C. § 10131(a)(5).....12
42 U.S.C. § 10134(d) .....13
42 U.S.C. § 10143.....1, 19
42 U.S.C. § 10151(a)(3).....21
42 U.S.C. § 10151(b)(2) .....21
42 U.S.C. § 10155(a)(1).....21
42 U.S.C. § 10222.....13
42 U.S.C. § 10222(a)(5)(A) .....1, 20

Rules and Regulations

Code of Federal Regulations
Title 10, Section 51.101 .....2
Title 10, Section 72.40 .....2
Title 10, Section 961.1 .....20
Title 10, Section 961.11 .....20

Notices

Federal Register
Volume 62, No. 13,802 (March 30, 2017).....15, 16
Volume 82, No. 8,773 (Jan. 30, 2017) .....17
Volume 83, No. 32,919 (July 16, 2018) .....1, 2
Volume 83, No. 44,070 (Aug. 29, 2018) .....1, 2, 17, 18

Miscellaneous Reports

Blue Ribbon Commission on America's Nuclear Future,
Report to the Secretary (Jan. 2012) (ML120970375) ..... 10, 14

Environmental Report on the HI-STORE CIS FACILITY
(Report No. HI-2167521) (Dec. 2017) ..... 4, 5, 6, 16, 19

HI-STORE CIS Facility Financial Assurance and Project
Life Cycle Cost Estimates, Rev. 0 (Report No. HI-2177593) ..... 16

HI-STORE CIS Safety Analysis Report (Report No. HI-2167374)
(Mar. 2017) ..... 10, 16

*New Mexico GOP Governor Hopeful: Toll Roads for Oil Traffic*,
Associated Press, KTBS (Aug. 21, 2018) ..... 5

NUREG-2157, Generic Environmental Impact Statement for
Continued Storage of Spent Nuclear Fuel (Sept. 2014) ..... 13

U.S. Department of Energy, *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*
(ML13011A138) ..... 15

WASH-1238, Environmental Survey of Transportation of
Radioactive Materials To and From Nuclear Power Plants (Dec. 1972) ..... 4

WCS Environmental Report ..... 5, 7, 10 17, 18, 19

WCS License Application, Rev. 0 ..... 17, 18

WCS Safety Analysis Report ..... 10

## I. INTRODUCTION

Pursuant to the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. § 10101, *et seq.* ("NWPA") and the Administrative Procedure Act, 5 U.S.C. §§ 706(2)(A) and (C), Beyond Nuclear, Inc. ("Beyond Nuclear") hereby requests that the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") dismiss the above-captioned applications by Holtec International ("Holtec") and Interim Storage Partners, L.L.P. ("ISP") to build and operate centralized interim spent fuel storage facilities ("CISF") in New Mexico and Texas, respectively.[1] The proceedings must be dismissed because the central premise of both Holtec's and ISP's applications – that the U.S. Department of Energy ("DOE") will be responsible for the spent fuel that is transported to and stored at the proposed interim facilities – violates the NWPA. Under the NWPA, the DOE is precluded from taking title to spent fuel unless and until a permanent repository has opened. 42 U.S.C. §§ 10222(a)(5)(A), 10143.

By even considering these unlawful applications, the NRC impermissibly allows Holtec and ISP to undermine longstanding Congressional policy, established in the NWPA, that ownership of and liability for spent fuel should remain with private licensees until a federal repository becomes available for permanent disposal. By conducting these licensing proceedings, the NRC also unfairly subjects Beyond Nuclear and its members to the costly and unnecessary expenses of challenging the applications that cannot be lawfully approved.

Finally, the fact that NRC is entertaining these unlawful license applications gives them undeserved legitimacy in the eyes of the public, giving rise to general public anticipation that Holtec and ISP may be allowed to store thousands of tons of highly radioactive waste at the

[1] These applications were noticed at 83 Fed. Reg. 32,919 (July 16, 2018) ("Holtec Hearing Notice") and 83 Fed. Reg. 44,070 (Aug. 29, 2018) ("ISP Hearing Notice"). Holtec's proposed CISF is referred to as "Holtec CISF" and ISP's proposed CISF is referred to as "WCS CISF."

proposed CISFs for decades. Beyond Nuclear respectfully submits that this public perception will unnecessarily depress the property values of Beyond Nuclear members who reside and own property in the vicinity.

## II. THE ISSUES RAISED BY THIS MOTION LIE OUTSIDE THE SCOPE OF THE PENDING LICENSING PROCEEDINGS AND THEREFORE SHOULD BE CONSIDERED IN A SEPARATE PROCEEDING

While Beyond Nuclear has submitted this Motion in the NRC's dockets for the Holtec and ISP license applications (Nos. 72-1050 and 72-1051, respectively), Beyond Nuclear does not seek consideration of the Motion in either of the licensing proceedings that has been noticed in the Federal Register. Holtec Hearing Notice, 83 Fed. Reg. 32,919; ISP Hearing Notice, 83 Fed. Reg. 44,070. The scope of those proceedings is limited to the question of whether the applications satisfy the Atomic Energy Act ("AEA"), the National Environmental Policy Act ("NEPA"), and NRC's regulations for implementation of those statutes. 10 C.F.R. §§ 72.40, 51.101. The question posed in this Motion, *i.e.*, whether consideration of Holtec's and ISP's license applications is permitted by the NWPA, a separate statute, can be answered without consideration of the AEA and NEPA. Therefore the Commission should establish a separate proceeding for consideration of this Motion.[2]

## III. BEYOND NUCLEAR HAS STANDING TO BRING THIS MOTION

As set forth below, Beyond Nuclear has standing to bring this Motion as a representative of its members. *Hunt v. Washington State Apple Advert. Comm'n*, 432 U.S. 333, 342 (1977).

[2] In an abundance of caution, Beyond Nuclear has submitted a hearing request and contentions in the Holtec licensing proceeding and anticipates submitting a hearing request and contentions in the ISP licensing proceeding. Beyond Nuclear's contentions assert the same NWPA claims as are asserted in this Motion. Beyond Nuclear's hearing requests will preserve these claims in the event that the Commission and/or a reviewing court holds that the licensing proceedings for consideration of the Holtec and ISP applications constitute the only venues in which the NRC will consider whether these applications violate the NWPA.

Beyond Nuclear is a nonprofit, nonpartisan membership organization that aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abolish both to protect public health and safety, prevent environmental harms, and safeguard our future. Beyond Nuclear advocates for an end to the production of nuclear waste and for securing the existing reactor waste in hardened on-site storage until it can be permanently disposed of in a safe, sound, and suitable underground repository. For almost ten years, Beyond Nuclear has worked toward its mission by regularly intervening in NRC licensing, relicensing, and other proceedings related to irradiated nuclear fuel matters. Based on the following, as well as the additional interests included in members' declarations, *see* Exhibits 01-08, Beyond Nuclear demonstrates that its members fulfill the standing requirements and have authorized Beyond Nuclear to represent their interests. Accordingly, Beyond Nuclear has standing to request NRC dismiss the Holtec and ISP applications.

**A. Beyond Nuclear's Standing is Established through Radiological Injury**

Beyond Nuclear's members are largely concerned with radiological injury. To establish standing, the injury alleged need not be large: even minor radiological exposures, within regulatory limits, resulting from a proposed license activity can be sufficient. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 417 (2001), *reversed on other grounds*, CLI-02-24, 56 NRC 335 (2002). In *Yankee Atomic Elec. Co.*, for example, the Licensing Board found standing because the Board could not "rule out" the potential for "some, even if minor, public exposures" from the decommissioning process to members of the petitioner organizations who lived within ten miles of the site, recreated along waterways, and regularly used roads that potentially would be used to transport waste. (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 69-70, *aff'd*, CLI-96-7, 43 NRC 235, 246-48

(1996). *See also Armed Forces Radiobiology Research Inst.* (Cobalt-60 Storage Facility), ALAB-682, 16 NRC 150, 154 (1982) (quoting *Duke Power Co. v. Carolina Environmental Study Group*, 438 U.S. 59, 74 (1978)) ("[T]he emission of non-natural radiation into appellees' environment would also seem a direct and present injury, given our generalized concern about exposure to radiation and the apprehension flowing from the uncertainty about the health and genetic consequences of even small emissions like those concededly emitted by nuclear power plants.").

The NRC recognizes two legal frameworks for analyzing standing based on radiological injury: traditional standing and the proximity presumption. *U.S. Army Installation Command* (Schofield Barracks, Oahu, Hawaii, & Pohakuloa Training Area, Island of Hawaii, Hawaii), LBP-10-4, 71 NRC 216, 228 (2010). Beyond Nuclear has standing pursuant to both frameworks.

**B. Beyond Nuclear Has Standing Pursuant to Traditional Standing Doctrine**

To establish standing through traditional means, the NRC applies judicial concepts of standing, *i.e.*, injury-in-fact, causation, and redressability. *Pac. Gas & Electric Co.* (Diablo Canyon Power Plant Indep. Spent Fuel Storage Installation) LBP-07-14, 56 NRC 413, 426 (2002).

Beyond Nuclear establishes standing through traditional means by virtue of the injuries to its members who live and travel on or along routes that Holtec and ISP plan to transport spent nuclear fuel. Members will be injured primarily from radiologic exposure received during normal transportation operations. *See* WASH-1238, Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants (Dec. 1972) (NRC found that a person who spends three minutes at an average distance of three feet from loaded truck or car might receive a dose of as much of 1.3 mrem); Environmental Report on the HI-STORE CIS

FACILITY at 4-32 (Report No. HI-2167521) (Dec. 2017) (using dose rate of 10 mrem/hour at a distance of 6.5 feet for transportation radiation impact analysis) (hereinafter "Holtec Environmental Report"); WCS Environmental Report at 4-13 (using dose rate of 0.1 mSv per hour at 2 meters for transportation radiation impact analysis). For example, the Licensing Board in *Duke Cogema Stone & Webster* found that "unwanted doses of ionizing radiation" from shipments of nuclear fuel transported "over the same public highways the Petitioners' members travel" established standing because "incident-free shipping of plutonium provides a dose of ionizing radiation, albeit small, to anyone next to the transport vehicle and a minor exposure to radiation, even one within regulatory limits, is sufficient to state an injury in fact." LBP-01-35, 54 NRC at 417.

There is also a risk of radiologic injury to Beyond Nuclear's members from an accident involving shipments of spent nuclear fuel being transported to the CISFs. *See e.g.*, Holtec Environmental Report at 4-34 (the application analyzes "a spectrum of accidents that ranged from high-probability accidents of low severity and consequences to severe accidents with radiological consequences"); WCS Environmental Report at 4-15 (noting that rail casks could release radioactivity in "exceptionally severe accidents."). There is a higher likelihood of an accident involving spent nuclear fuel near the CISFs because the transportation infrastructure in those areas is already unsafe and impacted from the oil and gas boom. *See e.g.*, *New Mexico GOP Governor Hopeful: Toll Roads for Oil Traffic*, Associated Press, KTBS (Aug. 21, 2018), https://www.ktbs.com/news/business/new-mexico-gop-governor-hopeful-toll-roads-for-oil-traffic/article_e8f4a10a-2542-5a9a-b64e-d0e6448c7bc8.html.

Further, Beyond Nuclear's members' interest in and right to travel will also be injured because they will either not know which route is safest to avoid radiological injury or they will

be unable to avoid unsafe routes because of the limited highways in the area. *See Duke Cogema Stone & Webster*, LBP-01-35, 54 NRC at 415.

Holtec plans to transport spent nuclear fuel to the Holtec CISF on the Burlington Northern Santa Fe Carlsbad Subdivision railroad. Holtec Environmental Report at 2-4, 3-105, 4-30. This railroad travels through Roswell, New Mexico, south to Carlsbad, New Mexico, and then travels east toward the Holtec site, along which it parallels Highway 62/180 for 20 miles at a distance of 100 to 500 feet. Holtec may also transport the spent nuclear fuel the final 3.8 miles to the Holtec CISF by truck. Holtec Environmental Report at 4-33. Beyond Nuclear members who live or travel on roads that cross or parallel the Burlington Northern Santa Fe Carlsbad Subdivision railroad will be exposed to small doses of unwanted radiation during the normal transportation of spent nuclear fuel to the Holtec Facility and a higher likelihood of an accident involving spent nuclear fuel. Their interest in travel will be affected if they wish to avoid these injuries. Thus, Beyond Nuclear has standing to request dismissal of the Holtec application through members:

- Danny Berry who regularly travels on roads and highways around the Holtec CISF, including Highway 62/180 where it parallels the Burlington Northern Santa Fe Carlsbad Subdivision railroad. *See* Exhibit 01.

- Keli Hatley and Margo Smith, who regularly travel on Highway 62/180 where it parallels the Burlington Northern Santa Fe Carlsbad Subdivision railroad, regularly travel other roads in the area on which Holtec may transport spent nuclear fuel, and regularly travel on Laguna Road/Country Road 55 which will have to be moved to avoid the Holtec CISF. *See* Exhibits 03 and 05.

- Nick King, who lives within 450 yards of one Burlington Northern Santa Fe Carlsbad Subdivision railroad, 800 yards of a second Burlington Northern Santa Fe Carlsbad Subdivision railroad, and within one mile of a railyard at which the spent nuclear fuel shipments may stop for extended periods. *See* Exhibit 04.

- Gene Harbaugh, who lives within 250 yards of a Burlington Northern Santa Fe Carlsbad Subdivision railroad and within 500 yards of a railyard at which the spent nuclear fuel shipments may stop for extended periods. *See* Exhibit 08.

- Jimi Gadzia, who lives within 900 yards of the Burlington Northern Santa Fe Carlsbad Subdivision railroad and whose frequent travel in Roswell causes her to regularly travel along and over this railroad. *See* Exhibit 02.

ISP also plans to transport spent nuclear fuel to the WCS CISF by rail. ISP plans to use the Texas and New Mexico Railway between Monahan, Texas, and Eunice, New Mexico. WCS Environmental Report at 4-8. This railroad parallels Highway 18 within a few hundred feet for approximately 40 miles. Beyond Nuclear members who live or travel on roads that cross or parallel the Texas and New Mexico Railway will be exposed to small doses of unwanted radiation during the normal transportation of spent nuclear fuel to the WCS Facility and a higher likelihood of an accident involving spent nuclear fuel. Their interest in travel will be affected if they wish to avoid these injuries. Thus, Beyond Nuclear has standing to request dismissal of the ISP application through members:

- Rose Gardner and D.K. Boyd, who regularly travel on roads and highways around the WCS CISF, including Highway 18 where it parallels the Texas and New Mexico Railway. *See* Exhibits 06 and 07.

Beyond Nuclear also establishes standing through traditional means by virtue of adverse impacts to its members' property values. *See Kelley v. Selin*, 42 F.3d 1501, 1509–10 (6th Cir. 1995) ("Petitioners are clearly asserting a threatened injury. The injury can be fairly traced to respondents' actions since petitioners allege that it is the storage of spent nuclear fuels in the VSC–24 cask that has the potential to interrupt enjoyment of their lakefront property and to diminish its value. Finally, a decision in their favor could redress the threatened harm."); *see also Louisiana Energy Servs., L.P.* (Claiborne Enrichment Ctr.), CLI-98-3, 47 NRC 77, 108-109 (1998). Because of public perception and anticipation, individuals are hesitant to move close to a nuclear facility or the transportation route for spent nuclear fuel, which leads to depressed property values near these sites. Close proximity to nuclear facilities and transportation routes for

spent nuclear fuel may decrease property values as soon as a nuclear facility is licensed. Thus, Beyond Nuclear has standing to request dismissal of the Holtec application through members:

- Margo Smith and Keli Hatley, whose homes and property are located within one to seven miles from the Holtec CISF and each of their livelihoods is directly connected to the value of the Smith Ranch, which shares a fence line with the Holtec CISF. *See* Exhibits 05 and 03.

- Daniel Berry, whose home and property is located within 11 miles of the Holtec CISF and who owns ranchland located within three to 15 miles of the Holtec CISF. *See* Exhibit 01.

- Gene Harbaugh, whose home and property is located within 250 yards of a Burlington Northern Santa Fe Carlsbad Subdivison railroad and 500 yards of the railyard that Holtec will use to transport spent nuclear fuel to the Holtec CISF. *See* Exhibit 08.

- Nick King, whose home and property is located within 450 yards of one Burlington Northern Santa Fe Carlsbad Subdivision railroad, within 800 yards of a second Burlington Northern Santa Fe Carlsbad Subdivision railroad, and within one mile of a railyard that Holtec will use to transport spent nuclear fuel to the Holtec CISF. *See* Exhibit 04.

- Jimi Gadzia, whose home and property is located within 900 yards of the Burlington Northern Santa Fe Carlsbad Subdivision railroad that Holtec may use to transport spent nuclear fuel to the Holtec CISF. *See* Exhibit 02.

Beyond Nuclear also has standing to request dismissal of the ISP application through members:

- Rose Gardner, whose home and property are located within seven miles of the WCS CISF. *See* Exhibit 06.

- D.K. Boyd, whose property is four miles from the WCS CISF at the nearest point. *See* Exhibit 07.

**C. Beyond Nuclear Has Standing Pursuant to the Proximity Presumption**

NRC has also applied an alternative to establishing standing based on the proximity presumption. *Tennessee Valley Auth.* (Sequoyah Nuclear Plant, Units 1 & 2; Watts Bar Nuclear Plant, Unit 1), LBP-02-14, 56 NRC 15, 3 (2002) ("This so-called proximity or geographical presumption 'presumes a petitioner has standing to intervene without the need specifically to

plead injury, causation, and redressability…' "); *Armed Forces Radiobiology Research Inst.*, ALAB–682, 16 NRC at 154 (The "proximity to a large source of radioactive material establishes petitioner's interest."). Where the "nature of the proposed action and the significance of the radioactive source" create an "obvious potential for offsite consequences," the NRC applies a presumption of standing to individuals residing, owning property, or having frequent and regular contacts within the radius of those potential offsite consequences. *Consumers Energy Co.* (Big Rock Point Indep. Spent Fuel Storage Installation), CLI-07-19, 65 NRC 423, 426 (2007) (quoting *Exelon Generation Co. LLC & PSEG Nuclear, LLC* (Peach Bottom Atomic Power Station, Units 2 & 3), CLI-05-26, 62 NRC 577, 580-581 (2005)); *see also Kelley v. Selin*, 42 F.3d 1501 (6th Cir. 1995).

The determination of the radius "beyond which . . . there is no longer an 'obvious potential for offsite consequences'" is made on a case-by-case basis. *Exelon Generation Co. LLC & PSEG Nuclear, LLC*, CLI-05-26, 62 NRC at 580-81. Licensing Boards have found standing based on proximity to spent nuclear fuel ranging from 4,000 feet to 17 miles. *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142 (1997); *Pac. Gas & Elec. Co.*, LBP-02-23, 56 NRC at 428. The standard for assessing the potential for offsite consequences is whether the consequences are plausible, not whether consequences are probable or likely. *Cfc Logistics, Inc.*, LBP-03-20, 58 NRC 311, 320 (2003), *citing Ga. Inst. of Tech.* (Georgia Tech Research Reactor) CLI-95-12, 42 NRC 111 (1995) (Commission found standing based on a "plausible scenario, albeit a highly unlikely one, in which three independent redundant safety systems—all designed to function under normal circumstances—could simultaneously fail in a research reactor.").

The potential for offsite consequences from both the Holtec CISF and WCS CISF is "obvious" due to the characteristics and quantity of spent nuclear fuel Holtec and ISP plan to consolidate at the CISFs. Spent fuel is and will remain highly radioactive and dangerous to humans for hundreds of thousands of years. *Nuclear Energy Institute v. EPA*, 373 F.3d 1251, 1257 (D.C. Cir. 2004). Holtec proposes to store an astronomical quantity of this extremely dangerous and long-lived radioactive waste -- up to 173,600 MTU, more than twice the total amount of commercially generated spent nuclear fuel existing in the entire United States today. *See infra*, Section V.A. For its part, ISP plans to store 40,000 MTU of spent nuclear fuel at the WCS CISF -- a quantity that is more than half of the spent nuclear fuel existing in the United States. WCS Environmental Report at 4-9. As discussed in the Blue Ribbon Commission's Report (for more detail, *see infra* Section V.A.), the *only* acceptable means for separating this dangerous material from the environment for the long-term is disposal, not interim storage. Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary at xi (Jan. 2012) (ML120970375) ("BRC Report") ("The conclusion that disposal is needed and that deep geologic disposal is the scientifically preferred approach has been reached by every expert panel that has looked at the issue and by every other country that is pursuing a nuclear waste management program."). Further, Holtec and ISP each acknowledge at least one plausible scenario that would result in off-site consequences from storage of spent nuclear fuel at both CISFs. HI-STORE CIS Safety Analysis Report at 8-5 – 8-6 (Report No. HI-2167374) (Mar. 27, 2017) (safety analysis explains that a criticality accident is possible due to a flooded canister) (hereinafter "Holtec SAR"); WCS Safety Analysis Report at 12-2 ("Analyses are provided for a range of hypothetical accidents, including those with the potential to result in a total effective

dose equivalent of greater than 5 Rem outside the owner controlled area or the sum of the deep-dose equivalent specified in 10 CFR 72.106.”).

Thus, Beyond Nuclear has standing to request dismissal of the Holtec and ISP applications based on the proximity presumption, through members who own property nearby and have frequent and regular contacts within the radius of potential obvious offsite consequences from the Holtec CISF and the WCS CISF, including:

- Keli Hatley, who lives one mile from the Holtec CISF. *See* Exhibit 03. Ms. Hatley often spends time with family approximately two miles from the Holtec CISF and ranches her cattle up to the fence line of the Holtec CISF. *Id*. Ms. Hatley and her children drive most days over a section of the Laguna Road/Country Road 55 that currently travels across the Holtec site and will have to be moved if the CISF is built. *Id.*

- Margo Smith, who lives seven miles from the Holtec CISF. *See* Exhibit 05. Ms. Smith regularly spends time within approximately two miles of the Holtec CISF, ranching and visiting her two daughters’ homes. *Id.*

- Daniel Berry, who owns property within three to fifteen miles of the Holtec CISF. *See* Exhibit 01. Mr. Berry also lives and works on this land, and regularly drives on Highway 62/180 near the Holtec CISF. *Id.*

- Jimi Gadzia, who owns mineral rights within ten to 16 miles of the Holtec CISF. *See* Exhibit 02.

- Rose Gardner, whose home and work are located within seven miles of the WCS CISF. *See* Exhibit 06. Ms. Gardner also visits family who live approximately five miles from the WCS CISF. *Id.*

- D.K. Boyd, whose property is four miles from the WCS CISF at the nearest point. *See* Exhibit 07.

## IV. STATUTORY FRAMEWORK

### A. Nuclear Waste Policy Act

The NWPA is Congress’ “comprehensive scheme for the interim storage and permanent disposal of high-level radioactive waste generated by civilian nuclear power plants.” *Ind. Mich. Power Co. v. DOE*, 88 F.3d 1272, 1273 (D.C. Cir. 1996). The NWPA establishes distinct roles for the federal government and spent fuel generators with respect to the storage and disposal of

spent fuel. The "Federal Government has the responsibility to provide for the permanent disposal of … spent nuclear fuel" but "the generators and owners of … spent nuclear fuel have the primary responsibility to provide for, and the responsibility to pay the costs of, the interim storage of … spent fuel until such … spent fuel is accepted by the Secretary of Energy." 42 U.S.C. § 10131. Thus, Section 111 of the NWPA specifically provides that the federal government will not take title to spent fuel until it has opened a repository. 42 U.S.C. § 10131(a)(5).

**B. Administrative Procedure Act**

The Administrative Procedure Act prohibits, and requires reviewing courts to hold unlawful and set aside, federal agency action that is "not in accordance with law," or "in excess of statutory jurisdiction, authority, or limitations, or short of statutory right." 5 U.S.C. §§ 706(2)(A), (C). These prohibitions have prevented other agencies from ignoring the mandates of the NWPA. For example, after the Yucca Mountain project was abandoned, the DOE determined it need not revise the annual fee nuclear power producers must pay pursuant to the NWPA to cover the costs of nuclear waste disposal. *Nat'l Ass'n of Regulatory Util. Comm'rs v. U.S. Dep't of Energy*, 736 F.3d 517, 519-520 (D.C. Cir. 2013). The D.C. Circuit struck that decision down as "contrary to law." *Id.* In striking similarity with Holtec's and ISP's assumptions discussed in detail below, DOE premised its determination on an assumption that a temporary storage facility could be constructed *without* NRC first issuing a license for the construction of a permanent facility. *Id.* Of course, the NWPA requires that precondition. The Court thus held that while "it is one thing to anticipate minor statutory additions to fill gaps," it is "quite another to proceed on the premise of a wholesale reversal of a statutory scheme. The latter is flatly unreasonable." *Id.*

## V. FACTUAL BACKGROUND

### A. History of Spent Fuel Storage and Policy in the U.S.

While the NWPA calls for construction of a repository for disposal of spent fuel, no repository has been licensed or built to date. Therefore, a significant quantity of spent fuel has accumulated at reactor sites. The spent fuel is stored in water-filled fuel storage pools and dry storage casks. NUREG-2157, Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel at 2-11 (Sept. 2014) ("Continued Storage GEIS"). As of 2011, approximately 67,500 MT of spent fuel had accumulated at commercial nuclear power plants, with the inventory growing by about 2,000 MT per year. Continued Storage GEIS at 2 –11. This inventory of stored spent fuel is now greater than the Congressionally imposed limit on the capacity of the Yucca Mountain repository of 70,000 MT. 42 U.S.C. § 10134(d).

Despite the increasing quantity of spent fuel stored at reactor sites, the NRC has concluded that onsite spent fuel storage poses no significant environmental risks, even for an indefinite storage period. Continued Storage GEIS at xlvii – xlviii.[3] Consistent with the GEIS, neither ISP nor Holtec has argued that spent fuel would pose less of a radiological risk if it were transported to an away-from reactor storage site.

Under Section 302 of the NWPA, 42 U.S.C. § 10222, reactor licensees were required to pay into a Nuclear Waste Fund for construction of a repository. When the repository failed to materialize, licensees began to recover contract damages for the purpose of covering the cost of continuing to store spent fuel at their reactor sites. *See, e.g.*, *Maine Yankee Atomic Power Co. v. United States*, 225 F.3d 1336, 1341–42 (Fed. Cir. 2000); *see also Nat'l Ass'n of Regulatory Util.*

[3] The only exceptions to the NRC's finding of "small" environmental impacts related to the potentially "large" adverse impacts to historic and cultural resources, and "moderate" environmental impacts by related nonradioactive waste. *Id.*

*Comm'rs*, 736 F.3d at 520; *Ind. Michigan Power Co.*, 88 F.3d at 1276-77 (finding that DOE's obligation under Section 302(a)(5)(B) of the NWPA to start disposing of spent nuclear fuel by a set date was not limited by the lack of a repository that Section 302(a)(5)(A) required prior to DOE taking title; only the remedy the courts could provide for DOE's failure to start disposing was limited). Contract damage lawsuits under the NWPA are now commonplace, and the DOE pays damages on a cyclical basis to reactor licensees. *See, e.g.*, *Nat'l Ass'n of Regulatory Util. Comm'rs*, 736 F.3d at 520.

In 1987, Congress amended the NWPA by directing DOE to narrow the focus of its search for a repository site to a single location, Yucca Mountain in Nevada. But after two decades passed without significant progress, the DOE announced in 2009 that it no longer considered Yucca Mountain a viable option for a final repository and announced plans to withdraw its license application for the site. President Obama thereafter created the Blue Ribbon Commission on America's Nuclear Future ("BRC").

In 2012, the BRC issued a set of recommendations for managing spent nuclear fuel, including that the U.S. government pursue consolidated interim storage of spent fuel, as part of an integrated program for spent fuel disposal. BRC Report at 40. The BRC cautioned that "a program to establish consolidated storage will succeed only in the context of a parallel disposal program that is effective, focused, and making discernable progress in the eyes of key stakeholders and the public." *Id.* A "robust repository program . . . will be as important to the success of a consolidated storage program as the consolidated storage program will be to the success of a disposal program," and therefore "[p]rogress on both fronts is needed." *Id.* The BRC also recognized that federal legislation would be needed before construction of a consolidated storage facility could begin. *Id.* at 41.

In January 2013, in response to the BRC Report, the DOE released *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* (ML13011A138) ("DOE Strategy") to provide "a basis for the Administration to work with Congress to design and implement a program to meet the government's obligation to take title to and permanently dispose of used nuclear fuel and high-level radioactive waste." *Id.* at 3. The DOE endorsed the BRC's recommendation that the government should pursue consolidated interim storage of spent fuel, but recognized that:

> The NWPA currently constrains the development of a storage facility by limiting the start of construction of such a facility until after the Nuclear Regulatory Commission (NRC) has issued a license for construction of a repository. This restriction has effectively eliminated the possibility of having an interim storage facility as an integral component of a waste management system.

*Id.* at 5-6. With respect to the issue of transferring ownership of spent fuel to the DOE during transportation, the DOE Strategy also states:

> [T]he Department is proceeding with planning activities for the development of transportation capabilities and storage facilities to facilitate the acceptance of used nuclear fuel at a pilot interim storage facility within the next 10 years and later at a larger consolidated interim storage facility. The Administration will undertake the transportation planning and acquisition activities necessary to initiate this process with the intent to transfer them to a separate organizational entity *if and when it is authorized by Congress and in operation.*

*Id.* at 6-7 (emphasis added). Thus, both the BRC and the DOE recognized that an interim spent fuel storage facility entailing U.S. government ownership of spent fuel could not be built or operated without authorizing legislation by the U.S. Congress.

**B. Holtec License Application for the Holtec CISF**

On March 30, 2017, Holtec filed an application to the NRC for construction and operation of the proposed Holtec CISF in Lea County, New Mexico. Holtec Hearing Notice, 62 Fed. Reg. 13,802. The proposed Holtec CISF would "initially store 500 canisters or 8,680 metric

tons of uranium in the CISF and eventually store up to 10,000 canisters in the CISF." *Id.* Ultimately, Holtec proposes to store a total quantity of 173,600 MTUs of spent fuel, over twice the capacity limit of the Yucca Mountain repository. Holtec SAR, Table 1.0.1 at 1-4. Holtec proposes to operate the facility for as long as 120 years (40-year license term plus 80 years of extensions). Holtec Environmental Report at 1-1.

In its license application, Holtec proposes to build and manage the Holtec CISF as a private company. Holtec SAR at 1-1. Nevertheless, Holtec's Environmental Report reveals that Holtec does not plan to begin construction of the facility until "after Holtec successfully enters into a contract for storage with the U.S. Department of Energy (DOE)." Holtec Environmental Report at 1-1. Holtec also assumes that ownership of spent fuel will be transferred to the DOE *before* it is shipped to the CISF. *See* Holtec Environmental Report at 3-104 ("DOE would be responsible for transporting SNF from existing commercial nuclear power reactor storage facilities to the CIS Facility."). Thus, as demonstrated by Holtec's Environmental Report, Holtec's entire operation depends on the assumption that DOE will take responsibility for the spent fuel that is transported to the CISF and stored there.[4]

[4] In various parts of its application, Holtec asserts that ownership or liability may rest with "either" licensees or the DOE. *See, e.g.*, HI-STORE CIS Facility Financial Assurance and Project Life Cycle Cost Estimates, Rev. 0 (Report No. HI-2177593) at 3 ("Additionally, as a matter of financial prudence, Holtec will require the necessary user agreements in place from the USDOE and/or the nuclear plant owners.") But these disclaimers are meaningless in light of the crucial fact that Holtec does not intend to begin construction of the facility until DOE has taken title to spent fuel and assumed responsibility for transporting it to the facility. The suggestion that DOE would transfer spent fuel *back to licensees* is absurd, given that the NWPA anticipates that spent reactor fuel is ultimately destined for federal ownership and disposal in a repository. *See* Section IV.A, *supra.*

**C. ISP License Application for WCS CISF**

Like Holtec, ISP has applied for a license to build and operate a CISF, in Andrews County, Texas. ISF Hearing Notice, 83 Fed. Reg. 44,070 (Aug. 29, 2018). The proposed WCS CISF site is approximately 40 miles from the proposed Holtec CISF site. The WCS CISF would house a total of 40,000 MTU of spent fuel over a period of 60 years. WCS Environmental Report, Rev. 2 at 1-1 .

Like Holtec, ISP assumes federal ownership of the spent fuel to be shipped to and stored at the proposed WCS CISF. And like Holtec, ISP attempts to avoid the legal implications of that assumption by claiming a possibility that spent fuel ownership will rest with private licensees.

The first application for a centralized interim spent fuel storage facility at the WCS site in Texas was filed by Waste Control Specialists L.L.C. on April 28, 2016. *See* Waste Control Specialists LLC's Consolidated Interim Spent Fuel Storage Facility Project, License Application; docketing and opportunity to request a hearing and to petition for leave to intervene, 82 Fed. Reg. 8,773 (Jan. 30, 2017). WCS candidly asserted that "[t]he U.S. Department of Energy (DOE) will be contractually responsible for taking title of the spent fuel at the commercial reactor sites and transporting the spent fuel to the CISF, by rail." WCS License Application, Rev. 0 at 101. Furthermore, the application stated that "WCS shall not receive [spent nuclear fuel] until such a contract with the DOE is provided to the NRC as a condition of the license." *Id.* at 1-6.

In 2017, WCS asked the NRC to suspend its review of its application. Then, in 2018, ISP formed as a new joint venture between WCS and Orano CIS, L.L.C., and submitted a revised application. 83 Fed. Reg. at 44,070-71. In all aspects where WCS' application had previously referred to the DOE's responsibility for spent fuel at the proposed facility, ISP now substituted the phrase "the U.S. Department of Energy (DOE) *or other holders of the title to SNF at*

*commercial nuclear power facilities (SNF Title Holder(s)).*" *See id*. ISP added this information without any comment, explanation, or evidence as to why it now thinks "other holders" would be willing to retain title to the waste during transportation and storage.

Thus, for instance, the License Application states:

> The U.S. Department of Energy (DOE) *or other holders of the title to SNF at commercial nuclear power facilities (SNF Title Holder(s)) will hold title to the SNF during transportation to and from and while in storage at the CISF*.

WCS License Application at 1-1 – 1-2 (emphasis in original). Similarly, it states: "The funding for constructing the CISF is expected to be primarily through future contracts for storage of SNF with the DOE *or other SNF Title Holder(s)." Id.* at 1-6 (emphasis in original). And:

> *ISP* will obtain funds to operate the CISF pursuant to future contracts with the DOE *or other SNF Title Holder(s)*. *ISP* shall not receive SNF until such a contract with the DOE *or other SNF Title Holder(s)* is provided to the NRC as a condition of the license.

*Id.* at 1-7 (emphasis in original).

ISP also seeks an exemption from the NRC's regulations for financial assurance for decommissioning, based on federal ownership of the spent fuel. WCS License Application at 1-7. The application asserts that if it fails to have a contract with DOE, it will obtain a surety bond for private owners, but again the assertion is *pro forma*:

> *ISP seeks this exemption for the case where the* DOE will be contractually responsible for taking title of SNF prior to transport and while it is placed into interim storage at the CISF. The NRC has recognized that a contract by the DOE specifically guaranteeing that funds will be made available to decommission equipment, facilities, and land is an equivalent financial assurance instrument that may be relied upon and that will save tax payers in a manner that is in the public interest.

WCS License Application at 1-9. *See also* WCS Environmental Report at 3-5 (emphasis in original) ("The DOE *or the SNF Title Holder(s)* would be responsible for transporting spent nuclear fuel (SNF) from existing commercial nuclear power reactors to the CISF. SNF would be transported to the CISF by rail"); WCS Environmental Report at 7-15 (emphasis in original)

(asserting that "*ISP* expects to enter into a contract(s) with DOE *or the SNF Title Holder(s)* that will provide the funding for facility construction, operation, and decommissioning.").

Thus, both Holtec and ISP rely on the assumption that the DOE will take responsibility for spent fuel during transportation and storage at their sites. And both Holtec and ISP also seek to legitimate their assumptions by citing the BRC Report and the DOE Strategy. Holtec Environmental Report at 1-3, WCS Environmental Report at 1-3. While they hedge this assumption by referring to the possibility of private ownership, such meaningless and unsupported references serve as nothing more than fig leaves over the essential premise of their proposals – that these facilities will be built *only* if DOE owns the waste.

## VI. ARGUMENT: THE NRC MAY NOT ISSUE LICENSES TO HOLTEC AND ISP BECAUSE THEY ASSUME FEDERAL OWNERSHIP OF SPENT FUEL DURING STORAGE AND TRANSPORTATION IN VIOLATION OF THE NWPA.

The NRC must dismiss Holtec's and ISP's license applications because the key condition of both applications -- federal acquisition of title to commercially-generated spent fuel prior to the opening of a permanent repository -- is contrary to the NWPA, which precludes licensees from transferring title of spent fuel to the DOE until a repository has opened. *Indiana Mich. Power Co.*, 88 F.3d at 1273 (holding that DOE's obligation to take title to spent fuel does not begin until a repository is opened.). Until such time as a repository opens and the DOE takes title to spent fuel, "[t]he generators and owners of high-level radioactive waste and spent nuclear fuel have the primary responsibility to provide for, and the responsibility to pay the costs of, the interim storage of such waste and spent fuel." 42 U.S.C. § 10131. *See also* 42 U.S.C. § 10143 (providing that "[d]elivery, and acceptance by the Secretary [of Energy], of any high-level radioactive waste or spent nuclear fuel *for a repository* . . . shall constitute a transfer to the

Secretary of title to such waste or spent fuel" (emphasis added)); 42 U.S.C. § 10222(a)(5)(A) (providing that DOE will "take title" to spent fuel *only* "following commencement of operation of a repository").[5] There is no dispute that a final repository is not operational, let alone even licensed.

Thus, the NWPA establishes a clear sequential order for transference of title, possession, and physical movement of spent fuel: DOE may only transport spent nuclear fuel *subsequent to* taking title to the spent fuel, and DOE may only take title after a repository is operational. Given that no spent fuel repository has opened, the NWPA precludes DOE from taking title to the spent fuel, and thereby also precludes it from having any responsibility for the transportation of the spent fuel between a reactor storage facility and an interim storage facility.[6]

By assuming that DOE will take title to the spent fuel to be stored at the CISFs, Holtec and ISP flout the clearly stated limitations of the NWPA and federal government policy of giving spent fuel generators the "responsibility" of coming up with "their own interim storage solutions." *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-02-29, 56 NRC 390, 404-06 (2002). Taking responsibility for spent fuel logically includes all

---

[5] The language of 42 U.S.C. § 10222(a)(5)(A) is memorialized in the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, 10 C.F.R. § 961.11 ("This contract applies to the delivery by Purchaser to DOE of SNF … acceptance of title by DOE to such SNF … , subsequent transportation, and disposal of such SNF" and "The terms of this contract shall be from the date of execution until such time as DOE has accepted, transported from the Purchaser's site(s) and disposed of all SNF…"). *See also* 10 C.F.R. § 961.1 ("This part establishes the contractual terms and conditions under which the Department of Energy (DOE) will make available nuclear waste disposal services … DOE will take title to, transport, and dispose of spent nuclear fuel …").

[6] As discussed above in note 7, under the statutory scheme of the NWPA and as a practical matter, DOE would never take title for transportation and return it to licensees.

obligations incident to the ownership of spent fuel, such as financing the cost of building and maintaining a facility to safely house the spent fuel, and liability for operational problems and accidents.

Notably, in *Private Fuel Storage*, the Commission concluded that the NWPA did not preclude it from licensing a private away-from-reactor spent fuel storage facility. 56 NRC at 405-06. But that decision concerned only privately-owned waste. The Commission has never asserted that in licensing a private spent fuel storage facility, it could ignore the NWPA's prohibition against transfer of title of spent fuel to the federal government in the absence of a repository. Thus the NWPA contains no current provision that would allow DOE to assume title and responsibility for the spent fuel to be stored at the proposed Holtec CISF or the WCS CISF.[7]

While both Holtec and ISP claim to rely on the BRC Report and DOE Strategy for support of their bids for NRC licensing of their proposed operations, neither document countenances their actions. As discussed above in Section V.A, the BRC explicitly stated that initiatives for consolidated interim storage of spent fuel should come from the U.S. government, should be integrated with an active spent fuel disposal program, and should be allowed by

[7] The *only* NWPA provision that allows transfer of title to spent fuel from commercial licensees to the DOE, prior to the opening of a repository, is the emergency "Interim Storage Program" found in Subtitle B of the NWPA. *But the Interim Storage Program expired in 1990.* And the program also imposed extreme requirements that are not met here. For instance, the Interim Storage Program limited the amount of spent fuel that could be transferred to the DOE to only 1,900 MT. 42 U.S.C. §§10151(b)(2), 10155(a)(1). In contrast, both the Holtec and ISP seek to initially store over 5,000 MT of spent fuel, and Holtec would eventually store over 173,000 MT. Moreover, before transferring that stopgap quantity of spent fuel to DOE, a reactor licensee was required to persuade the NRC that a lack of adequate spent fuel storage capacity at an operating nuclear reactor would jeopardize "the continued, orderly operation" of the reactor. 42 U.S.C. § 10151(a)(3). Finally, the Interim Storage Program required that spent fuel must be stored at a public facility, not a private facility. 42 U.S.C. § 10151(b)(2). None of those circumstances exist here, and thus the Program's requirements could not be satisfied even if it were still available.

federal legislation. Given the federal government's abandonment of its repository siting program for Yucca Mountain, there is no active spent fuel disposal program with which Holtec's and ISP's proposals could be integrated. Furthermore, the DOE Strategy also acknowledged that consolidated interim storage could not go forward with federal ownership of spent fuel without Congressional authorization.

Accordingly, the NWPA precludes the DOE from taking title to commercial spent fuel for storage at Holtec and ISP's proposed facilities. And by the same token, the Administrative Procedure Act precludes the NRC from acting "contrary to law" or "in excess of statutory authority" by issuing a license premised on a wholesale reversal of the statutory scheme established by the NWPA. 5 U.S.C. §§ 706(2)(A), 706(2)(C).

## VII. CONCLUSION

Given the fundamental incompatibility of Holtec's and ISP's license applications with the NWPA, the NRC has no lawful basis to review the applications. Therefore, the NRC should dismiss the applications and terminate the proceedings opened in the Holtec and ISP Hearing Notices.

Respectfully submitted,

/signed electronically by/
Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1725 DeSales Street N.W., Suite 500
Washington, D.C. 20036
240-393-9285
dcurran@harmoncurran.com

/signed electronically by/
Mindy Goldstein
Emory University School of Law
Turner Environmental Law Clinic
1301 Clifton Road

Atlanta, GA 30307
404-727-3432
magolds@emory.edu

September 14, 2018

# Tab 4

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE SECRETARY

| | | |
|---|---|---|
| In the Matter of: | ) | |
| | ) | |
| Interim Storage Partners | ) | Docket No. 72-1050 |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | |
| | ) | |

**BEYOND NUCLEAR, INC.'S HEARING REQUEST AND PETITION TO INTERVENE**

## I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.309, Beyond Nuclear, Inc. ("Beyond Nuclear") hereby requests the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") to grant a hearing on Interim Storage Partners' ("ISP") application for a license to build and operate a centralized interim spent fuel storage facility ("WCS CISF") in Andrews County, Texas. *See* 83 Fed. Reg. 44,070 (Aug. 29, 2018) ("ISP Hearing Notice").[1]

As discussed in Section II of Beyond Nuclear's attached Corrected Motion to Dismiss Licensing Proceedings for Hi-Store Consolidated Interim Storage Facility and WCS Consolidated Interim Storage Facility for Violation of the Nuclear Waste Policy Act ("Motion to Dismiss"),[2] Beyond Nuclear does not believe its contention lies within the scope of this licensing proceeding.

[1] Beyond Nuclear notes that it has timely filed a Hearing Request, and therefore does not join in or take a position on the extension request filed by other parties on October 2, 2018. The inclusion of Beyond Nuclear as a petitioner in that extension request was an inadvertent error that is hereby corrected.

[2] The Motion to Dismiss is attached as Exhibit 01. The Motion to Dismissed was filed on September 14, 2018 in this docket and in Docket No. 72-1051 for the HI-STORE Consolidated Interim Storage Facility ("Holtec CISF"). The Motion has corrections made pursuant to an errata filed on September 18, 2018.

# Tab 5

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the Matters of | ) | |
| HOLTEC INTERNATIONAL | ) | Docket No. 72-1051 |
| (HI-STORE Consolidated Interim Storage Facility) | ) | |
| INTERIM STORAGE PARTNERS LLC | ) | Docket No. 72-1050 |
| (WCS Consolidated Interim Storage Facility) | ) | |

**ORDER**

On July 16, 2018, the NRC provided notice in the *Federal Register* of Holtec International's application to construct and operate a consolidated interim storage facility for spent nuclear fuel.[1] Separately, on August 29, 2018, the NRC provided notice in the *Federal Register* of Interim Storage Partners' application to construct and operate a consolidated interim storage facility for spent nuclear fuel.[2]

On September 14, 2018, Beyond Nuclear, Fasken Land and Minerals, and Permian Basin Land and Royalty Owners filed motions to dismiss both the Holtec and Interim Storage Partners applications.[3] These groups argue that the NRC cannot, as a threshold matter, issue

[1] Holtec International HI-STORE Consolidated Interim Storage Facility for Interim Storage of Spent Nuclear Fuel, 83 Fed. Reg. 32,919 (July 16, 2018).

[2] Interim Storage Partner's Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44,070 (Aug. 29, 2018), corrected, 83 Fed. Reg. 44,608 (Aug. 31, 2018) (noting that the correct deadline to file intervention petitions is October 29, 2018). Interim Storage Partners is a joint venture of Orano USA and Waste Control Specialists.

[3] Beyond Nuclear filed its own motion to dismiss. *Beyond Nuclear, Inc.'s Motion to Dismiss Licensing Proceedings for Hi-Store Consolidated Interim Storage Facility and WCS Consolidated Interim Storage Facility for Violation of the Nuclear Waste Policy Act* (Sept. 14,

licenses to Holtec or Interim Storage Partners because both applications are contrary to the Nuclear Waste Policy Act (NWPA). Specifically, the groups argue that both applications contemplate the storage of Department of Energy-titled spent fuel in violation of various NWPA provisions.

The NRC's regulations allow interested persons to file petitions to intervene and requests for hearing in which they can raise concerns regarding a particular license application. These regulations do not, however, provide for the filing of threshold "motions to dismiss" a license application; instead, interested persons must file petitions to intervene and be granted a hearing. I therefore deny both motions to dismiss on procedural grounds, without prejudice to the underlying merits of the legal arguments embedded within the motions.

Beyond Nuclear also filed hearing petitions in the Holtec and Interim Storage Partners proceedings that incorporated by reference the NWPA arguments that it raised in its motion to dismiss and identified those arguments as proposed contentions.[4] I am separately referring these hearing requests—as well as other hearing requests challenging the applications—to the Atomic Safety and Licensing Board Panel (ASLBP) for the establishment of a Board to consider *all* hearing requests in accordance with the hearing procedures set forth in 10 C.F.R. §2.309. And, in accordance with 10 C.F.R. § 2.346(i), I am referring the motion from Fasken Land and

---

2018) (ADAMS Accession No. ML18257A318). Fasken Land and Minerals joined with Permian Basin Land and Royalty Owners to file a motion to dismiss that is substantially similar to Beyond Nuclear's motion. *Motion of Fasken Land and Minerals and Permian Basin Land and Royalty Owners to Dismiss Licensing Proceedings for Hi-Store Consolidated Interim Storage Facility and WCS Consolidated Interim Storage Facility* (Sept. 14, 2018) (ML18257A330). Both the NRC Staff and respective applicants filed oppositions to the motions, and Beyond Nuclear, Fasken Land and Minerals, and Permian Basin Land and Royalty Owners then filed replies.

[4] *Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene* (Sept. 14, 2018) (ML18257A324) (Holtec docket); *Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene* (Oct. 3, 2018) (ML18276A242) (Interim Storage Partners docket). Fasken Land and Minerals and Permian Basin Land and Royalty Owners have not filed related hearing petitions in either docket.

Minerals and Permian Basin Land and Royalty Owners to the ASLBP for consideration under § 2.309.

This Order is issued under my authority in 10 C.F.R. § 2.346(c), (g), (i), and (j).

IT IS SO ORDERED.

For the Commission

**NRC SEAL**

**/RA/**

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 29th day of October 2018

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| INTERIM STORAGE PARTNERS LLC | ) | Docket No. 72-1050-ISFSI |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | |
| | ) | |

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **Order of the Secretary** have been served upon the following persons by the Electronic Information Exchange:

U.S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
Washington, DC 20555-0001

E. Roy Hawkens
Chief Administrative Judge
E-mail: roy.hawkens@nrc.gov

Joseph McManus, Law Clerk
E-mail: joseph.mcmanus@nrc.gov

U.S. Nuclear Regulatory Commission
Office of Commission Appellate Adjudication
Mail Stop: O16-B33
Washington, DC 20555-0001
E-mail: ocaamail@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the Secretary of the Commission
Mail Stop: O16-B33
Washington, DC 20555-0001
Hearing Docket
E-mail: Hearing.Docket@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the General Counsel
Mail Stop - O-14A44
Washington, DC 20555-0001
Patrick Moulding, Esq.
Mauri Lemoncelli, Esq.
Sara Kirkwood, Esq.
Emily Monteith, Esq.
Alana Wase, Esq.
Joe Gillespie, Esq.
Thomas Steinfeldt
E-mail: patrick.moulding@nrc.gov
mauri.lemoncelli@nrc.gov
sara.kirkwood@nrc.gov
emily.monteith@nrc.gov
alana.wase@nrc.gov
joe.gillespie@nrc.gov
thomas.steinfeldt@nrc.gov

Counsel for Beyond Nuclear

Diane Curran, Esq.
Harmon, Curran, Spielberg and Eisenberg
1725 DeSales Street NW, Suite 500
Washington, DC 20036
E-mail: dcurran@harmoncurran.com

Mindy Goldstein, Esq.
Caroline Reiser, Esq.
Emory University School of Law
Turner Environmental Law Clinic
1301 Clifton Road
Atlanta, GA 30322
E-mail: magolds@emory.edu
caroline.j.reiser@emory.edu

Diane D'Arrigo
Nuclear Information and
Resource Service (NIRS)
6930 Carroll Avenue
Suite 340
Takoma Park, MD 20912
Email: dianed@nirs.org

Chris Hebner, Esq.
City of San Antonio, TX
P.O. Box 839966
San Antonio, TX 78283
E-mail: chris.hebner@sanantonio.gov

Counsel for Fasken Land and Oil and
Permian Basin Land and Royalty Owners
Robert V. Eye Law Office, L.L.C.
Robert Eye, Esq.
Timothy Laughlin
4840 Bob Billings Parkway, Suite 1010
Lawrence, KS 66049
E-mail: bob@kauffmaneye.com
tijay1300@gmail.com

Karen D. Hadden
Executive Director,
Sustainable Energy and
Economic Development (SEED) Coalition
605 Carismatic Lane
Austin, TX 78748
E-mail: karendhadden@gmail.com

Counsel for Interim Storage Partners LLC
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Avenue NW
Washington, DC 20004
Stephen Burdick, Esq.
Timothy Matthews, Esq.
Ryan Lighty, Esq.
Paul Bessette, Esq.
E-mail: stephen.burdick@morganlewis.com
timothy.matthews@morganlewis.com
ryan.lighty@morganlewis.com
paul.bessette@morganlewis.com

Wallace Taylor
Counsel for Sierra Club
118 3rd Avenue SE
Suite 326
Cedar Rapids, IA
E-mail: wtaylorlaw@aol.com

[Original signed by Herald M. Speiser ]
Office of the Secretary of the Commission

Dated at Rockville, Maryland
this 29th day of October, 2018

# Tab 6

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

| | | |
|---|---|---|
| In the Matter of: | ) | |
| | ) | |
| Interim Storage Partners | ) | Docket No. 72-1050 |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | |
| | ) | |

**PETITION OF PERMIAN BASIN LAND AND ROYALTY ORGANIZATION AND FASKEN LAND AND MINERALS FOR INTERVENTION AND REQUEST FOR HEARING**

Pursuant to 10 CFR 2.309 Petitioners Permian Basin Land and Royalty Organization (PBLRO) and Fasken Land and Minerals (Fasken) hereby respectfully petition for intervention and request a hearing in the above-captioned matter.

## I. FASKEN AND PBLRO HAVE STANDING TO REQUEST A HEARING

Fasken and PBLRO have bases to intervene pursuant to both of the NRC's recognized legal frameworks for analyzing standing based on radiological injury: traditional standing and the proximity presumption. *U.S. Army Installation Command* (Schofield Barracks, Oahu, Hawaii, & Pohakuloa Training Area, Island of Hawaii, Hawaii), LBP-10-4, 71 NRC 216, 228 (2010). PBLRO is an association formed in response and opposition to the proposed CISFs. In Andrews County, Texas (ISP WCS CISF) and Lea County, New Mexico (Holtec CISF). (Boyd Declaration, para. 2). Members of PBLRO, which includes Fasken, are oil and gas producers and royalty owners which have long-term economic, social and environmental interests in the Permian Basin. (Id.). PBLRO's purpose is to advocate on behalf of oil and gas producers and land and royalty owners who have substantial economic interests that are jeopardized by the

# Tab 7

BEFORE THE UNITED STATES
NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| IN THE MATTER OF | ) | |
| | ) | Docket No. 72-1050 |
| INTERIM STORAGE PARTNERS LLC | ) | |
| | ) | |
| (Consolidated Interim Storage | ) | November 13, 2018 |
| Facility Project) | ) | |

**PETITION TO INTERVENE AND REQUEST FOR ADJUDICATORY HEARING BY SIERRA CLUB**

INTRODUCTION

Interim Storage Partners LLC (ISP) proposes to construct a consolidated interim storage (CIS) facility in Andrews County, Texas. Pursuant to 10 C.F.R. Part 72, ISP has applied to the Nuclear Regulatory Commission (NRC) for a license to construct and operate the facility. The facility would store highly radioactive spent nuclear fuel, high level waste and greater than Class C waste from nuclear reactors around the country. The nuclear waste would be stored in metal canisters placed on concrete pads at the facility site.

Concurrently with the application for a license, ISP has submitted an environmental report (ER) and a safety analysis report (SAR). Radioactive waste would be transported to the CIS site by rail or truck from various reactor sites around the country. The transportation and

storage of the radioactive waste as proposed by ISP creates risks and adverse impacts that form a basis for denying the license to construct and operate the facility.

The storage and disposal of spent radioactive fuel from nuclear reactors is a problem that has no good solution. Sierra Club believes that all reasonable alternatives must be evaluated given the desirability of avoiding unnecessary dangers and risks associated with CIS. As the United States Court of Appeals for the District of Columbia Circuit observed:

> Even though it is no longer useful for nuclear power, SNF [spent nuclear fuel] poses a dangerous, long-term health and environmental risk. It will remain dangerous "for time spans seemingly beyond human comprehension." Nuclear Energy Inst., Inc. v. EPA, 373 F.3d 1251, 1258 (D.C. Cir. 2004)(per curiam). Determining how to dispose of the growing volume of SNF, which may reach 150,000 metric tons by the year 2050, is a serious problem.

New York v. NRC, 681 F.3d 471, 474 (D.C. Cir. 2012).

Compounding this problem is that, realistically, there is no assurance that a permanent repository for nuclear waste will ever be found. Therefore, an "interim" storage facility as proposed by ISP may very likely become a permanent repository, without the protections that would be required of a permanent repository.

> The impact determinations for at-reactor storage for each resource area for each timeframe are summarized in Table 4-2. For most of the resource areas, the impact determinations for all three timeframes are SMALL. Continued storage is not expected to adversely affect special species and habitats. For accidents (design basis and severe) and terrorism considerations, the environmental risks of continued storage are SMALL. However, for a few resource areas, impact determinations are greater than SMALL and varied for the three timeframes. For the long-term storage and indefinite storage timeframes, during which ground-disturbing activities may occur, impacts on historic and cultural resources range from SMALL to LARGE. The impacts from management and disposal of nonradioactive waste would be SMALL for both the short-term and long-term timeframes but SMALL to MODERATE for indefinite storage.

In addition, all of the statements and facts in support of Contention 2 are incorporated in support of this Contention.

Therefore, according to the NRC in its Continued Storage Rule, there is no benefit from or need for a CIS as proposed by ISP.

CONTENTION 4

Operation of the CIS site as proposed by ISP would necessitate the transportation of the radioactive waste from reactor sites to the CIS facility. Transportation from the reactors to the CIS site carries substantial risks. These risks must be evaluated in the ER.

Basis for the Contention

10 C.F.R. § 72.108 states that a nuclear waste storage facility must be evaluated with respect to the potential

impact on the environment of the transportation of the radioactive waste. The containers destined for the ISP CIS facility will be transported from various reactors around the country to the ISP site. There is a risk of radiation being emitted from the containers during shipment. The ER must address the environmental impacts of these risks. The ER, as submitted, does not adequately address the risks and consequences of a transportation accident and sabotage event.

Facts Upon Which Petitioner Intends to Rely In Support of This Contention

In November 2010, the American Public Health Association (APHA) called spent fuel transportation "a national public health threat that is largely preventable." American Public Health Association, Intrastate and Interstate Transportation of Spent Nuclear Fuel is a Public Health Risk, November 9, 2010, found at www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/09/08/12/intrastate-and-interstate-transportation-of-spent-nuclear-fuel-is-a-public-health-risk. APHA advocated for long-term fuel storage at reactors until a permanent repository is developed. In reviewing the APHA report, Amy Hagopian, a professor of

global health at the University of Washington said, "The potential hazards and risks are huge, so minimizing transport makes sense. It just takes one accident, and then everyone will be pointing fingers and asking how we got to this point." Jennifer Weeks, Managing Nuclear Waste, CQ Researcher, January 28, 2011, found at library.cqpress.com/cqresearcher/document.php?id=cqresrre2011012800.

A report by Marvin Resnikoff, and Matthew Lamb identified the consequences of a severe rail accident involving shipments of radioactive waste. Marvin Resnikoff and Matthew Lamb, Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada (2001), found at www.state.nv.us/nucwaste/trans/rwma0108.pdf. Employing DOE's RADTRAN 5 software developed by Sandia Labs, the study examined DOE's accident analysis for the State of Nevada, as set forth in the report. That report used the results of NUREG/CR-6672, commonly called the Modal Study. It examined Category 6 accidents, using DOE's RADTRAN 5. That analysis disagreed with one aspect of DOE's analysis, the vaporization of Cs-137 found in the cladding gap. DOE's estimates of Cs-137 volatilized was based on 1978 reports by Lorenz. Lorenz et al., Fission Product Source Terms for the

Light Water Reactor Loss-of-Coolant Accident, 46 Nuclear Technology 404 (1979), found at www.osti.gov/servlets/purl/6494228.

Resnikoff et al. used a more recent study, Gray and Wilson, Spent Fuel Dissolution Studies, FY 1994, Pacific Northwest Laboratories (1995), found at www.osti.gov/servlets/purl/205055. When fuel is heated in reactors, a percentage of volatile radionuclides, such as cesium, will migrate out of the fuel matrix under the influence of temperature gradients and concentrate in the fuel-clad gap. Resnikoff et al. concluded that the studies by Lorenz were not representative of spent fuel.

From the Nevada report the consequences of a transportation accident are shown in Table 1 and Table 2 below.

**Table 1**

Table ES-1: Comparison of State of Nevada and Yucca Mountain EIS Consequence Assessments : Urban Accidents

| | **Urban Truck Accident** | | | | **Urban Rail Accident** | | | |
|---|---|---|---|---|---|---|---|---|
| | State of Nevada, Cat.5[a] | State of Nevada, Cat.6[a] | YM DEIS, Cat. 5[a] | YM DEIS, Cat. 6[a] | State of Nevada, Cat.5[a] | State of Nevada, Cat.6[a] | YM DEIS, Cat. 5[a] | YM DEIS, Cat. 6[a] |
| Acute (24-hour) Population Dose (person-rem)[b] | 846 | not calculated | not calculated | not calculated | 26,171 | not calculated | not calculated | not calculated |
| Expecte | 0.42- | not | not | not | 13-444 | not | not | not |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| d Latent Cancer Fatalities[c] | 2.7 | calculated | calculated | calculated | | calculated | calculated | calculated |
| 1-year Population Dose (person-rem)[b] | 29,514 | not calculated | not calculated | 9,400 | 915,968 | not calculated | not calculated | 61,000 |
| Expected Latent Cancer Fatalities[c] | 15-94 | not calculated | not calculated | 5 | 458-2,931 | not calculated | not calculated | 31 |
| 50-year Population Dose (person-rem)[b] | 407,024 | not calculated | not calculated | not calculated | 12,771,207 | not calculated | not calculated | not calculated |
| Expected Latent Cancer Fatalities[c] | 204-1,306 | not calculated | not calculated | not calculated | 6,386-40,868 | not calculated | not calculated | not calculated |
| Dose to Maximally Exposed Individual (rem)[d] | 3.9 | 38.5 | not calculated | 4 | 22.5 | 224 | not calculated | 26 |
| Area contaminated to greater than 5 rem long-term dose ($km^2$) | 11.1 | 192.2 | not calculated | not calculated | 104.7 | 1208.4 | not calculated | not calculated |

**Table 2**

Table ES-2: Comparison of State of Nevada and Yucca Mountain EIS Consequence Assessments: Rural Accidents

| | Rural Truck Accident | | | | Rural Rail Accident | | | |
|---|---|---|---|---|---|---|---|---|
| | State of Nevada, Cat.5[a] | State of Nevada, Cat.6[a] | YM DEIS, Cat. 5[a] | YM DEIS, Cat. 6[a] | State of Nevada, Cat.5[a] | State of Nevada, Cat.6[a] | YM DEIS, Cat. 5[a] | YM DEIS, Cat. 6[a] |
| Acute (24-hour) Population Dose (person-rem)[b] | 799 | not calculated | not calculated | not calculated | 393 | not calculated | not calculated | not calculated |
| Expected Latent Cancer Fatalities[c] | 0.4-2.6 | not calculated | not calculated | not calculated | 0.2-1.3 | not calculated | not calculated | not calculated |
| 1-year Population Dose (person-rem)[b] | 27,886 | not calculated | not calculated | 430 | 13,760 | not calculated | not calculated | not calculated |
| Expected Latent Cancer Fatalities[c] | 14-89 | not calculated | not calculated | 0.2 | 7-44 | not calculated | not calculated | not calculated |
| 50-year Population Dose (person-rem)[b] | 388,326 | not calculated | not calculated | not calculated | 191,859 | not calculated | not calculated | not calculated |
| Expected Latent Cancer Fatalities[c] | 194-1,243 | not calculated | not calculated | not calculated | 96-614 | not calculated | not calculated | not calculated |
| Dose to Maximally Exposed Individual (rem)[d] | 1.73 | 17.1 | not calculated | 3.9 | 26.9 | 267 | not calculated | not calculated |
| Area contaminated to greater than 5 rem long- | 3.4 | 33.1 | not calculated | not calculated | 118.6 | 1202 | not calculated | not calculated |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| term dose ($km^2$) | | | | | | | | |

Resnikoff et al. used the above data and calculated the cost of decontamination after a spent fuel transportation accident in Las Vegas, shown on Table 3.

**Table 3**

Table 23: Decontamination Cost Estimates: Severe Spent Fuel Accidents in Las Vegas

| | **Category 5 truck accident** | **Category 6 truck accident** | **Category 5 rail accident** | **Category 6 rail accident** |
|---|---|---|---|---|
| **Area heavily contaminated ($km^2$)** | 0.68 | 10.6 | 5.7 | 102.8 |
| **Area moderately contaminated ($km^2$)** | 0.8 | 15.1 | 8.1 | 135.1 |
| **Area lightly contaminated ($km^2$)** | 9.7 | 166.5 | 90.9 | 970.5 |
| **Cost/$km^2$, heavy contamination*** | $394,604,748 | $394,604,748 | $394,604,748 | $394,604,748 |
| **Cost/$km^2$, moderate contamination*** | $182,592,165 | $182,592,165 | $182,592,165 | $182,592,165 |
| **Cost/$km^2$, light contaminati** | $128,263,609 | $128,263,609 | $128,263,609 | $128,263,609 |

| | | | | |
|---|---|---|---|---|
| **on*** | | | | |
| **Total Cleanup Costs, Billions** | **$1.7 billion** | **$28.3 billion** | **$15.4 billion** | **$189.7 billion** |

The cost estimates in Table 3 were calculated in 2001, and need to be updated for 2018 dollars. The dollar escalation from 2001 to 2018 is 369%. So the estimated total cleanup cost in Table 3 must be multiplied by 3.69. For a Category 6 accident, the total cleanup cost would be $189.7 billion X 3.69 = $700 billion.

According to Dr. Resnikoff, one of the authors of the above report, DOE's 2008 risk estimate does not incorporate recent information about rail fires and expanded traffic of oil tanker cars. This increased traffic of crude oil on rails has resulted in numerous derailments and fires. DOE and ISP risk estimates need to take into account this new reality. Transportation casks are required to withstand a half hour fire at 1475°F, but many rail fires have burned hotter for considerably longer time periods.

Revision 2 of the ISP CISF license application, which includes the environmental report, does not discuss the potential cleanup costs in a transportation accident. The ISP environmental report contains radiation doses (Table 4.2-9, Estimated Dose and Dose-Risk for Loss of Shielding

Accidents) but the doses are far smaller than those that appear in Table 1 above.

Probabilistic risk calculations must take into account the numerous long duration high temperature rail fires. Rail fires that have occurred in the past 3 years are the following.

- On July 6, 2013, an oil train wrecked in Lac-Megantic, Quebec, resulting in a fire that burned for over 24 hours, killing 47 people and burning down half the town.
- On November 8, 2013, an Alabama and Gulf Coast oil train derailed and exploded releasing about 750,000 gallons of oil from 26 rail cars.
- On December 30, 2013, a BNSF Railway oil train collided with a derailed grain train near Castleton, North Dakota, igniting thousands of gallons of fuel and forcing the evacuation of more than 2,000 residents.
- On January 7, 2014, a Canadian National oil train derailed and exploded near Plasterrock, New Brunswick, forcing the evacuation of 150 people.
- On April 30, 2014, a CSX Transportation oil train derailed and exploded near downtown Lynchburg, Virginia, spilling nearly 30,000 gallons of oil into the James River.
- On February 14, 2015, another Canadian National oil

train derailed in northern Ontario.

- Less than two months later, yet another Canadian National oil train derailed and exploded on the same line just 23 miles away near Gogama, Ontario.

- On February 16, 2015, a CSX oil train derailed along the Kanawha River, burning a nearby house to the ground.

- On March 10, 2015, a BNSF oil train derailed near Galena, Illinois, sparking a fire that lasted for more than two days.

- On May 6, 2015, a BNSF oil train derailed near Helmdel, North Dakota, spilling 60,000 gallons of oil.

- On July 16, 2015, a BNSF oil train derailed near Culbertson, Montana, spilling 35,000 gallons of fuel.

- On November 7, 2015, the derailment of a Canadian Pacific oil train forced the evacuation of dozens of homes in Watertown, Wisconsin.

- On June 3, 2016, the Union Pacific oil train derailed and exploded in Mosier, Oregon, filling the scenic Columbia River Gorge with thick black smoke.

Based on all of this experience, it is not hypothetical or speculative that there will be train wrecks involving fires during transportation of radioactive waste. Since lead melts at 330°C (626°F) and hydrocarbon fires burn at

1850°F and above, the lead in an MP-187 cask would vaporize in a long duration fire.

In the calculations above, rail casks were assumed to hold 24 PWR fuel assemblies, the same as the NUHOMS MP-187 cask. Resnikoff et al. also employed RADTRAN 5, and the report, NUREG/CR-6672, the same as in the ISP CISF application.

In addition to potential rail accidents involving long duration high temperature fires, the environmental report does not discuss the potential consequences of a sabotage event. In November 2008, Dr. Resnikoff analyzed the potential consequences of a sabotage event, "Potential Consequences of a Successful Sabotage Attack on a Spent Fuel Shipping Container," prepared for the State of Nevada, Agency for Nuclear Projects. The ISP ER does not discuss potential sabotage events.

In discussing the radiological impacts of transportation of the radioactive waste to the proposed CIS, the ER at 4.2.6 relies on several NRC documents. One of those documents is the Final Environmental Impact Statement for ISFSI in Tooele County, Utah (NUREG-1714)(Accession No. ML020150217). However, the discussion of the impacts of a transportation accident is irrelevant to the transportation

of radioactive material to the ISP CIS. This is because the analysis in NUREG-1714 was based on the use of HI-STORM and HI-STAR cask systems manufactured by Holtec, rather than the NUHOMS and NAC systems that will be used for the ISP project. Based on the use of the Holtec systems, NUREG-1714, 2.1.2.1, assumes that the casks can't leak. There is nothing in the ISP documentation to justify such an assumption in this case.

Another document relied on by ISP regarding the transportation issues is the Spent Fuel Transportation Risk Assessment (NUREG-2125)(Accession No. ML14031A323). The analysis in that document is irrelevant to the transportation risks in this case because the casks chosen for analysis in NUREG-2125, Table 1-1, are not all of the casks that will be used in the ISP facility. ER, Table 1-1. Specifically, from Table 1-1, the Advanced Standardized NUHOMS System, Standardized NUHOMS System, NAC-MPC, and MAGNASTOR casks will be used at the ISP facility, but were not involved in the NUREG-2125 analysis.

Another document relied on by ISP regarding the transportation issues is the Generic Environmental Impact Statement of Continued Storage of Spent Nuclear Fuel (NUREG-2157). However, there is no indication in NUREG-2157 as to

what type of cask system was being evaluated. As can be seen from the discussion above, the specific details of the cask system are important in evaluating the impacts of transporting radioactive waste to the ISP CIS facility.

Another reason ISP cannot rely on NUREG-2157 is that NUREG-2157 does not consider the impact of deteriorating railroad infrastructure on transportation risks. There were recently two train derailments in southeast New Mexico over the weekend of July 21 and 22, 2018. At least one of the derailments was caused by the track giving way.

Dr. Gordon Thompson, in his declaration, p. 18-19, hereto attached, describes the events and impacts that can occur during transport of the waste to the CIS facility. The likely events described by Dr. Thompson that are likely to occur during transport arise from accident, attack, or slow degradation. Dr. Thompson states that these events would result in radiation exposure to members of the public and radioactive contamination of the environment. The ER, 4.2.6, does not adequately address the likely transportation events and impacts discussed by Dr. Thompson.

Pursuant to 10 C.F.R. § 72.108, the ER must discuss the risks and costs of transportation of the radioactive waste to the ISP site.

CONTENTION 6

The ER and the subsequent EIS must evaluate the potential for earthquakes at the ISP site and the environmental impact of earthquakes. Likewise, the Safety Analysis Report (SAR) must adequately evaluate the earthquake potential of the proposed site. Both the ER and SAR are inadequate in this respect.

Basis for the Contention

Earthquakes have been reported in the area around the proposed ISP site in the last few years. The potential for earthquakes would be an aspect of the environment affected and the environmental impacts of the project that must be included in the ER, pursuant to 10 C.F.R. § 51.45. The earthquake analysis must also be in the EIS.

Pursuant to 10 C.F.R § 51.45 the ER must contain a description of the environment affected and the impact of the proposed project on the environment. The ER essentially dismisses the likelihood of earthquakes in the area and does not mention any environmental impacts from earthquakes. However, several earthquakes with a magnitude of 3 or greater have occurred in the area since 1975.

10 C.F.R. § 72.103(f)(1) requires that the SAR contain an adequate analysis of the earthquake potential of the area in and around the proposed ISP site. The SAR submitted by ISP does not comply with § 103(f)(1).

Facts Upon Which Petitioner Intends to Rely In Support of This Contention

The ER

The ER submitted by ISP does not even discuss the impact of earthquakes. ER Rev. 2, 4.3. As discussed below, earthquakes have been documented in the area in and around the ISP site. Therefore, the ER must evaluate the impacts of earthquakes at the proposed site.

10 C.F.R. § 72.103(b) requires that in areas of known potential seismic activity east of the Rocky Mountain Front, seismicity must be evaluated for a nuclear waste storage facility. Section 72.103 goes on to specify other requirements for evaluating the earthquake potential and impacts for a waste site. Section 72.103(f)(1) states:

> The geological, seismological, and engineering characteristics of a site and its environs must be investigated in sufficient scope and detail to permit an adequate evaluation of the proposed site, to provide sufficient information to support evaluations performed to arrive at estimates of the DE [design earthquake ground motion], and to permit adequate engineering solutions to actual or potential geologic and seismic effects at the proposed site.
>
> **********
>
> (2). . . The geologic and seismic factors considered for design must include a determination of the DE for the site, the potential for surface tectonic and nontectonic deformations, the design bases for seismically induced floods and water waves, and other

design conditions as stated in paragraph (f)(2)(iv) of this section.

**********

(i) Determination of the Design Earthquake Ground Motion (DE).

(ii) Determination of the potential for surface tectonic and nontectonic deformations.

(iii) Determination of design bases for seismically induced floods and water waves.

(iv) Determinations of siting factors for other design conditions.

There is a published study conducted by scientists at the University of Texas and Southern Methodist University showing the increased incidents of earthquakes induced by fossil fuel extraction in the area of the ISP CIS facility. Frohlich, et al., A Historical Review of Induced Earthquakes in Texas, Seismological Research Letters, V. 87, No. 4, July/August 2016, found at www.jakewalter.net/papers/ Frohlichetal2016.pdf.

Drilling for oil and natural gas has increased significantly in and around the site of ISP's proposed CIS facility in recent years. A map showing the intense drilling in the area is attached as Ex. 1. This drilling activity makes the underground area unstable and induces earthquakes. A recent study by Stanford University researchers has

documented the existence of prior earthquakes in west Texas, and more importantly, the existence of numerous faults in the area in and around the proposed ISP site. The study can be found at scits.stanford.edu/sites/default/files/3702_tss_lundsnee_v2.pdf.

The ISP ER, 3.3.3-3.3.4, contains a discussion of vibratory ground motion and faulting and concludes that there is essentially no chance of an earthquake in the area. But the ER makes no mention of induced earthquakes as documented in the above cited studies. The assessment of earthquake potential in the ER is inadequate.

SAR

ISP states in Section 2.6.2 of the Safety Analysis Report (SAR) that it conducted a Seismic Hazard Evaluation, which is found in Attachment D of the SAR. However, members of the public, including Sierra Club, cannot address the contents of that evaluation because Attachment D consists of several blank pages with the designation that the information is being withheld pursuant to 10 C.F.R. § 2.390.

The Frohlich et al. references cited above document the occurrence of earthquakes of magnitude 3 or higher in and around the ISP site since 1975. There is no indication in the portion of the SAR available to the public that shows

that ISP adequately evaluated the earthquake potential as required by 10 C.F.R. § 72.103(f)(1).

10 C.F.R. § 72.103 requires a discussion and analysis of the seismological characteristics of the proposed CIS site because of the obvious impact earthquakes would have on the safe operation of the facility. The failure of ISP to undertake the required seismological analysis violates this requirement.

CONTENTION 7

An ER is required to discuss alternatives to the proposed action. Pursuant to NEPA, this includes an examination of the no-action alternative. The discussion of the no-action alternative in the ISP ER is deficient because it does not discuss safer storage methods at the reactor sites, such as HOSS, nor does it acknowledge the NRC's Continued Storage Rule that concludes that waste can be safely stored at the reactor site indefinitely.

Basis for the Contention

The ER, and eventually the EIS prepared by NRC, must examine all reasonable alternatives, including the no-action alternative. This requirement is meaningless unless the no-action alternative is thoroughly and objectively evaluated. Only then can the proposed action be properly evaluated.

Facts Upon Which Petitioner Intends to Rely In Support of This Contention

The ER discusses the no-action alternative in Section 2.1. That discussion states that if the ISP proposal is not

# Tab 8

# Geologic Review of Interim Storage Partners LLC WCS Consolidated Interim Storage Facility Environmental Report

Patricia Bobeck
PhD, PG.

October 25, 2018

STATE OF TEXAS
PATRICIA BOBECK
GEOLOGY
License # 1068
LICENSED PROFESSIONAL GEOSCIENTIST

Patricia Bobeck
10/29/18

This report is an evaluation of the Environmental Report that is part of a license application submitted by Interim Storage Partners LLC for the proposed construction of a Consolidated Interim Storage Facility at Waste Control Specialists property in Andrews County Texas. This report addresses soil and groundwater at the site and impact to these materials in the event of rupture of spent nuclear fuel casks to be stored at the site under the license proposal. This report seeks to answer the question: Does the Environmental Report section of the License application adequately and thoroughly evaluate the impact of cask rupture & discharge of radioactive material to ground and groundwater at the WCS site?

This review focuses on two main topics:

Part A. The applicant's characterization of the type of radioactive material that could potentially be released by cask rupture.

Part B. The applicant's evaluation of the nature of surface geologic materials and groundwater at site.

**Part A.** The applicant's characterization of the type and amount of radioactive material that could potentially be released. To be complete, this characterization must also consider a) the time span of 60 to 100 years over which the releases could occur, and b) all events that could trigger a release.

The ER does not address two potential causes of potential releases: a) effects of seismicity resulting from hydraulic fracturing in this region where oil production is a primary industrial activity, and b) impact of a terrorist attack, for example, an aircraft striking the casks as they sit on the concrete pad at the site. While the risks of either of these may be small in a given year, the risk of such an incident increases over 100 years.

A discussion of the type and amount of materials that could be released from spent nuclear fuel casks as a result of such incidents are beyond the scope of this geologic review, but a number of substances, both airborne and particulate, could impact surface and subsurface geological materials and groundwater at the site and in the region. Constituents that fall to the ground can infiltrate with water and move as groundwater does.

**Conclusion Part A**

The ER does not address two potential scenarios of cask rupture and release of radioactive materials at the site.

**Part B.** This part of the review covers the applicant's characterization of the nature of surface geologic materials and groundwater. Primary topics are the report's identification of geological units, characterization of groundwater resources (including the Ogallala Aquifer), surface water flow, and preferential infiltration pathways. Both the Environmental Report (ER) and the Safety Analysis Report (SAR) of the license application contain information about site geology; this evaluation refers the SAR where it pertains to geology.

The Ogallala/OAG and the Dockum Group lie beneath the Consolidated Interim Storage Facility (CISF) site. The Ogallala aquifer is the largest aquifer in the United States and a major aquifer under the Texas High Plains. It consists of sand, gravel, clay and silt and has a maximum thickness of 800 feet. Availability of Ogallala water is critical to the regional economy because it is used for irrigation (Texas Water Development Board (TWDB) Report 380, p. 51). The Dockum Group is classified as a minor aquifer. It is composed of four units and consists of gravel, sandstone, mudstone, shale and conglomerate. Groundwater is most abundant in the coarse grain sediments located at the base of the group (TWDB Report 380, p. 97).

**B.1** The ER does not clearly identify the geologic units present at the site, or the tops and bases of the units, although it does contain various subsurface investigations that describe the units in different ways. These portions of the report include the following:

i) 15 monitoring wells/piezometers installed in 2005-2009 in the CISF area (Figures 3.3-1 through 3.3-3). Figure 3.3-1 talks about depth to top of "Red Beds", but this terminology does not appear on cross sections 3.3-2 and 3.3-3. Instead, the cross sections have terminology such as claystone, sandy gravel, gravelly sand, caliche. This section of the ER does not adequately identify the subsurface materials at the CISF site.

ii) 18 soil borings installed in the CISF and surrounding area are described in SAR Chapter 2 Attachment E, Section 3.1 Geologic Conditions and Appendix A. This section has a

list of geologic materials present at the site but does not identify the geologic units on boring logs.

iii) Section 3.4.14 Subsurface Hydrology, which states that the shallowest water bearing unit is at a depth of 225 ft but does not identify it or the overlying units.

iv) The exception is Safety Analysis Report (SAR) Figure 2-14, the Hobbs Geologic Atlas of Texas, which indicates with certainty that the Ogallala formation is present at the ground surface at the WCS site.

The ER does not adequately identify the geologic units that underlie the site, the depths of their tops and bases, and their thicknesses. The analysis of the geologic materials present at and below the site and the formations that may contain groundwater is central to determining the fate and transport of any radioactive material carried across the site either as surface runoff or that might fall as radioactive dust on the ground surface.

**B.2** The ER does not clarify the connection between the Ogallala Formation mapped at the site, its relationship to the OAG (Ogallala, Antlers, Gatuña undifferentiated) at the site, or the Ogallala Aquifer, or the hydraulic connection of this southern portion of the Ogallala to the central portion of the main Ogallala Aquifer located to the north.

i) Fig. 2-14 of the SAR consists of The Hobbs Sheet of the Geologic Atlas of Texas and accompanying documentation. This geologic map indicates that the Ogallala formation is present at the ground surface at the WCS site. This map was published in 1976, likely prior to the purchase of the site for waste disposal purposes.

ii) Section 3.4.13 of the ER discusses various terminology used to describe the High Plains Aquifer, the principal west Texas aquifer, which consists of the Tertiary Ogallala Formation and underlying Cretaceous strata. This section further states that Ogallala aquifer is used interchangeably with the High Plains aquifer since the Ogallala aquifer is the primary component of the High Plains aquifer. The author states that regionally the strata of the Tertiary Ogallala and Gatuña, and Cretaceous Antlers are distinct, but that locally these sands, gravels and sandstones make up a single hydrostratigraphic unit called the OAG that overlies the Triassic Dockum Formation. The ER does not clearly set forth its approach for discussing the relationship between the OAG and Ogallala Aquifer.

iii) In Section 3.3.1, the ER states that the OAG is present at the site but does not identify the OAG on Figures 3.3-1, 3.3-2, and 3.3-3, which show cross sections of piezometers and monitor wells in the area of the proposed CISF. The ER does not indicate the depth and thickness of the unit (the OAG) or explain its relationship to the larger Ogallala Formation and Ogallala Aquifer.

iv) The table associated with Figure 3.3-1 shows that depths to the top of the Red Beds range from 47 to 93 feet. The table and narrative do not indicate whether these depths are the top of the Dockum. The table does not indicate whether the Dockum is the unit called "claystone" in Fig. 3.3-3 or if the top of the Dockum corresponds to the base of the caliche. Furthermore, the report does not indicate if the thickness of 47-93 ft. is the thickness of the OAG under the CISF. This section of the ER does not adequately identify the lithologies at the site or their lateral extent.

v) A comparison of Figs 3.3-1 and 3.4-2 shows that OAG groundwater flows offsite to the northeast. Both "Saturated OAG Wells" (PZ-47, PZ-57) shown on Fig. 3.4-2 cross the greatest thicknesses of OAG (per previous discussion, 87 and 93 ft depth to top of Red Beds, respectively). These two wells also contain two of the three thickest sand intervals recorded in these wells (20 ft.). This leads the reader to draw the conclusion that groundwater within the OAG unit flows to the northeast. The ER does not provide any additional information about the area northeast of the CISF and potential offsite movement of this groundwater, which would be vitally important in the event of its contamination.

vi) Figures 3.3-1, 3.3-2, and 3.3-3 also indicate that claystone occurs at greater depth to the east and north of the CISF, and is overlain by sandy gravel and gravely sand to the east and north of the CISF. The ER does not identify these units or their relation to local and regional groundwater. It appears that any groundwater flowing on top of this unit will flow to the east and north (northeast), as shown in Fig 3.4-2. The ER does not adequately address groundwater flow in the northeastern part of the CISF and the area northeast of the CISF, which in the event of a release, would be the areas with high levels of contamination.

vii) Figure 3.4.2 shows an isolated perched area that existed in 2008 surrounding two wells (TP-77 and TP 87) that have the shallowest depths to the top of the red beds (43, 45 ft., respectively). These do not appear on the cross sections Figs 3.3.2 and 3.3.3. These areas of perched groundwater can enlarge during times of abundant rainfall and could result in a

continuous shallow groundwater layer at the site. The ER does not provide information on the historical fluctuation of this shallow perched water zone, which would be highly contaminated in the event of a release from the CISF, or the potential movement of this groundwater.

viii) Further in section 3.4.14, the author states that the shallowest water bearing zone at the site is at a depth of about 225 ft., but does not identify it or describe the materials between the surface and the depth of 225 ft. The ER does not identify the units or the characteristics of the units between the surface and the depth of 225 ft. As a result, the ER does not provide adequate information on the porosity and permeability of these materials and the ability of contaminants to infiltrate them.

ix) Figure 3.4.3 is an east-west cross section that shows between 200 and 250 feet of the Ogallala Formation to lie directly on top of the Dockum in the western part of Gaines County and to overlie the Edwards Trinity in the eastern part of Gaines County. This cross section does not, however, cross Andrews County, so the reader can glean no information about the WCS site from this cross section. Figure 3.4.4 shows a north-south cross section that depicts the Ogallala Formation as directly overlying the Dockum in Andrews County. This section shows the thickness of the Ogallala to be approximately 100 feet. However, the reference map on these cross sections does not show the outline of Andrews County, so it is not possible to make an approximation as to whether the information is valid for the CISF site.

x) Section 3.4.14.1 states that the southern and eastern limits of the OAG aquifer lie to the north and east of the proposed CISF, but does not provide supporting evidence for this statement. This appears to contradict the statement cited above in bullet iii). The ER does not identify the presence/absence of the Ogallala Formation/Ogallala Aquifer at the site, or the connectedness of the subsurface materials at the site with the Ogallala Aquifer.

**B.3** The ER describes surface flow as moving in multiple directions from east to west, including E, SE, S, SW, and W. Section 2.2.1 of the ER states that the proposed CISF will be located on relatively flat ground that gently slopes upward to the north. Section 3.4 of the ER states that the WCS site is on the southwestern slope of surface water drainage between the Pecos and Colorado rivers, and that in the vicinity of the CISF the slope is SW toward Monument Draw. Section 3.2.1 states that regionally the site is on a gently southeastward sloping plain with a natural slope of about 8 to 10 ft per mile. Section 3.4.1 describes the area as

characterized by ephemeral drainages, sheet flow, minor gullies and rills, internally-drained playas and a salt-lake basin.

i) Section 2.2.1 of the ER states that at the CISF location, elevations range from 3416 ft to 3496 ft above mean sea level (msl). However, Fig 2 of the SAR Chap 2, Attachment E shows the site to be at elevations ranging from approx. 3487 ft to approx. 3496 ft. This is a significant difference in the amount of relief at the site: 80 ft vs 9 ft. The ER does not consistently identify the slope of the area, which controls surface water flow.

ii) Section 3.4 states that the proposed CIFS is on the southwestern slope of a drainage divide; the slope is downward to the southwest toward Monument Draw, NM, which is 3 mi from the proposed CIFS. Monument Draw drains internally, meaning that surface water infiltrates into the subsurface along Monument Draw, in Winkler County according to Section 3.4. The Eunice NE 7.5-minute topographic map shows that the head of Monument Draw is approximately 3 miles southwest of the proposed CISF; it appears that surface water flow in that direction from the CISF could encounter Baker Spring. The ER does not address the impact of a release of contaminants and their surface flow toward Monument Draw.

iii) The ER does not discuss whether surface water flows from the CISF site southwest to Baker Spring. Section 2.2.1 indicates that Baker Spring is located 1 mi (1.6 km) southwest of the CISF. Section 3.4.1 states that two small surface draws empty into the Baker Spring depression, which is the site of a former excavation of caliche caprock into the underlying red bed clays, not a natural spring; it is in contact with subsurface geologic materials and may perhaps act as a conduit to them. In the event of a release of airborne material, this area would a) likely receive a sprinkling of dust or b) receive released material via surface water flow. The ER does not address these potential impacts.

iv) Section 3.4.1 and Section 3.4.2 both state that the area northeast of the CISF flows eastward to a playa lake/salt-lake basin located within the permitted area (not clear if this is Waste Control Specialists permitted area = consisting of 1338 acres (542) ha.). This basin (In addition to "a few" others) are present within a 6.2 mi (10 km) radius of the CISF. This "destination" playa lake/salt-lake basin is described as a partially covered feature located 3 mi (4.8 km) east of the permitted area (again, it's not clear which permitted area this refers to). It is not clear if this is the "depression pond" shown on Figure 1.1-1 of the Safety Analysis Report Attachment B Floodplain Report. The report does not clearly indicate the locations of potential

preferential infiltration sites and does not adequately address the potential impact of a release on this area.

v) Section 3.4.1 describes another, larger surface depression within the permitted area as a 15-acre (56 ha) playa located 0.5 mi (0.8 km) northeast of the existing RCRA landfill. Again, the ER does not clearly address the locations of these features and does not adequately address the potential impact to these depressions in the event of a release.

vi) The paragraph describing these features in Section 3.4.1 appears to have been repeated in its entirety in Section 3.4.2, which is confusing to the reader.

vii) Section 3.4.1 discusses an ephemeral drainage feature called Ranch House Draw, which is shown on Figure 1.1-1 of the SAR Attachment B Flood Plain. Ranch House Draw crosses the area from east to west. Section 3.4.2 states that "most of the drainage from the area of the CIFS site is downslope toward Ranch House Draw with a small portion of the drainage from this area toward the southwest." This discussion provides additional evidence of a wide surface flow drainage area.

viii) The description of the "destination" basin corresponds to a basin located on the Jumbo Hill 7.5-minute topographic map. The basin appears to be at a surface elevation of about 3360 ft. in a steep-walled depression. The land surface dips in the direction of the basin and numerous valleys/vales on the map appear to direct surface water flow to this basin. In fact, Section 3.4.2 states that surface drainage from the area north and east of the proposed CISF flows eastward into this basin. Again, the ER does not clearly identify basins that could potentially receive contaminated surface flow.

ix) Section 3.4.1 mentions another ephemeral drainage feature, Ranch House Draw, which crosses the area from E to W. Section 3.4.1 states that "most of the drainage from the area of the CIFS site is downslope toward Ranch House Draw with a small portion of the drainage from this area toward the southwest."

Thus, it appears that surface water potentially flows in a radial pattern covering a radius of about 180°, from E to W, from the site. The piecemeal discussion of surface runoff makes it difficult to obtain an overall picture of surface flow at the site, and does not adequately characterize the impact of a release on this surface flow. In the event of a cask rupture, released

material/constituents deposited on the ground surface would spread over the entire 180° area, from east to west.

**B.4** The ER points out the presence of nearby playa lakes. As discussed in the previous section, surface runoff flows in the direction of numerous basins, playa lakes, and salt-lake basins. These depressions hold water after large precipitation events and facilitate infiltration to the subsurface in addition to evaporation and plant uptake, as described in Section 3.4.1.

1) Section 3.4.1 discusses an established playa basin on the eastern edge of the CISF site and that surface topography maps indicate approximately 10 ft of relief in the playa. The ER provides no other information on this playa. It is unknown whether this playa is one already described above in Section 3.4.1 or an additional playa.

ii) Playas mentioned in the ER include:

| Size | Location | Description/additional info |
|---|---|---|
| Unknown | 3 mi E of permitted area | destination of CISF surface drainage |
| 15 acre (6 ha) | 0.5 mi. NE of existing RCRA landfill | |
| unknown | Eastern edge CISF | established playa basin, 10 ft relief |

It is not known if this is a complete inventory of nearby playa lakes.
The ER does not evaluate the impact of a release of radioactive material on these playa basins and the resulting infiltration of contaminants into underlying groundwater.

**Part B. Conclusions**

The evaluation focused on four aspects: lithology, water bearing units, surface water flow and preferential infiltration basins. The ER does not adequately define the geologic units present at the site or their properties and extents. The ER does not characterize the relationship between the OAG materials present at the site with the larger Ogallala Formation. The ER does not evaluate the degree to which groundwater present under the CISF site within the OAG or Ogallala Aquifer might be in connection with the greater Ogallala Aquifer. The ER does not adequately discuss the impact of a release on surface water flow and its effect on playa basins.

**Overall Conclusion**

The conclusion of this review is that the Environmental Report fails to provide the basic information necessary to adequately and thoroughly address the impact of cask rupture and discharge of radioactive material to ground and groundwater at the Interim Storage Partners site.

# Tab 9

Follow Us:

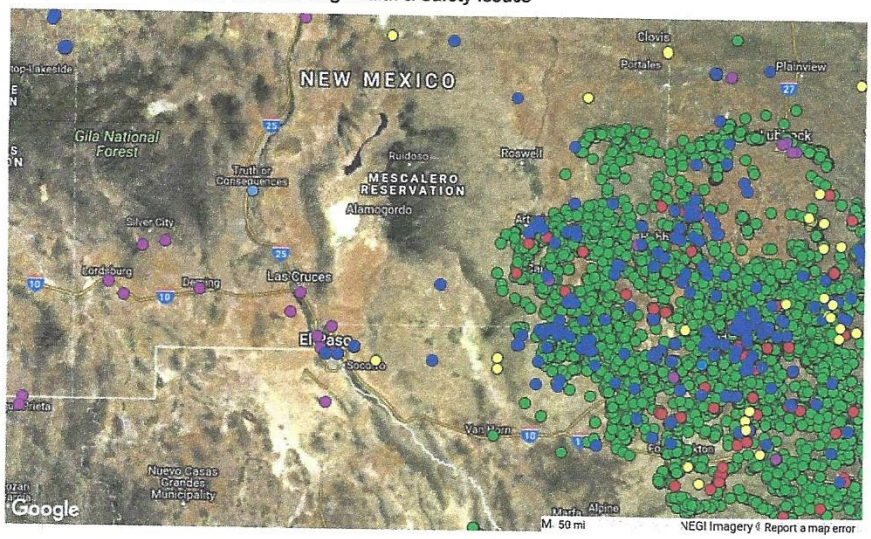
Drilling Maps

Share Health & Safety Issues Near Oil & Gas Drilling Sites

Home | How To Use Map | Power Plants | Refineries | Fracking Sites | New Mexico Solar Map | About | Blog | Data | Contact

Map of New Mexico Oil & Gas Fracking Health & Safety Issues

Like 1 Tweet Share 75




- Drilling

**Report New Mexico Health & Safety Oil & Gas Fracking Issues**

1 Blue Dots = Oil & Gas Health or Safety Issue Reported
2 Oil & Natural Gas Drilling Sites, Power Plants, Renewable Energy, Refineries
3 Add pin, enter address, describe health issue(s) & number of people
4 Share map with friends, family & Gov't officials
Detailed Video Instructions

Click on the dots above and navigate to the State maps below to learn more about each energy operation and issue.

United States, Africa, Alabama, Arkansas, Asia, Australia, Austin, Bakken, Bakersfield, Baldwin Hills, Barnett, Boulder, Brazil, California, Canada, Carson, China, Colorado, Dallas, Denver, Eagle Ford, Europe, Farmington, Fayetteville, Florida, Georgia, Haynesville / Bossier, Houston, Hermosa Beach, Huntington Beach, Idaho, Iowa, Illinois, Indiana, Iran, Iraq, Kansas, Kentucky, La Habra, Los Angeles, Long Beach, Louisiana, Maine, Marcellus, Maryland, Massachusetts, Mexico, Michigan, Middle East, Minnesota, Missouri, Mississippi, Montana, Nebraska, New Albany, New Hampshire, New Orleans, New Jersey, New Mexico Nevada, New York, Niobrara, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Orange County, Pennsylvania, Philadelphia, Pittsburgh, Playa Del Rey, Qatar, Russia, Santa Barbara, Saudi Arabia, South America, South Carolina, South Dakota, Tennessee, Texas, United Kingdom (UK), Uinta Basin, Utah, Venezuela, Virginia, Washington, Whittier Hills, Wilmington, Wisconsin, West Texas, West Virginia, Woodford, Wyoming

**Discuss Oil & Gas Fracking Issues in New Mexico**

0 Comments Drilling Maps Login

Recommend 1 Share Sort by Newest

Start the discussion…

LOG IN WITH OR SIGN UP WITH DISQUS ?

Name

Be the first to comment.

Subscribe Add Disqus to your siteAdd DisqusAdd Privacy

Privacy Policy | Legal Notice | Copyright @ 2012 - 2018 | Syndicated Maps | Dead Cell Zones | Photo Enforced | Bad Intersections | Solar Energy Maps | Refinery Maps | Sick Buildings | Disaster Relief | Dangerous Schools | Power Plant Maps

EXHIBIT
1
PENGAD 800-631-6989

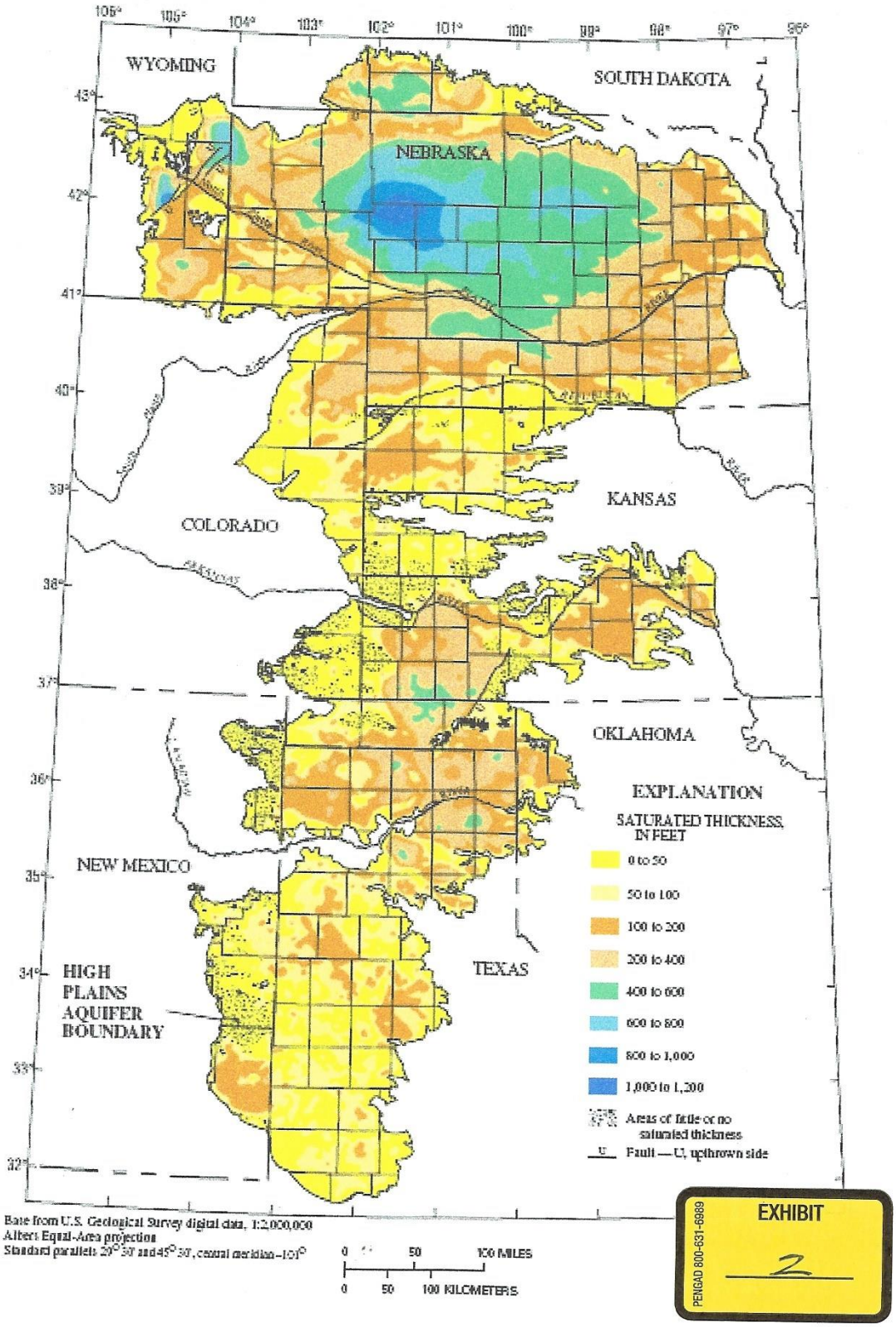



EXHIBIT
2
PENGAD 800-631-6989

*Figure 14. Saturated thickness of the High Plains aquifer, 2000. (Modified from Weeks and Gutentag, 1981.)*

# Tab 10

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**

| | | |
|---|---|---|
| In the Matter of | ) | Docket No. 72-1050 (NRC-2016-0231) |
| Interim Storage Partners LLC | ) | |
| (Consolidated Interim Storage Facility) | ) | November 13, 2018 |
| | ) | |

* * * * *

**PETITION OF DON'T WASTE MICHIGAN, CITIZENS' ENVIRONMENTAL COALITION, CITIZENS FOR ALTERNATIVES TO CHEMICAL CONTAMINATION, NUCLEAR ENERGY INFORMATION SERVICE, PUBLIC CITIZEN, INC., SAN LUIS OBISPO MOTHERS FOR PEACE, SUSTAINABLE ENERGY AND ECONOMIC DEVELOPMENT COALITION AND LEONA MORGAN. INDIVIDUALLY, TO INTERVENE, AND REQUEST FOR AN ADJUDICATORY HEARING**

## I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.309, 10 C.F.R. Part 72, and the hearing notice published by the Nuclear Regulatory Commission ("NRC or Commission") at 83 Federal Register 44070 (August 29, 2018), Petitioners Don't Waste Michigan, Citizens for Alternatives to Chemical Contamination, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Nuclear Energy Information Service, Citizens' Environmental Coalition, and Sustainable Energy and Economic Development (SEED) Coalition, ("DWM," "CACC," "PC," 'SLOMFP," "NEIS," "CEC," and "SEED") and Leona Morgan, an individual (collectively, "Petitioners") hereby petition and move for leave to intervene and request a hearing before the Nuclear Regulatory Commission on the application of Interim Storage Partners/Waste Control Specialists ("ISP" and "WCS") for a license to construct and operate the WCS Consolidated Interim Spent Fuel Storage Facility in Andrews County, Texas ("ISP CISF," "WCS CISF," "WCS" or "ISP").

found in the record of the Yucca Mountain NRC proceeding;[8] and (2) the map known as Figure 2.2-4 on p. 2-71 of the ISP Environmental Report, which identifies expected mainline rail routes by corporate ownership.

In order for Petitioners to meaningfully participate in the NEPA process, and for state and local government officials and emergency response personnel to comprehend the scope of this vast SNF shipping campaign, there must be complete disclosure of all probable transportation routes, along with quantities of SNF and the likely radioisotopic contents. This is necessary for several purposes: to determine whether Environmental Justice populations (people of color and low/moderate income people) may be disproportionately affected by shipments of SNF and GTCC waste; to ascertain whether there may be more efficient routing alternatives available; to determine the need for infrastructure upgrades or replacement actions on anticipated routes; and to promote assessments of risks to public health and property by those who will be asked to assume the burdens.

***C. Failure to Address Planned Transportation in the ER Comprises a Legal Omission***

The exclusion of disclosure and analysis of the transportation aspects of the ISP project creates a contention of omission. Where a contention alleges the omission of material information or an issue from an application, the contention remains a live controversy until and unless the information is later supplied by the applicant, which renders the contention moot. *Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-06-16, 63 NRC 737,

---

[8]http://www.state.nv.us/nucwaste/news2017/115th%20Congressional%20Districts%207252017.pdf (at page 3); http://www.state.nv.us/nucwaste/news2017/State%20Maps.pdf; https://www.nirs.org/wp-content/uploads/factsheets/mibargefactsheet92804.pdf; http://www.state.nv.us/nucwaste/news2017/pdf/Cities Affected.pdf

742 (2006). When a contention of omission has been met with provision of the missing information, the intervenor if it wishes to raise specific challenges regarding the new information may timely file a new contention that addresses the admissibility factors in 10 C.F.R. § 2.309(f)(1). *Oyster Creek*, LBP-06-16, 63 NRC at 744; *Entergy Nuclear Vermont Yankee, L.L.C. and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Plant), LBP-05-24, 62 NRC 429, 431-32 (2005).

***D. Failure to Address Transportation Impacts in the NEPA Document Comprises Unlawful Segmentation of the Project***

The ISP storage facility in Texas cannot be separated from the need for physical delivery of SNF and GTCC waste to be delivered there in order for interim storage to take place. Separating consideration of the transportation component from the storage component breaks the project up into pieces segments it and consequently the overall project cannot be logically analyzed. "Segmentation is an attempt to circumvent NEPA by breaking up one project into smaller projects and not studying the overall impacts of the single overall project." *Stewart Park & Reserve Coal., Inc. (SPARC) v. Slater*, 352 F.3d 545, 559 (2d Cir. 2003).

The "scope" of an EIS is defined as "the range of actions, alternatives, and impacts to be considered in an environmental impact statement." 40 C.F.R. § 1508.25.The NRC regulation governing the scope of the EIS, (10 C.F.R. § 51.29(a)(1)), states that the agency should use the provisions of a CEQ regulation, 40 C.F.R. § 1502.4, for that purpose. Section 1502.4 in turn directs that

> [a]gencies shall use the criteria for scope (§ 1508.25) to determine which proposal(s) shall be the subject of a particular statement. Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement.

this consequence must be considered in an EIS.'" *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1378 (9th Cir.1998) (quoting *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1312 (9th Cir.1990)); 40 C.F.R. § 1508.25(c)(3).

Accordingly, the scope of the EIS should include investigation and analysis under NEPA of the ISP CISF as a potential permanent repository, located at the surface in west Texas.

**Contention 11: Having No Dry Transfer System And No Radioactive Emissions Mitigation Plan For ISP's CISF Are Impermissible Omissions Under the AEA And Must Be Addressed Under NEPA**

Petitioners hereby incorporate all of the claims, allegations and assertions set forth above as if fully rewritten herein.

ISP's plan to not have a dry transfer system ("DTS") or other technological means of handling problems with damaged, leaking or externally contaminated SNF canisters or damaged fuel in the canisters at the WCS site, from the date of commencement of operations, contradicts the expectations of the Continued Storage GEIS, and the unanalyzed risks, and increased possibilities of minor to severe radiological accidents must be addressed in the Environmental Impact Statement. There is no plan for radiation emissions mitigation or radioactive releases at the CISF site. These refusals to contingently prepare for radiological problems at the site are a byproduct of ISP's "start clean/stay clean" policy, are unrealistic and must be addressed in the EIS as well as in licensing conditions.

***Basis for the Contention***

Joint Petitioners hereby incorporate all of the claims, allegations and assertions set forth above as if fully rewritten herein.

ISP invokes the Continued Storage GEIS to excuse or prevent analysis of the

environmental impacts of constructing, operating and decommissioning the CISF from the standpoint of radiological dangers. But there are very real, unacknowledged or under-recognized radiological threats and problems posed by such things as high burnup fuel, as well as inherent dangers arising from the handling and transfer of spent nuclear fuel. The WCS license is for a site-specific ISFSI. ISP's "start clean/stay clean" policy must be analyzed in the environmental document. Failure to have a functioning DTS from inception of operations at the WCS site violates the Atomic Energy Act obligation to protect the public.

***Facts Upon Which Joint Petitioners Intend to Rely In Support of the Contention***

There are potential radiological dangers and consequential waste management concerns which will arise from the point of commencement of operations at the ISP CISF.

ISP plans to operate the CISF as a "start clean/stay clean" facility. This means

> The facility is configured and will be operated as a "clean" facility. All components of the facility including the transport casks and storage canisters are designed to minimize the potential for any contamination. Continual radiological survey throughout the life of the facility will be performed to identify any possible contamination and to verify that the facility remains clean.

License Application p. 2-1. The plan further is for there to be very selective screening of SNF canisters at the reactor sites to determine which may be transported to ISP's facility in Texas, to consciously avoid taking on canisters with damaged or unstable fuel, external contamination or leaks. *Id.* The scheme is that the canisters, once sealed and shipped to the CISF, will remain stable and undamaged until transported away to a geological repository.

Consistent with the "start clean/stay clean" ideal, the Emergency Response Plan for the CISF contains no provisions for "emissions mitigation" (*i.e.*, reduction of emissions or releases to the surrounding environment of radiation and/or radioactive material from SNF as a result of

damage to SNF assemblies and/or SNF containers).

But there are complications in the receipt and oversight of spent nuclear fuel that are not fully acknowledged by ISP/WCS. Among the radiological red flags is the determination by Joint Petitioners' expert Robert Alvarez, "WCS recognizes the concerns and uncertainties surrounding high burnup spent nuclear fuel by stipulating in its license application that, 'all fuel with assembly average burnup greater than 45 GWd/MTHM [Giga-watt days per Metric Ton Heavy Metal] shall be canned inside the canister.'" Alvarez Report at 5. Alvarez points to the Nuclear Waste Technical Review Board's (NWTRB) 2010 warning that "the damaged and unknown state of cladding at any point of time during dry storage" raises "a possibility that accidents or handling could fail weakened fuel-rods" and that "the uncertain hydrogen embrittlement and delayed hydride cracking mechanism could result in additional failed cladding. The likelihood of the latter mechanism increases with time" and that "[a]ccordingly, cladding failure during dry storage and handling could present significant hazardous conditions to workers and especially if the used fuel needs to be handled."[47]

Mr. Alvarez identified further problems with high-burnup fuel:

> The uncertainties of storing a mix of high- and low burnup spent fuel in a canister are compounded by the lack of data on the long-term behavior of high burnup spent fuel. This problem was highlighted by the Nuclear Waste Technical Review Board, an expert panel that provides scientific oversight for the Energy Department on spent fuel disposal. That panel said there is little to no data to support dry storage and transport for spent fuel with burnups greater than 35 gigawatt days per metric ton of uranium. In a May 2016 letter to the Energy Department, the board raised elemental questions that should have been answered before the NRC and reactor operators took this leap of faith: "What could

[47]Quoting from "United States Nuclear Waste Technical Review Board, Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel," December 2010, P. 117. https://www.nwtrb.gov/docs/defaultsource/reports/eds-final.pdf?sfvrsn=8

> go wrong? How likely is it? What are the consequences?"[48] The board has yet to receive answers to those questions.

Alvarez Report p. 6-7.

To the overlay of HBU difficulty, Mr. Alvarez points out the coming management traffic jam at the reactor sites as well as at any participating CISF that packaging of SNF for geological repository disposal may require approximately 80,000 "small" canisters: "Existing large canisters can place a major burden on a geological repository such as: handling, emplacement and post-closure of cumbersome packages with higher heat loads, radioactivity and fissile materials. Repackaging expenses rely on the transportability of the canisters, but more importantly on the compatibility of the canister with heat loading requirement for disposal."[49]

In 2012, Energy Department researchers concluded that "waste package sizes for the geologic media under consideration …are significantly smaller than the canisters being used for on-site dry storage by the nuclear utilities."[50] A nuclear industry study concluded in 2014 that "casks and canisters being used by the power utilities will be at least partially, and maybe largely, incompatible with future transport and repository requirements, meaning that some, if not all, of the [used nuclear fuel] that is moved to dry storage by the utilities will ultimately need to be repackaged."[51]

---

[48]Quoting from Nuclear Waste Technical Review Board, Letter to John Kotek, Acting Assistant Secretary for Nuclear Energy, U.S. Department of Energy, May 23, 2016. https://www.nwtrb.gov/docs/default-source/correspondence/rce0516.pdf

[49]http://www.beyondnuclear.org/storage/kk-links/Alvarez%20SNF%20at%20closed%20reactors%20rev%202.pdf

[50]*Id.*

[51]Chris Phillips, Ivan Thomas and Steven McNiven, "Nuclear Industry Study on the Feasibility of Standardized Transportation, Aging and Disposal Canisters for Used Nuclear Fuel," Energy Solutions

Petitioners' expert Dr. Gordon Thompson[52] observes that "[o]ne manifestation of the United States' lack of a coherent SNF strategy is the lack of standardization of SNF containers." Despite the DOE's 2005 announcement that most of the SNF sent to the proposed Yucca Mountain repository would be delivered to the site "in standard canisters which are then placed in a waste package for emplacement, without handling individual fuel canisters," there still is no federal policy to implement repackaging into standardized SNF containers at reactor sites or a CISF. Thompson 2018 Declaration at 8.

Besides the repackaging quandary caused by the imperatives of geological disposal, Dr. Thompson identifies the prospect of SNF damage en route to the CISF:

> NRC's GEIS acknowledges that SNF could be damaged prior to entry into storage, or during storage. The GEIS discusses that issue in connection with the provision of a capability to repackage SNF, saying, in part:
>
> > "As stated in Section 2.1.4, one reason DTSs may be needed in the future is to reduce risks associated with unplanned events (e.g., the need to repackage spent fuel that becomes damaged or that becomes susceptible to damage while in dry cask storage). The NRC defines damaged spent fuel as any fuel rod or fuel assembly that can no longer fulfill its fuel-specific or system-related functions (NRC 2007). These functions include criticality safety, radiation shielding, confinement, and retrievability of the fuel. Appendix B of this GEIS describes spent fuel degradation mechanisms that could occur during continued storage. These include a mechanism (*i.e.*, hydride reorientation) in which high-burnup spent fuel cladding can become less ductile (more brittle) over time as cladding temperatures decrease. Taking actions (e.g., repackaging or providing supplemental structural support) can reduce risks posed by damaged fuel by

---

Federal EPC. WM2014 Conference, March 2-6, 2014, Phoenix, Arizona, USA. http://www.wmsym.org/archives/2014/papers/14011.pdf

[52]Dr. Thompson is a widely-acclaimed research scientist with a Ph.D. in mathematics. His *curriculum vitae*, 2018 Declaration and Declaration of 19 December 2013: Comments on the US Nuclear Regulatory Commission's Waste Confidence Generic Environmental Impact Statement, Draft Report for Comment (September 2013)," which is cross-referenced to his 2018 Declaration, have all been filed in the ISP docket.

> maintaining fuel-specific or system-related safety functions."[53]

> A similar statement could be made in regard to damage to SNF containers. NRC's GEIS acknowledges that the DTS design it describes, to illustrate present or anticipated capability to repackage SNF, "does not have the capability to handle damaged spent fuel." Nevertheless, says the GEIS, "international experience provides a broad understanding of the technical feasibility of various methods for handling damaged fuel." *In other words, the GEIS does not identify any available design of a DTS or equivalent system that could repackage SNF in the event of damage to SNF and/or an SNF container*.

Thompson 2018 Declaration at 6-7. Dr. Thompson also points out that a 2012 U.S. Department of Energy Report, from the Idaho National Laboratory, urges incorporation of a DTS function into the design work for development of a CISF:

> "Recommendation 2: A repackaging and remediation capability should be integrated into the design of future facilities where UNF [used nuclear fuel SNF] will be consolidated.
>
> > *A key objective is to ensure that UNF is transported to its final destination, or a destination with the necessary repackaging capabilities, before the need for repackaging arises. Although presently small, the likelihood of the need for a DTS to enable retrieval of UNF for inspection or repackaging will increase as the duration and quantity of fuel in dry storage increases. Stored fuel will eventually require remediation and/or repackaging for transport. Any large-scale repackaging operations that may eventually be necessary can be more safely and effectively conducted at a consolidated facility.*"[54]

Thompson 2018 Declaration at 7.

Dr. Thompson recommends that licensing conditions for receipt of SNF at a consolidated-storage ISFSI "include the establishment at the site of a DTS or equivalent system, and the successful testing of that capability using actual damaged SNF." He cites the following reasons, besides those discussed in the GEIS and the INL report, as calling for installation of

---

[53]Continued Storage GEIS, § 2.2.2.1.

[54]Carlsen and Raap, 2012, page 24.

DTS capability from the outset:

> (I) storage of comparatively aged SNF at the site;
> (ii) likely receipt at the site of damaged SNF assemblies and/or damaged SNF containers;
> (iii) likely occurrence, at the site, of damage to SNF assemblies and/or SNF containers; and
> (iv) the substantial lead time required to design, construct, and successfully test a DTS or equivalent system that could repackage SNF, including damaged SNF.

Thompson 2018 Declaration at 8.

Dr. Thompson concludes that an ISP CISF that lacks a DTS or equivalent capability to repackage SNF; fails to include in its Emergency Response Plan preparations for "emissions mitigation" (*i.e.*, reduction of emissions to the surrounding environment of radiation and/or radioactive material from SNF as a result of damage to SNF assemblies and/or SNF containers); and has the potential for SNF to remain at the site for the indefinite future, "would be likely to create significant adverse impacts on

> (I) the general welfare, as stated in the Atomic Energy Act;
>
> (ii) the common defense and security, as stated in the Atomic Energy Act; and/or
>
> (iii) environments and human populations affected by the facility

Thompson 2018 Declaration at 17-18.

Dr. Thompson further foresees that there will more likely than not be damaged SNF assemblies and containers arriving at the site as a result of accident, attack, or slow degradation. The absence of repackaging capability at the site, and the absence in the ISP Emergency Response Plan of preparations for emissions and releases mitigation would cause the affected SNF assemblies and/or SNF containers to remain at the site in a damaged condition, or to be transported elsewhere in a damaged condition. These circumstances, he cautions, would

result in "radiation exposure of workers and members of the public at dose levels exceeding permissible routine exposures, or at dose levels exceeding Protective Action Guides for emergency response; radioactive contamination of the surrounding environment, on-site and/or off-site, at levels requiring remedial action; and/or financial costs substantially exceeding the costs of routine operation of the ISP facility." *Id.* at 18.

Dr. Thompson further predicts there would be damage to SNF fuel assemblies and/or containers at the ISP site, as a result of accident, attack or slow degradation. He foresees that likely modes of attack would include "initiation of a 'cask fire' involving sustained burning in air of the zircaloy cladding of SNF, causing release from SNF to the atmosphere of radionuclides including cesium-137;" "initiation of a 'non-fire release' involving release from SNF to the atmosphere of radionuclides but without the occurrence of a sustained zircaloy fire," which he further states could occur from an accident or slow degradation. He continues, "Given the absence of repackaging capability at the site, and the absence in the ISP Emergency Response Plan of preparations for emissions mitigation, the affected SNF assemblies and/or SNF containers would remain at the site in a damaged condition, or would be transported elsewhere in a damaged condition." Thompson 2018 Declaration at 18-19.

The expected impacts foretold by Dr. Thompson include

> (I) radiation exposure of workers and members of the public at dose levels exceeding permissible routine exposures, or at dose levels exceeding Protective Action Guides for emergency response;
>
> (ii) in the event of a cask fire, radioactive contamination of the surrounding environment at levels comparable to contamination levels in the vicinities of the Chernobyl reactor after its 1986 accident and the Fukushima reactors after their 2011 accident, thereby creating various adverse impacts on humans and their environment;
>
> (iii) in the event of a non-fire release, radioactive contamination of the surrounding environment, on-site and/or off-site, at levels requiring remedial action; and/or

> (iv) financial costs substantially exceeding the costs of routine operation of the WCS facility.

Thompson 2018 Declaration at 19.

Notably, the presence of a DTS and radiation emissions procedures are key factors in helping to prevent, or at least to protect against or mitigate, the worst effects Dr. Thompson described.

The Commission will issue a license under 10 C.F.R. Part 72 upon determining "that the application for a license meets the standards and requirements of the Act and the regulations of the Commission, and upon finding that "[t]he applicant's proposed operating procedures to protect health and to minimize danger to life or property are adequate." 10 C.F.R. § 72.40(a)(5). The Commission further must find that "[t]here is reasonable assurance that . . . [t]he activities authorized by the license can be conducted without endangering the health and safety of the public." 10 C.F.R. § 72.40(a)(13).

Moreover, 10 C.F.R. § 72.98 directs that:

> (b) The potential regional impact due to the construction, operation or decommissioning of the ISFSI or MRS must be identified. The extent of regional impacts must be determined on the basis of potential measurable effects on the population or the environment from ISFSI or MRS activities.
>
> ( c) Those regions identified pursuant to paragraphs (a) and (b) of this section must be investigated as appropriate with respect to . . . (3) Any special characteristics that may influence the potential consequences of a release of radioactive material during the operational lifetime of the ISFSI or MRS.

The ER, SAR and Emergency Response Plan lack awareness or analysis of the potential regional impacts and safety plans addressing surrounding populations and the environment, given the distinct prospect of the possible occasional arrival of damaged, externally contaminated or leaking SNF casks or canisters, the chances that fuel damage and/or cask/canister damage and

# Tab 11

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**Before the Atomic Safety and Licensing Board**

| | | |
|---|---|---|
| In the Matter of | ) | Docket No. 72-1050<br>NRC-2016-0231 |
| WCS Consolidated Interim Spent Fuel Storage Facility | ) | November 13, 2018 |
| | ) | |
| | ) | |

* * * * *

**EXPERT DECLARATION OF ROBERT ALVAREZ**

Terry J. Lodge, Esq.
316 N. Michigan St., Ste. 520
Toledo, OH 43604-5627
(419) 205-7084
Tjlodge50@yahoo.com
Counsel for Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, Petitioners

MEMORANDUM

**To:** Terry Lodge
**From:** Robert Alvarez
**Date:** October 22, 2018

**Re:** Comments on the Application for a License for a Consolidated Interim Spent Fuel Storage Facility by Waste Control Specialists LLC ( Docket No. 72-1050)

You have asked me to review the Application for a License for a Consolidated Interim Spent Fuel Storage Facility by Waste Control Specialists (WSC) LLC (Docket No. 72-1050).

I am familiar with the subject of spent power reactor fuel management and disposition and have experience with it as a senior federal official and have written about it in detail in several prior articles, which are attached to this memorandum.

I have extensive experience with the topic of spent power reactor fuel management in particular and with the workings of the Department of Energy more generally. While serving in the U.S. Department of Energy I was involved in providing analysis and other support to the Secretary of Energy regarding the storage and disposal of DOE and civilian spent nuclear reactor fuel. I currently serve as an Associate Fellow at the Institute for Policy Studies, and Adjunct Professor at Johns Hopkins University, where I teach a graduate course about nuclear non-proliferation.

I previously served as senior policy adviser to the Secretary of Energy and deputy assistant secretary for national security and the environment from 1993 to 1999. During this tenure, I led teams in North Korea to establish control of spent nuclear fuel containing weapons materials. I also coordinated the Energy Department's nuclear material strategic planning and established the department's first asset management program.

Before joining the Energy Department, I served for five years as a senior investigator for the US Senate Committee on Governmental Affairs, chaired by Sen. John Glenn, and as one of the Senate's primary staff experts on nuclear policies. In 1975, I helped found and direct the Environmental Policy Institute, a respected national public interest organization. I have published articles in *Science*, *Science and Global Security*, the *Bulletin of Atomic Scientists*, *Technology Review*, and *The Washington Post*. I have been featured in the television programs *NOVA* and *60 Minutes*. In 2003, as senior scholar at the Institute for Policy Studies, I co-authored an extensive report on reducing the storage hazards of spent power reactor fuel in the United States,[1] which subsequent reviews by the National Research Council have been in general agreement with regarding our findings. [2] [3]

---

[1] Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson, and Frank N. von Hippel, Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States, *Science and Global Security, 11:1–51, 2003*

[2] National Research Council, Board on Radioactive Waste Management, Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage, National Academies Press (2006)

## Failure to Accurately Address Life-Cycle Costs

In my opinion, the License Application by WCS falls far short of what is logically or legally required, in large part because it fails to address the life-cycle cost implications from the assumption of ownership by the federal government of commercial spent nuclear fuel. Transfer of title of 5,000 MT (Metric Tons) of power reactor spent fuel requires legislation and is very likely subject to annual funding authorization and appropriations. The terms and conditions of an interim spent nuclear fuel storage contract between the U.S. Government and WCS does not exist. Nor, is there any degree of certainty that such federal legislation transferring title will occur.

WCS is undertaking a highly speculative view of its pre-disposal responsibilities for spent nuclear fuel, which the United States Government will be presumed to own. Under the Nuclear Waste Policy Act (42 U.S.C. 10101 et seq ) "the *Contract for Disposal of Spent Nuclear Fuel and/or High-level Radioactive Waste"* states clearly that "the DOE has the responsibility, following commencement of operation of a repository…".[4]

In the absence of contract terms that are not established without new federal legislation this license application contains strong elements of speculation that are at odds with established research by the U.S. Department of Energy. Moreover, it is not the domain of the Nuclear Regulatory Commission (NRC) or WCS to speculate what the contractual requirements will be with the DOE or legislative stipulations by the U.S. Congress.

For instance, under Executive Order Order 13123, government agencies are required to use life cycle cost analysis (LCCA) to minimize the government's cost of ownership.[5] Over the life of the project, facility management cost is often two to three times higher than acquisition costs. For some 15 years, the U.S. Department of Energy has done life-cycle cost estimation for environmental restoration and waste management expenses at its nuclear sites in numerous Congressional Budget Requests.

Regardless, the estimated cost for an interim spent nuclear fuel storage facility of $424 million in construction, labor, storage and decommissioning costs cited by WCS,[6] significantly underestimates the costs from a detailed study for storage of 5,000 metric tons done for the U.S.

---

[3] National Research Council, Committee on Lessons Learned from the Fukushima Nuclear Accident for Improving Safety and Security of U.S. Nuclear Plants, Phase 2, National Academies Press (2016)

[4] U.S. Department of Energy, Contract for Disposal of Spent Nuclear Fuel and/or High-level Radioactive Waste, https://www.energy.gov/sites/prod/files/gcprod/documents/New_Standard_Contract.pdf

[5] U.S. Department of Energy, Guidance on Life-Cycle Cost Analysis Required by Executive Order 13123 April 2005

[6] Application for a License for a Consolidated Interim Spent Fuel Storage Facility byWaste Control Specialists (WCS) LLC (Docket No. 72-1050), June 18, 2018, pp. 1-5 & 1-6.

Department of Energy in May 2015 by the nuclear industry.[7] As Table 1 from the study shows, costs are about 5 times the amount cited by WCS in its license application. Life-cycle costs are not mentioned by WCS, but over 40 years range from $2.17 Billion to $2.437 billion (escalated value). Over 80 years the life cycle costs range from $4.252 billion to $4.691 billion (escalated value).

**Table 1**

**Pilot ISF Comparative Costs ($M) Using Commercial DPCs in a Low Seismic Area**

| Alternative | Capital Cost | Annual O&M Cost | D&D Cost | 40 Year LCC | 80 Year LCC |
|---|---|---|---|---|---|
| C-PAD | $780- $970 | $39 | $91 | $1,226<br>$2,177 (EV) | $1,429<br>$4,252 (EV) |
| C-STD | $809 - $998 | $40 | $93 | $1,269<br>$2,254 (EV) | $1,481<br>$4,411 (EV) |
| C-UGS | $793 - $990 | $39 | $118 | $1,152<br>$2,213 (EV) | $1,290<br>$4,293 (EV) |
| C-BGV | $784 - $1,252 | $39 | $187 | $1,178<br>$2,387 (EV) | $1,299<br>$4,657 (EV) |
| C-AGV | $838 - $1,383 | $39 | $181 | $1,222<br>$2,437 (EV) | $1,345<br>$4,691 (EV) |

Source: DOE/ Holtec International, CBI and Longenecker Associates, 2015

Subsequently, I identified the spent fuel from reactors, which matched the dry casks storage systems and other details WCS may deploy at its proposed storage facility based on DOE studies.[8] [9] Then on the basis of the 2015 nuclear industry study done for the DOE, costs were estimated based on spent nuclear fuel in storage systems at 11 closed reactors identified in the NRC license application made by WCS. As the table below shows, the life-cycle costs are significantly higher than indicated by WCS.

[7] Holtec International, CBI and Longenecker Associates, Task Order 15, Generic Design Alternatives for Dy Storage of Spent Nuclear Fuel, Prepared for the U.S. Department of Energy, May 15, 2015. https://www.energy.gov/sites/prod/files/2016/10/f33/to16-final-report_0.pdf

[8] U.S. Department of Energy, Preliminary Evaluation of Removing Used Nuclear Fuel from Shutdown Sites, Nuclear Fuels Storage and Transportation Planning Project, FCRD-2016-000478, September 2016.

[9] U.S. Department of Energy, Dry Storage Cask Inventory Assessment, Nuclear Fuels Storage and Transportation Planning Project, FCRD-NFST-2014-000602, Rev 2, August 2016.

**Table 2**
**Estimated Cost For Spent Nuclear Fuel in WCS-Designated Cask Types**

| Reactor | Assemblies | Metric Tons | 40 years | 80 years |
|---|---|---|---|---|
| Haddam Neck | 1019 | 413.5 | $179,848,984 | $ 351,220,675.00 |
| Duane Arnold | 2825 | 531 | $231,234,408 | $ 451,569,440.00 |
| Lacrosse | 333 | 38 | $16,547,848 | $ 32,315,704.00 |
| Oyster Creek | 4711 | 753 | $327,908,580 | $ 640,361,183.00 |
| Yankee Rowe | 533 | 127.2 | $55,391,745 | $ 108,172,566.00 |
| Maine Yankee | 1432 | 542.3 | $236,155,215 | $ 461,179,109.00 |
| Zion 1&2 | 2226 | 1019.4 | $443,917,807 | $ 866,911,275.00 |
| Kewaunee | 1335 | 518.7 | $225,878,131 | $ 441,109,357.00 |
| Songs 1,2&3 | 3855 | 1606.1 | 699,407,877 | $ 1,365,848,733.00 |
| TOTAL | 18269 | 5549.2 | $2,416,823,595 | $ 4,718,688,042.00 |

Sources:
Waste Control Specialists, License Application, Docket-72-150, FCRD-NFST-2014-000602, Revision 2 (2016,
DOE Generic Design Alternatives for. Dry Storage of Spent Nuclear Fuel , Appendix A-6 (2015)

Annual cost inflation =1.9%
Discount Rate=3.4%

## High Burnup Spent Nuclear Fuel

Significant uncertainties surround prolonged storage of high burnup spent nuclear fuel. This fuel generally contains a higher percentage of uranium-235, allowing reactor operators to effectively double the amount of time the fuel can be used. Once it is used, high burnup significantly boosts the radioactivity in spent fuel and its commensurate decay heat. Of concern is the damage that high burnup fuel may have on the cladding of the fuel. The Nuclear Regulatory Commission (NRC) and the nuclear industry do not have the necessary information to determine if prolonged storage of high burnup fuel may damage fuel cladding and create leakage. Even NRC admits, "there is limited data to show that the cladding of spent fuel with burnups greater than 45,000 MWd/MTU [Mega-watt days per Metric Ton Uranium] will remain undamaged during the licensing period."[10]

Research shows that under high burnup conditions, the zirconium cladding of the fuel rods may not be relied upon as a key barrier to prevent the escape of radioactivity, especially during prolonged storage in the "dry casks" that are the preferred method of temporary storage for spent fuel. High burnup waste reduces the fuel cladding thickness and a hydrogen-based rust forms on the zirconium metal used for the cladding, which can cause the cladding to become brittle and fail. In addition, under high burnup conditions, increased pressure between the uranium fuel pellets in a fuel assembly and the inner wall of the cladding that encloses them causes the cladding to thin and elongate. In addition, the same research has shown that high burnup fuel temperatures make the used fuel more vulnerable to damage from handling and transport;

[10] U.S. Nuclear Regulatory Commission, Standard Review Plan for Spent Fuel Dry Storage Facilities, Final Report NUREG-1567, March 2000. P. 6-15. http://www nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1567/sr1567.pdf

cladding can fail when used fuel assemblies are removed from cooling pools, when they are vacuum dried, and when they are placed in storage canisters. [11] [12] [13] [14] [15] [16]

The pickup and transportation order of spent fuel has yet to be determined. It has been assumed that the oldest would have priority, leaving sites with fresher and thermally hotter fuel that may be "trapped" at sites to cool down further. As of the end of 2013, data provided to DOE indicates that about 24 percent of some 244,000 spent nuclear fuel assemblies in the United States are high burnup. About 83 percent of some 58,745 high burnup assemblies, remained in pools.[17]

WCS recognizes the concerns and uncertainties surrounding high burnup spent nuclear fuel by stipulating in its license application that, "all fuel with assembly average burnup greater than 45 GWd/MTHM [Giga-watt days per Metric Ton Heavy Metal] shall be canned inside the canister."[18] The Nuclear Waste Technical Review Board (NWTRB) concluded in 2010 that given "the damaged and unknown state of cladding at any point of time during dry storage, there is a possibility that accidents or handling could fail weakened fuel-rods. Furthermore, the uncertain hydrogen embrittlement and delayed hydride cracking mechanism could result in additional failed cladding. The likelihood of the latter mechanism increases with time. Accordingly, cladding failure during dry storage and handling could present significant hazardous conditions to workers and especially if the used fuel needs to be handled."[19]

The uncertainties of storing a mix of high- and low burnup spent fuel in a canister are compounded by the lack of data on the long-term behavior of high burnup spent fuel. This problem was highlighted by the Nuclear Waste Technical Review Board, an expert panel that provides scientific oversight for the Energy Department on spent fuel disposal. That panel said there is little to no data to support dry storage and transport for spent fuel with burnups greater than 35 gigawatt days per metric ton of uranium. In a May 2016 letter to the Energy Department, the board raised elemental questions that should have been answered before the NRC and reactor

---

11 U.S. Nuclear Regulatory Commission, Rulemaking Issue, Notation Vote, Memorandum from: R.W. Borchardt, Executive Director for Operations, Subject: Proposed Rulemaking – 10CFR50.46c, Emergency Core Cooling System Performance During Loss-of-Coolant Accidents (RIN 3150-AH42), SECY-12-0034, March 1, 2012, p. 2. http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0034scy.pdf

12 Ibid.

13 Ibid

14 International Atomic Energy Agency, Impact of High Burnup Uranium Oxide and Mixed Uranium – Plutonium Oxide Water Reactor Fuel on Spent Fuel Management, IAEA Nuclear Energy Series, No.. NF-T-3.8, June 2011. P. 39. http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1490_web.pdf

15 Ibid.

16 Ibid. p.69.

[17] U.S. Department of Energy, Energy Information Administration, Nuclear Fuel Data survey, Form-859, 2013

[18] U.S. Nuclear Regulatory Commission, LICENSE FOR INDEPENDENT STORAGE OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE, NRC Form 588, Docket No.72-1050, page 2.

[19] United States Nuclear Waste Technical Review Board, Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel, December 2010, P. 117. https://www nwtrb.gov/docs/default-source/reports/eds-final.pdf?sfvrsn=8

operators took this leap of faith: "What could go wrong? How likely is it? What are the consequences?"[20] The board has yet to receive answers to those questions.

At sites like the San Onofre Nuclear Generating Station (SONGS), storage of about a third of spent nuclear fuel generated by reactors 2 & 3 will not be eligible for storage at the proposed WCS site. According to a DOE report, "there are 1115 uncanistered fuel assemblies from San Onofre-2 and -3 that have burnups greater than 45 GWd/MTHM. The San Onofre site has decided not to package these assemblies in damaged fuel cans."[21] As a result, the WCS license application indicates that it will not accept the high burnup spent fuel, from SONGS as well as other candidate sites, including Oyster Creek, Kewaunee, and Duane Arnold, unless it is considered *a priori* damaged and placed in more expensive double-shell canisters. The decision to forgo double-shell containment of high burnup spent nuclear fuel indicates that this material is likely to be "stranded" for decades, given the time frame required for research to assess long-term integrity. The NWTRB recommends "that a validation inspection program of both low and high-burnup fuels be instituted after 15 and 30 years of storage."[22]

At Maine Yankee and Zion, these high burnup used nuclear fuel assemblies are packaged in damaged fuel cans, which reduces the concern over the transportability of this high burnup fuel.[23]

## Repackaging for Disposal

Dry cask storage systems are either single purpose (storage only) or dual purpose (storage and transportation). None are currently licensed for disposal. "Direct disposal of the large canisters currently used by the commercial nuclear power industry is beyond the current experience base globally," a 2013 DOE study observes, "and represents significant engineering and scientific challenges."[24] A 2013 report by the staff of the Nuclear Waste Technical Review Board concludes, "repackaging the SNF may be a lengthy process and could impact operational schedules at the utility sites, at a consolidated storage facility, or at the repository, depending on where repackaging is performed."[25] It's not out of the question that if DOE assumes title for

[20] Nuclear Waste Technical Review Board, Letter to John Kotek, Acting Assistant Secretary for Nuclear Energy, U.S. Department of Energy, May 23, 2016. https://www.nwtrb.gov/docs/default-source/correspondence/rce0516.pdf?sfvrsn=15

[21] Op Cit Ref 9, p.229.

[22] Op Cit Ref 19, p.117.

[23] U.S. Department of Energy, Preliminary Evaluation of Removing Used Nuclear Fuel From Nine Shutdown Sites, PNNL-22418, April 30, 2013. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22418.pdf

[24] U.S. Department of Energy, Office of Nuclear Energy, Task Order 12: Standardized Transportation, Aging, and Disposal Canister Feasibility Study, June 14, 2013. https://curie.ornl.gov/system/files/documents/not%20yet%20assigned/STAD_Canister_Feasibility_Study_AREVA_Final_1.pdf

[25] U.S. Department of Energy, Nuclear Waste Technical Review Board, Staff Briefing Document, Framework for the Technical Workshop on the Impacts of Dry-Storage Canister Designs on the Future Handling, Storage, Transportation, and Geologic Disposal of Spent Nuclear Fuel in the United States, Washington, DC, November 18–19, 2013. http://www nwtrb.gov/meetings/2013/nov/framework.pdf

spent nuclear fuel for a pilot consolidated interim storage facility it may elect to do detailed development of repackaging as recommended by some in the nuclear industry.[26]

Under the Nuclear Waste Policy Act (42 USC 10101), which sets forth the process for disposal of high-level radioactive wastes, the U.S. Government cannot accept title to spent nuclear fuel until it is received at an open permanent repository site. According to the law, "the persons owning and operating civilian nuclear power reactors have the primary responsibility for providing interim storage of spent nuclear fuel from such reactors."[27] The U.S. Government Accountability Office reported in 2014: "per DOE, under provisions of the standard contract, the agency does not consider spent nuclear fuel in canisters to be an acceptable form for waste it will receive. This may require utilities to remove the spent nuclear fuel already packaged in dry storage canisters".[28]

In 2012, Energy Department researchers concluded that "waste package sizes for the geologic media under consideration…are significantly smaller than the canisters being used for on-site dry storage by the nuclear utilities."[29] A nuclear industry study concluded in 2014 that "casks and canisters being used by the power utilities will be at least partially, and maybe largely, incompatible with future transport and repository requirements, meaning that some if not all, of the [used nuclear fuel] that is moved to dry storage by the utilities will ultimately need to be repackaged."[30] Existing large canisters can place a major burden on a geological repository, such as: handling, emplacement and post closure of cumbersome packages with higher heat loads, radioactivity and fissile materials. Repackaging expenses rely on the transportability of the canisters, but more importantly on the compatibility of the canisters with heat loading requirements for disposal.

WCS has not included a repackaging capability in its license application. According to DOE research:

> **"Repackaging at reactors would be challenging** Operating sites: Impact operations- Shutdown sites: Build new facility or pools
>
> "**Repackaging at ISF [Interim Storage Facility] or repository would offer flexibility** Purpose-built facility (minimize dose, maximize throughput)
>
> "**Repackaging may impact transportation** Probably more canisters to move (if not performed at repository)

---

[26] Op cit Ref. 20

[27] 42 U.S.C. 10101, Sections 123 & 131.

[28] U.S. Government Accountability Office, Spent Nuclear Fuel Management: Outreach Needed to Help Gain Public Acceptance for Federal Activities That Address Liability, GAO-15.141, October 2014, P. 30. http://www.gao.gov/assets/670/666454.pdf

[29] Ibid.

[30] Chris Phillips, Ivan Thomas and Steven McNiven, Nuclear Industry Study on the Feasibility of Standardized Transportation, Aging and Disposal Canisters for Used Nuclear Fuel, Energy Solutions Federal EPC. WM2014 Conference, March 2-6, 2014, Phoenix, Arizona, USA. http://www.wmsym.org/archives/2014/papers/14011.pdf

> **Empty canisters, overpacks, and materials generated in repackaging process would have to be managed** Low-level waste on the order of $9500 / assembly".[31]

According to DOE research the costs of repackaging at a centralized storage site are large,[32] ranging in an additional expense from about $40,000 to about $87,000 per assembly from a pressurized reactor (PWR) relative to loading and capital costs. For the spent fuel at potential candidate sites with (PWRs),[33] estimated repacking costs range from $450 million to $978 million.

In the final analysis, before interim storage facilities are licensed the full costs of government ownership of spent nuclear fuel prior to the accepting title before a disposal repository is opened, are necessary to determine the nature and extent of the federal liability. The WCS license should not be issued until Congress is made aware of this potentially very large public expense.

---

[31] U.S. Department of Energy, Office of Nuclear Energy, Standardized Transportation, Aging, and Disposal (STAD) Canister Design, Presentation to the Nuclear Waste Technical Review Board, June 24, 2015. http://www nwtrb.gov/meetings/2015/june/jarrell.pdf

[32] Potentially eligible PWR sites include: Rancho Seco (492 assemblies), SONGS 1 (395 assemblies), SONGS 2&3 (3,460 assemblies), La Crosse (333 assemblies), Yankee Rowe (533 assemblies), Connecticut Yankee (1,019 assemblies), Maine Yankee (1,432 assemblies), Zion 1 & 2 (2,226 assemblies), Kewaunee (1,335 assemblies), and Palisades (433 assemblies).

I hereby certify that I have made the foregoing statements under penalty of perjury.

October 23, 2018

Date

Robert Alvarez

# Tab 12

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**Before the Atomic Safety and Licensing Board**

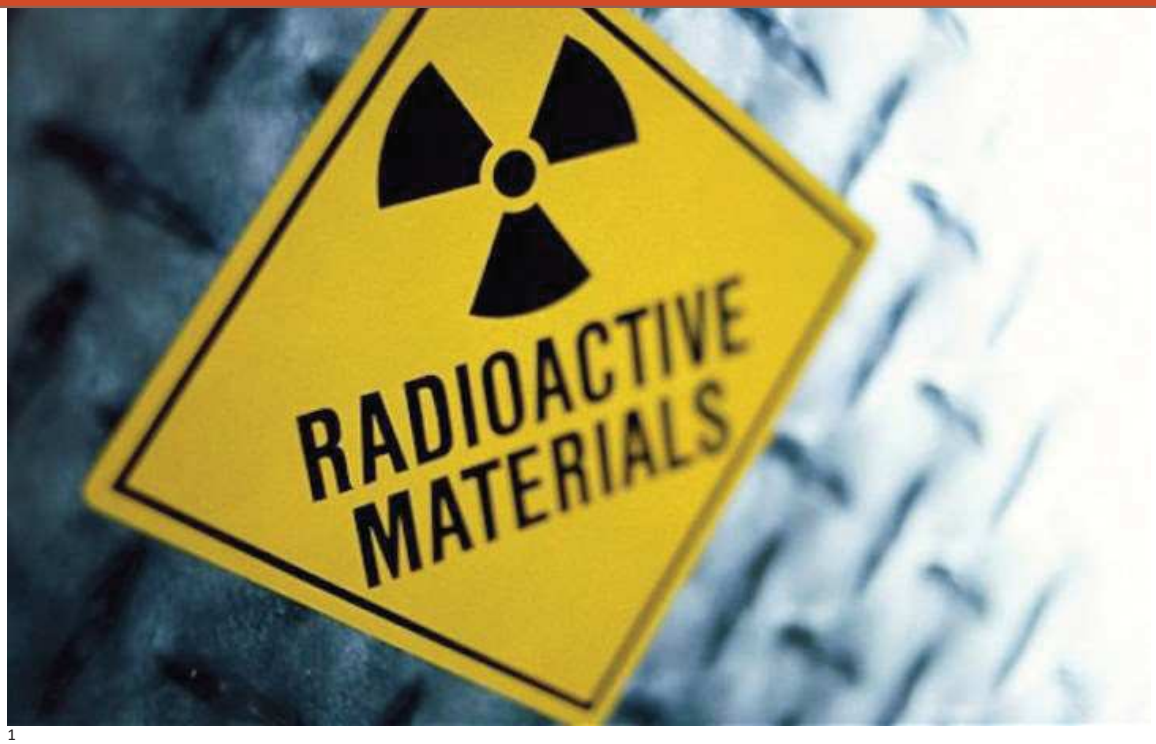
| | | |
|---|---|---|
| In the Matter of | ) | Docket No. 72-1050<br>NRC-2016-0231 |
| WCS Consolidated Interim Spent Fuel Storage Facility | ) | November 13, 2018 |
| | ) | |
| | ) | |

* * * * *

**EXPERT WITNESS REPORT AND *CURRICULUM VITAE***
**OF JAMES DAVID BALLARD**

Terry J. Lodge, Esq.
316 N. Michigan St., Ste. 520
Toledo, OH 43604-5627
(419) 205-7084
Tjlodge50@yahoo.com
Counsel for Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, Petitioners

# Interim Storage Partners: Transportation of the Inventory and the Storage of Highly Radioactive Waste Materials.




[1]

**James David Ballard, Ph.D.**
**Professor, Criminology and Justice Studies**
**California State University, Northridge**
**October 2018**

[1] Image was taken from: https://opinion.premiumtimesng.com/2016/05/23/172942/

# TABLE OF CONTENTS

ABSTRACT ..... 4

THREAT ENVIRONMENT ..... 6

Target Environment ..... 6

Target Profile ..... 8

Worldwide ..... 9

Domestic ..... 10

Attacks ..... 13

Wastes as Targets ..... 17

Symbolism ..... 20

Dangerous Cargoes ..... 22

Lessons Learned ..... 24

ISP PARTNERSHIP ..... 25

CONSEQUENCES ..... 31

Radiological Impacts ..... 31

Economic Impacts ..... 34

Data ..... 36

Direct ..... 37

Indirect ..... 38

Stigma ..... 38

Social Consequences ..... 40

Social Groups ..... 41

Anomie/Social Ennui ..... 42

Social Dislocation ..... 42

Social-Psychological ..... 43

Social Cohesion ..... 43

Political Impacts ..... 44

Jurisdiction ..... 44

Presumption of Response ..... 45

Political Consequences ..... 46

Legal Aspects ..... 47

Liability ..... 49

Analytical Typology ..... 51

Matrix Example ..... 51

INFORMED CONSENT ..... 53

$T_1$ – Transportation ..... 54

$T_2$ – Terrorism (HIE) ..... 55

$T_3$ - Tribal Lands ..... 56

$T_4$ - Trust ..... 57

Implications ..... 58

RECOMMENDATIONS ..... 60

AUTHOR'S BIOGRAPHY ..... 69

## ABSTRACT

This report focuses on the radiological safety and security implications for the proposed Interim Storage Partners (ISP) Consolidated Interim Storage Facility (CISF) in Andrews County, Texas.[2] It analyzes the implications for nuclear waste transportation/storage policies regarding potential Human Initiated Events (HIE) against commercial spent nuclear fuel (SNF)[3] and Greater than Class C (GTCC) highly radioactive waste shipments and their storage at the proposed facility in Andrews County.[4,5]

This document focuses on the following topics in preparation for comment and intervention by the October 2018 deadlines. This report includes discussions that will inform potential testimony and acts as pre-testimony consultation on:

- Analysis of the potential threats to waste shipments/storage by a HIE on any of the end of the fuel cycle operations that would constitute the supply chain for a proposed CISF.

---

[2] See ISP statement regarding the Orano, USA (Orano) and Waste Control Specialists (WCS) partnership underlying this CISF proposal: http://us.areva.com/EN/home-4039/orano-jv-wcs-cisf.html

[3] Some people in the energy industry and government have started to use the term 'used nuclear fuel'. This report will use the more well-known term of spent nuclear fuel for more universal understanding by those transit and termination communities that will be impacted by this proposed CISF in Andrews County, Texas.

[4] The ISP Environment Report (USNRC Docket # 72-1050) focuses on SNF and greater than class C wastes from NPP operations. The former Yucca Mountain Project included high-level wastes (HLW) and suggested defense wastes may have been destined for Yucca Mountain as well. This listing of only two waste types for the facility in Texas (SNF and GTCC) was communicated by ISP, despite federal regulations (10 CFR, Section 72) which focus on "Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste." The listing of high level wastes listed in 10 CFR, Section 72 creates ambiguity for the materials that will be transported and stored at the Texas facility. This is problematic since safety and security considerations might be different for these dissimilar types of wastes. The presentation herein assumes that the totality of materials that would have been transported and stored at Yucca Mountain is logically going to be stored at the Texas CISF since it is a stop gap storage solution until a long-term geologic repository can be sited.

[5] One stakeholder has articulated various concerns about the potential 'regional' CISF's being considered by the NRC in New Mexico (Holtec) and Texas (ISP). These issues include: 1) The transportation component of the EIS for any CISF application should take into account the policies of the WIEB HLRW Committee; 2) The transportation component of the EIS for any CISF application should fully evaluate all reasonable modes and routes; and 3) The transportation component of the EIS for any CISF application should consider all facets of a SNF/HLW (GTCC) transportation program that could influence the safety of the public and the environment. See July 27, 2018 letter to the NRC from the Western Interstate Energy Board (WIEB) High-Level Radioactive Waste (HLRW) Committee. Also note that the idea behind the use of interim storage was to be a regional idea, not one or two western US based facilities (per the WEIB webpage). This western based siting policy choice has severe implications for the state of Texas and the many transit communities the wastes travel through to reach this destination or the one nearby in New Mexico. The issue is regional inequity of the placement of CISF's. The vast majority of reactors, and respective SNF and GTCC, are in the Eastern half of the United States. This regional radiological risk inequality is not just objectionable on its face, but it significantly exacerbates transport risks, given the distance that needs to be traveled. This inequality is in addition to any other issues that are present: tribal economic exploitation, environmental injustice, the yet to be determined suitability of the New Mexico/Texas CISF sites, the lack of consent-based siting, etc.

- The unique nature of the ISP organization *vis-à-vis* waste transport/storage and potential issues directly associated with said relationships.

- Preliminary appraisal of the consequence assessment methodology necessary for such actions and as a valid concern prior to the advent of any shipment campaign for these highly radioactive materials and that also apply to storage operations.

- Preliminary assessment of the informed consent process from the various communities (local, tribal, state and state-regional groups) that would be involved in consenting for the proposed Texas CISF facility.[6]

[6] In response to the BRC findings some movement was made on consent for siting of waste facilities. When the DOE sought public comments on informed consent based siting processes during the public comments/hearings, one comment was telling. The Institute for Energy and Environmental Research (IEER) said "Informed consent is all the more necessary in regard to an issue as fraught as nuclear waste, including spent fuel (which contains the vast majority of radioactivity in all nuclear waste)… What should be the standard of informed consent in regard to matters involving security for eons (given the plutonium-239 content of spent fuel) and involving health risks for even longer, given that the half-lives of some fission products, like iodine-129 and cesium-135 are in the millions of years? Informed consent can never be in the abstract: it is the obligation of the DOE to inform the public exactly what is involved. The DOE has fallen very far short of what is needed in its discussion of 'Integrated Waste Management.' Since the DOE is seeking comment on what a "consent-based siting process" should consist of, IEER is setting forth some minimal requirements." See https://ieer.org/resource/repository/comments-doe-consent-based-siting-nuclear-waste-2016/. The status of the DOE as title holder/funder for the transportation efforts and the CISF is unclear currently given the legality of their involvement and the recommendations by non-partisan review boards suggesting the DOE exclusion from the whole storage process after decades of mismanagement, poor planning and the failure of siting the Yucca Mountain facility. These recommendations are understandable given the lack of progress after over three decades of geologic repository siting by the DOE and after huge expenditures, scandals at this agency and on-going failure to accomplish this task.

## THREAT ENVIRONMENT

This report will start with a discussion on the risks the shipments and storage facility might face given the threat environment of contemporary society and recognizing the upheaval in worldwide political affairs. This discussion chooses to not address specific tactics or weapons that could be deployed against shipments or the storage facility in the name of safety and security for the corridor communities and workers that would be employed in transit activities or at the CISF.

### Target Environment

The potential of HIE attacks against the radioactive wastes that are in-transit to the proposed CISF, be it by rail, highway or barge, and when they are eventually within the confines of the storage facility are analyzed herein. This evaluation starts with a discussion on the risk profile for attacks against waste shipments and storage facilities. These potential attack risks are discussed as HIE: human initiated events like sabotage, accidents, protests and terrorism on waste transportation systems and storage facilities.[7, 8]

The point of such an examination is to establish the target rich environment that is the nuclear industry and how prevalent the facilities are as potential and recognizable targets. It also helps establish that HIE risks are present, that HIE represent a robust articulation of potentials for the end of the fuel cycle operations necessary to stock the proposed facility and that these events represent a range of potentials far exceeding the very limited vision of risks set forth in a traditional design basis threat (DBT)[9] normally

---

[7] Human Initiated Events (HIE) were defined by the author's 2002 United States Senate testimony but were articulated at other events prior to this date. See J. D. Ballard testimony for the Committee on Energy and Natural Resources, *United States Senate*, One-Hundredth Seventh Congress. This testimony is available at http://www.yuccamountain.org/leg/ballard052202.html.

[8] Specific accident scenarios that threaten the cargoes are beyond design basis events (BDBE) and could be exacerbated by human error or interference. Exemplar events include the Fukushima disaster (March 2011) and the Baltimore Tunnel Fire (July 2001). Fukushima was amplified by many errors of commission and omission. The aftereffects of the Fukushima disaster are discussed in more detail herein and referenced accordingly. The tunnel fire was not amplified by intervention but rather exceeded the planned for maximum creditable accident typically used in risk calculations regarding transportation of wastes. This tunnel fire was analyzed by a Nevada contractor and found to have enormous potential radiological impacts if a highly radioactive waste shipment was involved in this rail incident. See: http://www.state.nv.us/nucwaste/news2001/nn11459.pdf

[9] The DBT is a technique similar to risk management (Johnson 2005; Johnson 2004). It is a proxy threat, or risk, for the physical plant/operations. It is based in part on a scenario that has been codified from threats found in the real world, at least at the time of its formal regulatory articulation (NRC 2005; Blankenship 2005; Chetvergov 2005; Ellis 2005). It sets the benchmarks for training and security by identifying a representation of the risks of nuclear materials. It is used for the training, weapons and tactics that a HIE group could deploy. The best practices for DBT usage issue a call to design security to face contemporary threats, respective vulnerabilities and to allocate resources accordingly (NRC 2005; Khripunov 2005). Research shows that DBT's tend to focus on infrastructure and physical security hardware (Johnson 2005). The DBT has a long history in the US (since the 1970's) and the NRC/DOE believe it seemingly codifies the most reasonable threats NPP face. The DBT is generally the basis of physical protection systems (PPS) for fixed sites like an NPP or in this case the Texas interim storage facility under consideration. See: Johnson, R. G. 2004. "Adversarial Safety Analysis: Borrowing the Methods of Security Vulnerability Assessments." *Journal of Safety Research* 35: 244-248; Johnson, R. G. 2005. Unleashing Your Inner Mother-in-Law: How to do an Adversarial Vulnerability Assessment. Presentation at ASIS annual conference, Orlando Florida. Download date: July 23, 2007. Available at: http://pearl1.lanl.gov/external/c-adi/seals/images/AVA.ppt; Nuclear Regulatory Commission (NRC). 2005. "Design Basis Threat.
*(Footnote continued)*

used to frame the risk of such attacks.[10] Examining attack scenarios that could cause some degree of release of in-transit and/or stored radioactive inventory seems reasonable in light of the proposed actions, current threat environment and to better inform the public about risks so they can make a decision from an informed consent position. A brief discussion will be included on design basis events (DBE)[11] like those experienced in Japan. These are included since shipments and storage facilities will face such risks as well and these events may induce radiological emergencies or even radiological releases in extreme cases.

The discussion to follow suggests that regulators need to reconsider the risks, impacts and safety/security for any radiological waste transportation effort given the long historical record, and experience derived from research about the previously proposed Yucca Mountain geologic facility, the changing threat environment such shipments/facilities will face in the future and the need to plan for a robust variety of DBT's and beyond design basis events (BDBE).[12] In-transit risks are part of the equation

---

*Federal Register*, Volume 70, Number 214; Blankenship, J. 2005. "International Standard for Design Basis Threat (DBT)." Paper presented at the *NUMAT Conference*, Salzburg Austria. Download Date August 4, 2007. Available online at http://www.numat.at/; Chetvergov, S. 2005. "Evolution of Nuclear Security in the Republic of Kazakhstan." Paper presented at *NUMAT Conference*, Salzburg Austria. Download Date August 4, 2007. Available online at http://www.numat.at/; Ellis, D. 2005. "Training Programs for the Systems Approach to Nuclear Security." Paper presented at *NUMAT Conference*, Salzburg Austria. Download Date August 4, 2007. Available online at http://www.numat.at/; Khripunov, I. 2005. "Nuclear Security Culture: A Generic Model for Universal Application." Paper presented at NUMAT Conference, Salzburg Austria. Download Date August 4, 2007. Available online at http://www.numat.at/. Contemporary articulations of the DBT can be found at the IAEA website: http://www-ns.iaea.org/security/dbt.asp

[10] Typically a DBT would incorporate the risk of an attack into a singular scenario as noted in Endnote 9. In the case of such a complicated effort needed to stock an interim facility like that proposed at the ISP CISF site in Texas, an individual DBT does not seem prudent or capable of covering the range of risks the transportation and storage activities would face. As such this presentation uses HIE to help articulate a reasonable range of potential threats rather than shortcut the process and use the traditional NRC/IAEA DBT procedure.

[11] In 10 CFR 60.2 (1) [Title 10 – Energy; Chapter I -- Nuclear Regulatory Commission; Part 60 -- Disposal of High-Level Radioactive Wastes in Geologic Repositories; Subpart A -- General Provisions], the term design basis events means: (1)(i) Those natural and human-induced events that are reasonably likely to occur regularly... or one or more times before permanent closure of the geologic repository operations area; and (ii) Other natural and man-induced events that are considered unlikely, but sufficiently credible to warrant consideration, taking into account the potential for significant radiological impacts on public health and safety. (2) The events described in paragraph (1)(i) of this definition are referred to as "Category 1" design basis events. The events described in paragraph (1)(ii) of this definition are referred to as "Category 2" design basis events." This report uses HIE for human initiated events and DBE for naturally occurring events that create risks for shipments or storage facilities. Planning for these two very different risks would likewise diverge into logical dissimilarities.

[12] For details on the post-Fukushima analysis of "event" see the DOE report from 2013 on the subject. The report is widely used as a reference and available at: https://www.energy.gov/sites/prod/files/2013/12/f5/BDBE_Report_final.pdf. Additionally, the NRC, IAEA and DOE all have definitions for DBE that have slightly different foci from each other. For example, the NRC's definition can be reviewed and located at: https://www.nrc.gov/docs/ML1432/ML14328A170.pdf; IAEA's training materials help illustrate the organization's position and the IAEA's definition can be found at: http://www-ns.iaea.org/downloads/ni/training/specific_expert_knowledge/safety%20assessment/IV%201_2%20SA%20-%20Event%20Classification%20(Coment1).pdf; the DOE's definition can be found at https://www.energy.gov/ehss/beyond-design-basis-events.

and need to be addressed by the receiving end of the transportation management program necessary to stock a proposed interim storage facility.

## Target Profile

The target profile herein looks at the breadth and depth of facilities that could potentially initiate shipments to the proposed CISF in Texas. These are identified to help recognize the wide range of potential issues that may transpire. Additionally, the transit distances shipments would endure to get to the storage facility in Andrews County, Texas become vividly illustrated by means of these maps. The point is clear – these materials will traverse most states (~45), many political jurisdictions (hundreds) and far more communities than just the end point in Western Texas.

Trying to isolate analysis for the CISF to the end point of the shipment routes is problematic, shortsighted and not acceptable safety/security procedures. Such isolated analysis is no longer acceptable policy in the Post-Fukushima world and adds to the risks communities in the transit corridor face. A task force from the NRC released a report on the implications of the Fukushima disaster for nuclear power plants (NPP)[13] operations in the United States.[14] This and other resources[15] were used to identify the impacts of the event, or HIE threat, regarding a radiological release.[16] How these threats could be applied to a transport related incident in the United States and the storage of materials on an interim basis is further articulated herein. The rationale is simple; to stock a storage facility it is necessary to transport the materials to the site. The lack of details on the totality of waste conveyance in the ISP proposal, like the proposed Yucca facility in-transit issues, demonstrates that transportation is integral to the discussions on storage at the proposed CISF.

The discussion below is offered in an effort to situate the scope of the issues faced by the prime contractor (ISP), potential single source manager/supplier of wastes (DOE)

---

[13] NPP operations are not without incident. Mismanagement, malfunctions and deception about the outcomes/events are seemingly commonplace for NPP operators. One good summary of the worldwide NPP radiological incidents is found on the website Wikipedia. See: https://en.wikipedia.org/wiki/List_of_nuclear_power_accidents_by_country

[14] See: http://www.nrc.gov/japan/japan-info.html

[15] See these for the basis of this overall presentation, including specific information, text and structure: Ballard, J. D. 2016. "Update: Fukushima Dai-ichi and Nevada's Contentions under NEPA." State of Nevada, Nuclear Waste Projects Office, Carson City, NV; Ballard, J. D. 2014. "Fukushima Dai-ichi and Nevada's Contentions under NEPA." State of Nevada, Nuclear Waste Projects Office, Carson City, NV; Ballard, J. D. D. 2013. "Japan's Fukushima Daiichi Disaster: Implications for Further Research on Terrorism and Sabotage." State of Nevada, Nuclear Waste Projects Office, Carson City, NV. Additionally, other research done for the proposed Yucca Mountain facility demonstrates risks. For example see: "Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada" by Lamb and Resnikoff of Radioactive Waste Management Associates and Richard Moore, P.E., August 2001. This report is available at: http://www.state.nv.us/nucwaste/trans/rwma0108.pdf

[16] For international experiences with transport of SNF see information on a British rail accident at https://www.theguardian.com/uk/2002/jun/12/transport.world; http://fissilematerials.org/blog/2014/01/nuclear_train_accident_in.html

and government regulators (NRC). This discussion is offered to better plan for contingencies in recognition of the potential consequence severity of the events that could transpire. It also recognizes how those adverse and cascading consequences may change the perception of, and negative potential for, the aftereffects of a HIE attack on the community wherein the transport of the wastes create a radiological incident. These are critical impacts that affected communities must be made aware of prior to consenting to any transportation efforts through, and storage facility in, those locations.[17]

## Worldwide

According to the World Nuclear Association (WNA), nuclear power is one of the key energy sources across the global community. With over 453 commercial reactors located in ~30 countries, NPP's are readily available as a target and furthermore they have a unique profile as a target.[18] Additionally as of 2018, this association reports that an additional 57 reactors are under construction worldwide. Not all of these will be added to the inventory of plants, as some will replace decommissioned facilities on the worldwide list of NPP. Still the inventory of available targets is robust. For example, NPP's provide ~11% of the world's electricity[19] and the social stigma associated with all things radiological combine to make these plants potential symbolic targets of extreme value to violent extremists.[20]

In addition to the NPP ~250 research reactors are also noted in over 50 countries, many at research institutions, universities and other high profile locations. Together these nearly 700 facilities represent a significant universe of potential targets for a variety of adversaries.[21]

These worldwide NPP and research facilities produce radioactive wastes in quantity and because of ongoing operations; they contribute additional wastes to the overall global stockpile of highly radioactive materials.[22] These highly radioactive materials require

---

[17] See the paper authored by Halstead and Dilger (2011) titled "Repository Transportation Planning, Risk Management, and Public Acceptance: Lessons Learned." Conference presentation at IHLRWMC, April 2011, Albuquerque, NM.

[18] Details on current world NPP capacity can be found at the association's website and in its 2018 Annual Report. For specific details please see: http://www.world-nuclear.org/getmedia/b392d1cd-f7d2-4d54-9355-9a65f71a3419/performance-report.pdf.aspx. A different perspective on NPP worldwide can be found at: https://www.worldnuclearreport.org/-2017-.html

[19] For 2016 data see: http://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx

[20] One of the more detailed articulations of this social phenomenon is from Spencer Weart's work on nuclear fear. See the book *The Rise of Nuclear Fear*. Cambridge, MA: Harvard University Press, 2012.

[21] This was gleaned from the WNA. Information was originally downloaded on July 27, 2011. Details are available at: http://www.world-nuclear.org/info/inf01.html. This data has not changed greatly in the 7 years since first reported.

[22] For estimates of the global inventory of these materials, including sources other than SNF please see: "Estimation of Global Inventories of Radioactive Waste and Other Radioactive Materials", 2010. IAEA TECDOC 1591. Information originally was

*(Footnote continued)*

isolation from human contact and/or reprocessing of the SNF for further use, operations which also produces radioactive wastes.

World-wide the transport of these materials is an on-going activity, albeit seemingly much slower than would be needed to stock the proposed CISF facility. These shipments can be internal to an installation (e.g. cooling pool to dry storage), or external like moving to storage installations (e.g. by rail, truck or barge) or reprocessing facilities (e.g. by rail, truck or barge). Reprocessing facilities are not as widespread as power production or research installations. Reprocessing from various methodologies is currently done at facilities in Great Britain, Russia, France, Japan, and India.[23]

## Domestic

The United States has ~22% of the world's NPP plants for a total of ~99 NPP facilities located around the country at 65 sites and within 31 different states.[24] There are two main types of NPP facilities: pressurized-water reactors also known as PWRs and boiling-water reactors or BWRs.[25] Many NPP are currently operating, but some have been decommissioned, or are in the process of being, decommissioned.[26] The map below shows a geographic dispersion of these waste origination plants (NPP).

Of particular note is that many of these locations are in the Eastern portion of the United States and transportation of these materials to a storage facility in Texas will impact transit corridor communities around the country that are transportation hubs for rail activity and those near NPP concentrations (e.g. Chicago, Detroit, Saint Louis, etc.). Such NPP geolocations thus require long distance transport to the proposed Texas facility and through these hub cities.[27]

---

downloaded on May 24, 2012. Information is available at: http://www-pub.iaea.org/books/iaeabooks/7857/Estimation-of-Global-Inventories-of-Radioactive-Waste-and-Other-Radioactive-Materials

[23] See the WNA (2018). Information was downloaded on August 23, 2018. Details are available at: http://world-nuclear.org/information-library/nuclear-fuel-cycle/fuel-recycling/processing-of-used-nuclear-fuel.aspx

[24] The number of NRC regulated sites is more extensive than these numbers. Estimates are that 45 states/territories are included on the total list of NRC sites. For reactors see: https://www.nrc.gov/info-finder/reactors/ and for all see: https://www.nrc.gov/info-finder/region-state/. As to the best contemporary count of operational NPP please see: http://www.beyondnuclear.org/reactors-are-closing/

[25] One report (based on older numbers of active reactors = 104) shows that sixty-nine (69) of the nation's NPP are PWR and thirty-five (35) are BWR. See: http://issues.org/28-2/alvarez/. The differences in operations/design between these two main types of NPP are critical to security planning and risk mitigation at the plants.

[26] For a list of the many NRC regulated sites being decommissioned see: https://www.nrc.gov/info-finder/decommissioning/

[27] In the aftermath of the 9/11 attacks, government reports helpful to safety and security discussions were removed from public view by the NRC, DOE and other federal agencies. For example the NRC's *Safeguards Summary Events List* (SSEL) provided details on a variety of incidents relative to NPP and other facilities. The last easily available copy of this report (Version 4) was useful in

*(Footnote continued)*

Additionally, America has ~45 research reactors at universities and other facilities around the United States. Many of these are operating, but some have been decommissioned and/or are in the process of being decommissioned. The next map shows the geographic dispersion of some of these research reactor facilities in relationship to NPP.

understanding the extent of sabotage from within the ranks of employees of nuclear operations. Considering the potential for a dedicated insider to help HIE perpetrators, such data is critical for communities to know prior to agreeing to shipments and storage at a CISF facility.

A basic assumption would be that fewer shipments and fewer miles traveled would equal a reduction in the risk of HIE or DBE. Given the potential for HIE, other issues also must be addressed by regulators and ISP for the proposed CISF. The proposal by ISP should address a range of threats even considering the need for information blackouts/exclusions (like the SSEL) typically in the post 9-11 world. NRC should likewise reconsider the placement of one or more CISF in the Western United States only. Given the performance of the dry storage facilities in Fukushima storage in place using HOSS is a viable alternative.

Lastly, the DOE has additional facilities that can contribute to the stockpiles of wastes that may need transportation and storage.[28] Locations of DOE sites may include: Argonne National Laboratory (ANL), East Tennessee Technology Park (ETTP), Idaho Cleanup Project (ICP), Idaho National Laboratory (INL), Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), New Brunswick Laboratory (NBL), Nevada National Security Site (NNSS), Oak Ridge National Laboratory (ORN), Pacific Northwest National Laboratory (PNNL), Sandia National Laboratories (SNL), Savannah River Site (SRS), Waste Isolation Pilot Plant (WIPP), West Valley Demonstration Project (WVDP) and the Y-12 National Security Complex (Y-12).[29,30] These facilities are shown on the map below.[31]

---

[28] The DOE is one party to this effort that may well become more important over the operational lifespan of the CISF. Secretary of Energy Rick Perry said "My hope of this committee and administration is that we, finally after 35 years of kicking the can for whatever reason, we can start . . . moving to temporary or permanent siting of this nuclear waste." Confirmation Hearing of Secretary of Energy Rick Perry: Hearing before the Sen. Energy & Nat. Res. Comm., 115th Cong. (Jan. 19, 2017). Because of the presumption of this Energy Secretary, Nevada included language in its two recent legislative efforts to set fair rules for a potential re-start of Yucca Mountain licensing (see S. 95 (115th Congress) and H.R. 456 (115th Congress).

[29] DOE. (August 2011). "Review of Requirements and Capabilities for Analyzing and Responding to Beyond Design Basis Events." Office of Nuclear Safety Office of Health, Safety and Security. U.S. Department of Energy: Washington, DC. See p. i. For location names and acronyms, see p. 3 for map.

[30] Currently, the CISF is set to receive SNF and GTCC from commercial NPP. That was one aspect of the proposal that seemed clear but perhaps will change over time. DOE would potentially be the prime supplier for wastes that DOE has taken possession of prior to arrival at the CISF. DOE's own jurisdictional SNF, HLW and GTCC materials are not specifically a part of the ISP CISF proposal at this time but ISP's proposal suggests plans for additional modifications for waste limits and given 10 CFR, Section 72, which may in the future include wastes of a very different type than articulated in this version of the proposal. The Yucca Mountain experience has offered a lesson on DOE and wastes: The community near the CISF should expect mission creep as to additional forms of wastes if DOE is involved and additional waste shipment streams must be anticipated. One example was the evacuation of wastes from WIPP to the existing waste facilities in Andrews County. After the extensive contamination experienced at WIPP due to mistakes in packaging, suspect packages were sent to this facility. With such ambiguity as to exactly what will be actually stored at the proposed CISF, the presentation herein added DOE facilities to be on the conservative side of analysis. Much like Holtec, ISP uses the most desirable waste streams for their proposal. They excluded liquid, transuranic and other more problematic waste streams that could pose additional safety and security concerns, at least for the initial approval process.

[31] The ISP Report focuses on SNF and greater than class C wastes from commercial NPP operations. The Yucca Mountain Project included HLW and other military related materials not listed as inventory potentials by ISP. This despite the report noting that 10 CFR, Section 72 focuses on the "Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste." This begs the question, is ISP only expecting commercial wastes or will the facility be licensed for receipt of all waste streams under 10 CFR, Part 72? Will the DOE *ex post facto* seek to place defense wastes in the CISF? Will the foreign partnership involved in the ISP seek to place extra-territorial wastes at the Texas CISF? Such ambiguity for the materials that will be transported and stored at the facility is problematic since safety and security considerations might be very different for these dissimilar types of wastes. One again, the presentation herein assumes the totality of materials that would have been transported and stored at Yucca Mountain as logically the same inventory that is going to be stored at the CISF. Given the global retrievals of wastes by DOE operations and the inclusion of the foreign company in this partnership, assuming extra-territorial wastes is prudent.

The production sites for GTCC materials are generally thought of as similar to that for DOE facilities and NPP. These would add shipment complexity to the proposed action.[32] Together these NPP, research reactors and DOE facilities represent a domestic American target universe of ~160 domestic facilities that could be the origination points for shipments to the proposed storage facility.[33, 34]

## Attacks

Such a geographic dispersion analysis of origination sites suggests that no matter what the policy of the United States, or the inventory size for current/future supplies of radioactive materials the various sites produce, these wastes will generally need wet

---

[32] A 2016 document listed WIPP (and vicinity), Hanford, INL, LANL, NNSS, SRS as potential origination points. Interestingly "generic regional commercial disposal sites" were included in the listing. As of August 2018 the specific details of sites can be found at: http://www.gtcceis.anl.gov/documents/eis/GTCC_EIS_Summary_Jan_2016.pdf

[33] The use of this number is a best estimate of total origination points. The author acknowledges that some facilities are co-located, thus shipments would be from multiple NPP at the same site, or a multifaceted DOE site, but each represents a data point in transportation analysis. Still knowing the exact location and details of shipment planning for each facility, or parts thereof, would help define who/what has title to the waste and thus who/what organization is going to initiate shipment (if DOE is excluded). This is true if they are in one location, or multiple locations at one site. This delineation is of interest to safety and security professionals since they will technically represent different risk profiles with respect to types of wastes, age of wastes, transportation routes and other variables.

[34] Details on the complexity of the potential different waste streams (NPP, decommissioning, defense operations, commercial operations), from the many potential origination sites (see maps), and for all forms of potential wastes (SNF, HLW, GTCC, liquid, solid, assemblies, etc.) is important to specify. That level of differential analysis is not found within the ISP CISF proposal and NRC should undertake this prior to the EA/EIS process so as to allow the bidders for interim storage facilities the data to plan for the full range of wastes that could be stored. Likewise, this analysis should therefore be part of the NRC evaluation so that stakeholders can fully comprehend the scope of activities necessary to stock the proposed facility. As part of the consent based analysis, impacted communities should be identified, political jurisdictions mapped and populations alerted to the possible transport of these materials through their communities, states, tribal lands, etc. Additionally training and equipment for the many first responder agencies would likewise need funding, advanced notification and on-going updates considering many rural areas would see volunteer fire agencies offering their response assets in the event of an incident. Details on official emergency response procedures for radiological emergencies can be found at: https://www.remm.nlm.gov/onsite.htm

storage at first (SNF being the bulk of wastes), potentially dry storage at the NPP (as fuel pools are already overstocked and extensive time will be needed to construct a CISF and then transfer the wastes to the facility), loading/transfer of storage/transport casks and ultimately transportation to the storage facilities (after suitable cooling outside of the reactor vessel). Also, logically such shipments will be subject to HIE risks over the lifespan of the transport and stocking effort. DBE's for the transport and storage are also necessary to define, understand and communicate, so that communities along the transportation routes and at the initiation and destination points, are risk informed.[35]

The typical use of a singular DBE in NPP designs/nuclear facilities, or the DBT for a generic attack scenario against the same, fail to account for the risk complexity such a massive supply infrastructure implies.[36] ISP does not address the complexity of, or risks of the range of HIE in their proposal, even though they are a significant involved party in the end of fuel cycle operations and a substantial contractor, by partnership, who has operations at all phases of this shipment infrastructure.[37] Likewise, NRC has allowed this company to bid for the CISF without at least an effort at discussing safety and security implications of transportation risks from HIE or DBE.

This lack of the ability to perceive systematic risk complexity for a proposed interim storage facility may well underestimate the impacts of a radiological event involving these materials. Thus, a programmatic transportation inclusive Environmental Impact Statement (EIS)[38] should be initiated prior to the proposal process and should address

---

[35] Origination points for waste shipments are included since these NPP facilities may not currently have rail access and thus local communities will be subject to heavy-haul trucking shipments to a nearby railhead. A similar intermodal transfer process would be needed f or barge shipments.

[36] ISP does discuss various potential natural disasters in their proposal – those defined by NRC regulations. Failures to address complex natural disasters in the aftermath of Fukushima are problematic. It is not ideal to ignore them when discussing transportation and the end of the transit nuclear storage facilities like the CISF. A disaster is rarely singular in nature – a flood causes bridges to wash out, roadways to collapse, power to be lost and so on. For example, the current presence of sinkholes in the Carlsbad area near both truck transport and rail infrastructure might help illustrate. In a hypothetical built off of current realities, a sinkhole develops, causes a train to drop into the hole and thereby creates a radiological incident. Even without a release, the fact that a radiological cargo is present will alarm the public. Emergency response to such a disaster would be localized at first and delays would ensue as heavy equipment needed to retrieve the cask(s) would need to be mobilized. Thus, what may seem like just a simple train wreck turns into a massive social disruption event involving evacuation, response, retrieval and remediation efforts. Not really simple and not one, but rather a complex set of impacts from this event can be noted as distinct possibilities. A single DBE for such contingencies, like a singular DBT, is problematic.

[37] ISP's proposal has few mentions of terrorism. This risk blindness mindset is problematic and may show a distinct intellectual opposition to any alternative analysis of threats transportation or such a facility may face.

[38] For a differentiation between programmatic and site specific EIS please see: https://www.usbr.gov/pn/programs/eis/kkc/scoping/progsite.pdf

the totality of the shipment infrastructure that will supply this new storage facility.[39] Failure to supply such a programmatic EIS prior to the proposal phase for a CISF has left ISP vulnerable to liability in the event of a radiological emergency at the storage site, but perhaps also while in-transit wastes are moving towards that destination. The ISP proposal is currently insufficient to address the transportation issue for waste movements to the proposed CISF on any level.

One of the key lessons learned from recent experiences with wastes and related facilities (e.g., NPP or potential storage) is that a single scenario based risk profile can be overwhelmed in various ways:

1. When the DBE/DBT is under-predicted. The perceived scale of a possible DBE in Japan was not sufficient to account for the actual risk designed for by system planners. This engineering deficit is critical to not repeat and helps demonstrate that engineering alone cannot address natural disasters let alone human factors like HIE.
2. When the DBE/DBT does not consider compounding events. Cascading events produce compounding complexity for an incident with the in-transit and stored wastes. Articulation of the ranges of potential release fractions, consequences and risks allow for a better methodology to recognize and convey these complex event risk profiles.
3. These risks can be further exacerbated by human error, failures in training, communication failures, security failures and so on. These may be the result of an atrophy of vigilance as years, even decades, of everyday experience with minor operational issues lead to a loss of attention to safety and security.[40]
4. The cascading effects these compounding factors generate demands that planners seek more complex/realistic estimations of risk inducing events when planning for nuclear related material facilities and by logical extension transportation of radioactive waste shipments necessary to stock those facilities. Failure to address these complexities would be considered risk blindness and

[39] This argument has been made for years by the Nevada Agency for Nuclear Projects and their Nuclear Waste Project Office. For example Halstead and Dilger (2011) offer a summary of transportation issues in an April 11, 2011 presentation at the American Nuclear Society (ANS) meetings in Albuquerque, New Mexico. The title of this slide presentation was "Repository Transportation Planning, Risk Management, and Public Acceptance: Lessons Learned." One telling lesson learned was summarized by a quotation found on slide three: "Transportation must be given equal consideration with storage and disposal, at every stage, in planning and implementing a successful national nuclear waste management program."

[40] For information about the loss of vigilance (a.k.a. atrophy of vigilance) by complex organizations see: Freudenberg, W. R., & Gramling, R. (1994). *Oil in troubled waters*. New York: SUNY Press and/or Freudenberg, W. R., & Gramling, R. (2002). "How crude: Advocacy coalitions, offshore oil and the self-negating belief." *Policy Sciences*, 35(1), 17–41.

expose the CISF facility and those responsible for planning transport to liability for the consequences of an incident.

One way to help overcome risk blindness when considering transportation and storage of wastes is to analytically generate a range of attack scenarios with a range of release fractions resulting from these risks. Permutations of attack scenarios could be generated by development of compartmentalized risk threats. For example you could define such risk variables as:

**AT + TF + HE = Risk Profile.**

AT=attack threat, TF=technological failures, HE=human errors.

The resultant risk calculations then could be methodically and systematically manipulated during analysis to account for a range of potential risks and produce results that cover a range of potential outcomes.[41] This spectrum of risk could then be articulated as a collection of possible attack or accident scenarios progressing from the least impactful to the most catastrophic.[42]

The next section will examine the development of credible attack scenarios for HIE against waste transportation by rail, truck and barge, during intermodal transfer and for the storage of the materials at the end point of the transportation effort necessary to stock the proposed facility. [43]

---

[41] This suggestion is similar to the logic behind the RADTRAN program by Sandia National Laboratories. See: https://prod.sandia.gov/techlib-noauth/access-control.cgi/2014/140780.pdf. This Sandia computer code/program allows dose estimates for transportation activities – routine radiation estimates as well as those that might result from a radiological incident. When using the program the analyst has some choices to make as to variables that might affect the outcomes – so weather is a good example. Rain, wind and other weather related variables can be considered as to the overall impact on an incident. In a similar fashion analysts of HIE needs to be done in a fashion that allows such environmental (and other) variables to be manipulated as input factors so as to construct a variety of potential risk profiles that reflect a variety of consequences for an incident. This would also be true of BDBE.

[42] For an example of such analysis see North Atlantic Treaty Organization (NATO). Project # SST.CLG.978964, "Terrorism Attacks on Nuclear Power Plants and Nuclear Materials Transports." This multiple institution effort was led by Dr. Friedrich Steinhausler, Institute for International Security, Stanford University from October 2001 to July 2004. As of August 2018 the report remains unreleased to the public by NATO.

[43] The author has spent decades developing attack scenarios as related to SNF shipments and/or at NPP. The discussion herein does not address specific weapons or tactics since such information could compromise the safety and security of shipments and/or storage facilities.

## Wastes as Targets[44]

Several different adversaries and related factors could make the shipment of highly radioactive nuclear wastes prime targets for a HIE and attractive to a variety of potential violent political actors. These include risk factors from:

- International Groups
- Domestic Groups
- Lone Wolf Attacks
- Symbolic Value of Target

First, these shipments are an attractive target for international terrorist groups. They represent an easily identifiable target, a predictable transportation pathway, and one that allows for extensive planning and support from transnational sources. Examples include:

- The connection between some of the potential cargoes and the American military infrastructure presents a potential for retaliation attacks.[45]
- Attacks on energy infrastructure have been a concern of terrorist experts for decades. [46] In this case NPP and the wastes this industry produces would be the focal point of attacks.
- Anyone attacking these cargoes would be able to create an enormous economic impact by the introduction of "event risk" into the energy industry and its related commodities markets.[47] Such "shock impacts" on spot or long-term energy markets may become a motivating factor for attacks.

---

[44] This section is a compilation of testimony given by the author. For specific testimony details see: Ballard, J. D. 2008. "Terrorism Risk and the Transportation of Spent Nuclear Fuel and High Level Radioactive Waste." Testimony before the United States Senate, Committee on Commerce, Science and Transportation. Hearing on Safety and Security of Spent Nuclear Fuel Transportation, September 24, 2008. Available at http://commerce.senate.gov/; Ballard, J. D. 2002a. "Testimony" before the United States Senate, Committee on Energy and Natural Resources, One-Hundredth Seventh Congress regarding S. J. Res.34 Approving the Site at Yucca Mountain, Nevada, for the Development of a Repository for the Disposal of High-level Radioactive Waste and Spent Nuclear Fuel, Pursuant to the Nuclear Waste Policy Act of 1982. Available at http://www.yuccamountain.org/leg/ballard052202.html; Ballard, J. D. 2002b. "Testimony of James David Ballard." United States House of Representatives, Subcommittee on Highways and the House Subcommittee on Transportation and Infrastructure. Available at http://gopher.house.gov/transportation/highway/04-25-02/ballard.html.

[45] For international example see: https://www.aipac.org/-/media/publications/policy-and-politics/aipac-analyses/one-pagers/a-history-of-iranian-attacks-on-americans.pdf

[46] For an energy related, oil industry specifically, illustrative example please see: https://www.heritage.org/environment/report/coordinated-terrorist-attacks-global-energy-infrastructure-modeling-the-risks. Additionally, in 2012 the magazine *Forbes* ran a story on this subject. See: https://www.forbes.com/sites/matthewhulbert/2012/11/16/a-terrorist-guide-to-energy-carnage/#1bb583b75235

[47] Assessment of 'event' risks takes time to fully identify and comprehend. For example the 9/11 attacks showed that the fear was not as bad as the reality, at least on economic impacts like stock market losses. Military spending on the other hand exceeded

*(Footnote continued)*

- The lack of more rigorous safety and security arrangements during transit is a grave concern. The use of certain tactics to prohibit the hijacking of the cargo and the scantiness of armed escorts for the totality of the shipment distances, or at the final destination, potentially add to the target attractiveness.[48]

These and other types of human factors may increase the risk of international terrorism and raise the risk profile to levels that do not apply to normal rail, highway or barge shipments, even those with radioactive, toxic or other dangerous materials.[49] ***Highly radioactive wastes like SNF and GTCC are not normal commodities***; they represent a different type of risk depending on which waste is being analyzed and should be recognized as such.[50]

The shipments may also represent a target profile for domestic groups who would perpetrate violence to advance their agendas. These domestic adversaries could be motivated by such factors as:

- Opposition to the forced acceptance of energy wastes into, or through, their community/state/region.
- Groups that could justify violence based on deeply held distrust of the DOE and its motives with respect to nuclear wastes.

---

expectations in the aftermath of that catastrophic event, funding that continues to this day. See: https://www.thoughtco.com/economic-impact-of-terrorism-and-the-september-11-attacks-3209217

[48] To reiterate, specific tactics and weapons that might be used against shipments or storage facilities are not discussed in this presentation due to their potential to promote attacks. They are noted here only as a way to illustrate vulnerabilities.

[49] Many in the nuclear industry argue that shipments of wastes are safe – just look at past shipments they typically say. The Western Governors Association recognizes this perspective in a policy statement regarding the proposed Yucca Mountain facility, albeit more much more cautiously: http://westgov.org/images/files/WGA_PR_2018-10_Radioactive_Materials_Management.pdf. Industry typically champions the safety record of several thousand shipments in the USA. See as an example: http://www.nwtrb.gov/docs/default-source/meetings/2018/june/lanthrum.pdf?sfvrsn=4. This begs the question: perhaps the shipments to, from and returning shipments that are sent back to the origination point, these multiple shipment pathways that are envisioned for this facility would challenge these arguments and create shipments numbers in the orders of magnitude greater than past experience data. Until exactly what will be shipped is defined (e.g. older fuel first?), when that will transpire (e.g. is it 20 year post reactor fuel), who will be the title holder of record defined (e.g. is it ISP as a key player in all functions associated with the movement of these materials to the interim facility), what is the role of the DOE and till many other variables are known, until then this proposal does not address this serious issue and leaves that work to the NRC to address in its request for the EA/EIS proposal process – not what has transpired to date on the Texas CISF but rather what should transpire when this current effort is abandoned as deficient, economically unfeasible and dangerous given the lack of the most critical aspect of transportation.

[50] From a security perspective the differences between defense wastes and commercial wastes is important. On the surface the ISP proposal would be about commercial NPP related wastes (SNF and GTCC), but it is not unreasonable to read the proposal and review federal regulations and come to a logical conclusion that more types of wastes can and will be stored at CISF if it is approved. Basically, after approval ISP will most likely seek additional inventory levels for wastes and some of those could easily be military related given DOE's sole supplier status or given the partnership ISP represents, foreign wastes. Each type of wastes would attract different adversaries and may create different hazards in the event of a radiological release during a HIE.

- Violent opposition to the shipments and nuclear facilities that transcend the normal adversarial relationship most protests have with NPP/shipments of wastes.[51]
- One again, the lack of more rigorous safety and security arrangements during transit is a grave concern. The use of certain tactics to prohibit the hijacking of the cargo and the scantiness of armed escorts for the totality of the shipment distances, or at the final destination, potentially add to the target attractiveness.

Domestic based adversaries represent as large a threat as a well-financed international terrorist organization, albeit with different motives perhaps. Domestic groups would have a situational awareness advantage over international groups, but that is not a barrier given time to plan attacks. Both domestic and international groups would have such time since the ISP proposal would allow for shipments over a decades long timeframe.

It is important to note that America is not immune to internal attacks, even potential devastating attacks using mass victimization tactics. After all, the country has already witnessed a domestic rail incident where a group was willing to remove a track section in front of a train carrying SNF at a location just outside of Minneapolis, Minnesota.[52] While not successful, this incident represents an organized attempt to derail the radioactive cargo and draw attention to a groups' opposition to the shipment of nuclear wastes regardless of the potential consequences.[53] Likewise accidents involving wastes

---

[51] The majority of anti-nuclear groups are non-violent by choice and philosophy. The vast majority of these activists use collective actions that might be misinterpreted as violent by the nuclear industry but these protests are not in fact violent political actions and not terrorism. The Golden Valley, MN example noted is a good exemplar (see Footnote 52 below). The future might change this as noted elsewhere – social movements morph as circumstances change. One aspect of security that is important to recognize is the anticipatory nature of such planning. Thus, this item is noted as a means to make an argument that shipments may face social movements that are not as non-violent as those of the past, or currently in opposition to the operation of NPP and/or shipment of wastes.

[52] The Golden Valley incident is interesting in that it will not show up in accidents related to SNF. A train carrying SNF was scheduled to traverse the track, another train carrying lumber was waived forward first and when it reached the section of rail that had been deliberately removed, the lumber train derailed. Graffiti at the site showed that the derailment was designed for the SNF train, not the lumber shipment. The 1986 incident was taken from an article in the *Milwaukee Journal* dated October 28, 1986. One data quality problem with terrorism research is how to define the act of terrorism when cross-classification or misclassification of an incident could occur. For example, in 1972, skyjackers forced a Southern Airways DC-9 aircraft to circle Oak Ridge, Tennessee. The skyjackers threatened to crash the plane into the Y-12 Plant if demands were ignored. The question for terrorism research becomes was this an attack on a nuclear weapons facility, an aircraft attack, or could it be considered something else? This type of complex attack scenario should be of concern to transportation planners when they consider safeguards for shipments to the Texas CISF facility. Details on both incidents were compiled in 1998 by the author and available at: http://www.state.nv.us/nucwaste/trans/jballard.htm#N_17

[53] Protest groups in Germany have also interfered with transportation infrastructure in advance of shipments. The German groups did notify authorities of the potential rail/road hazards they created. These groups had a goal to prevent radiological incidents and used such non-violent actions to bring attention to the vulnerabilities. Likewise mass human protests, as a means of slowing down

*(Footnote continued)*

are in the public record and should be recognized in planning for a storage facility and the transport necessary to supply that facility.[54]

Lone wolf attacks are those perpetrated by a single individual. While there is no denying the potential threat they may pose, in general security planners are less concerned by these solo attackers than the more organized groups of attackers an international or domestic group pose. Recent history in the United States and elsewhere suggest these low level attacks by single individuals are increasing in frequency.[55]

## Symbolism

The primary reason why the highly radioactive waste shipments could become HIE targets is their symbolic value to terrorists, be they international or domestic.[56] Terrorism is normally defined in terms of the tactics used in the actual attacks, or by means of an analytical typology of adversaries, and/or the investigative focus is within the confines of criminal law. Another way of understanding terrorism is to focus on why certain targets are more symbolically attractive. The proposed shipment campaign may well have a very high symbolic profile. An example may assist in understanding: Why was the World Trade Center (WTC) the target of repeated attacks? These buildings

---

train or truck shipments, showed that thousands of protesters could effectively act as human blockades. Here again the protests were non-violent in actuality and in philosophy.

[54] Data from the Yucca Mountain Project could help understand the potential for accidents. A Nevada report states "Based on the 1971-1990 accident data, DOE calculated accident and incident rates for commercial spent fuel shipments to a repository. For truck shipments, DOE calculated O.7 accidents and 10.5 incidents per million shipment miles. For rail shipments, DOE calculated 9.7 accidents and 19.4 incidents per million shipment miles. Because of the small number of spent fuel shipments and accidents during these years, DOE compared these accident/incident rates to the general accident rates for large commercial trucks and general rail freight movements. Based on this analysis, DOE concluded that accident rates for general truck and rail transportation should be used in repository transportation risk and impact studies. DOE recommended use of a truck accident rate of 0.7 - 3.0 accidents per million shipment miles and a rail accident rate of 11.9 accidents per million shipment miles. An estimate of the number of accidents likely to occur during spent fuel shipments to a repository can be obtained by multiplying the anticipated accident rates by the anticipated cumulative shipment miles. If all spent fuel were to be shipped to the repository by truck in larger-capacity casks, requiring about 46,000 shipments and over 100 million shipment miles, between 70 and 310 accidents and over 1,000 incidents would be expected over the operating life of the repository. Under the DOE base case scenario (88% rail, 12% truck), about 50 to 260 accidents and 250 to 590 incidents would be expected." This older analysis does not anticipate the current generation of casks (e.g., Holtec has proposed a 37 PWE assembly rail cash shipment vessel). In years past 24 PWR assemblies was the cask rail shipment limit. For a more detailed, albeit dated, discussion see: http://www.state.nv.us/nucwaste/trans/trfact03.htm

[55] Lone wolf terrorism attacks are those perpetrated by a single violent social actor. The lone wolf is very difficult to detect and their actions are hard to counteract say security professionals. For additional information see: https://www.pbs.org/wgbh/frontline/article/lone-wolf-attacks-are-becoming-more-common-and-more-deadly/; and additionally please see: https://www.theguardian.com/uk-news/2015/dec/06/lone-wolf-terror-attacks-impossible-to-stop-says-security-expert

[56] J. D. Ballard has discussed the idea of symbolic attacks in many forums over the last several decades. For one example see: United States Senate, Commerce, Science and Transportation Committee, (September 2008), "Terrorism Risk and the Transportation of Spent Nuclear Fuel and High Level Radioactive Waste." http://www.state.nv.us/nucwaste/news2008/pdf/ballard080924.pdf

symbolize more than just steel and concrete. Adversaries that attacked the WTC complex in February 1993, and again in September 2001, knew that this commercial office complex represented more than just buildings, it symbolized American economic might in a global economy. The attacks on this office complex were seemingly against the core values of American society and its perceived economic hegemony in the global community.

So, could an attack against waste shipments or storage be seen as such a symbolic act? First, at a most basic level, we should not forget that these wastes are highly radioactive and the general public fears this fact.[57] The cultural conditioning represented by such historical facts as the decades long Cold War doctrine of mutual assured destruction by nuclear weapon, and the images of mass victimization and destruction documented after the use of nuclear weapons during WW II, have these contributed to a generalized and specific anxiety about radioactivity and all things nuclear?[58]

Depending on a reasonable person's position with respect to nuclear power and how the DOE has conducted the nation's nuclear operations, public perceptions are understandably affected. Typical discussions on this subject, especially on the pro-nuclear side, seemingly denigrate the 'uninformed' masses who dare to criticize the industry and especially the 'science of engineering' behind their actions. The idea that technology will save the day and that the nuclear engineers know what is right for the public, are very suspect philosophies to many outside of the nuclear energy industrial complex. This is especially true given the public is aware of the many failures involving the weapons complex and even with NPP operations. That public distrust of DOE, NRC and such industry proclamations is further reified after every nuclear power related accident and incident.

---

[57] Pop culture has a term for such fear – Radiophobia. This term is normally used in a derogatory fashion by nuclear energy insiders. It is exploited by the supporters of all things nuclear to denigrate the legitimate fears of the public. The legacy of mismanaged sites like Hanford, West Valley and Rocky Flats is profound. These sites were managed by DOE and now represent huge costs for American taxpayers for cleaning up the contamination and processing wastes. Likewise NRC does not have the best record either on decommissioned certain aspects of NPP shutdowns (e.g., Big Rock Point, MI). It is not unreasonable to expect the same type of administrative negligence to transpire at CISF's given the lack of change in managers and regulators that seemingly do not learn from history and mistakes from the past.

[58] One example of how this type of nuclear/radiological fear is entrenched in the culture: https://blogs.scientificamerican.com/guest-blog/the-rise-of-nuclear-fear-how-we-learned-to-fear-the-bomb/

These historical facts are coupled with a generalized public distrust of government[59] and as noted its mismanagement of the nation's nuclear weapons arsenal, the by-products of the weaponization of the atom, and what some consider the trivializing attitude taken by the energy industry and federal agencies when it comes to the safety and security of the public health, workers, environment and economic well-being of the nation.[60, 61]

Regardless of the actual health hazards posed by these shipments, and they are many, any incident involving these cargoes would elicit a public response of fear, panic and distrust of any authority figure wishing to explain the health science of radioactivity over the reality of the public perception of the risks. The symbolic value of an attack against highly radioactive waste shipments is easy to understand in this situation and should not be underestimated. Such public perceptions are very real in their adverse political, economic, legal and social consequences.

## Dangerous Cargoes

Additionally, the radiological inventories within the cargoes, that must be transported to stock a CISF, are very dangerous. The DOE in the Final EIS for the former Yucca Mountain Project, reports that truck and rail casks will carry huge radiological inventories and in the event of a release latent cancer fatalities and large-scale economic losses will occur.[62] Thus, the wastes are not only dangerous in a symbolic manner; they represent a potential weapon of mass radiological contamination. A type of potential dispersion device/weapon that would create a backlash against the continued use of nuclear power in America, a backlash against federal agencies and their efforts at regulating the transport of these materials, a backlash at the industrial

---

[59] See: Llewellyn, S., Brookes, S., & Mahon, A. (2013). *Trust and confidence in government and public services* (Routledge Critical Studies in Public Management; 12). More to the point on distrust in the nuclear enterprise is: Iversen, K. (2012). The Dirty Secrets of Rocky Flats. *The Nation, 294*(24), 23.

[60] For details see on worker safety: https://www.osti.gov/biblio/7080383-doe-radiation-research-program-floundering-nas. To see data that reviews the many sites the DOE is undertaking cleanup efforts at after years/decades of management issues see: https://www.energy.gov/em/cleanup-sites. Finally, the Hanford Washington facility, which DOE has managed for at least four decades, has experienced a myriad of issues from tunnel collapse, downwind contamination and many others. Hanford is a prime example of DOE mismanagement issues.

[61] For details on DOE management of the nation's nuclear arsenal and wastes at production plants see: http://www.chicagotribune.com/news/nationworld/ct-tunnel-collapses-nuclear-waste-site-20170509-story.html

[62] The exact details of the extent of these two categories of losses are debatable. DOE documents note smaller impacts: https://www.energy.gov/nepa/downloads/eis-0250-final-environmental-impact-statement than do other researcher(s). These alternative analyses differ from the DOE on the exact parameters of the losses and risks. For an illustrative example see: http://www.state.nv.us/nucwaste/trans/rwma0108.pdf.

partners of such efforts (ISP) and a backlash against anyone politically in charge at the time of the attack, and thus responsible for protecting public health and welfare.

Many observers would argue that a proactive substitute for transportation of these wastes across America is to use a safer alternative, like sheltering the wastes in place at their existing facilities using dry storage technologies until such time as the radiological inventory is far less dangerous.[63] This alternative strategy would allow the public to gain a semblance of acceptance for NRC actions and DOE management (or whoever is finally in charge) thus reducing the potential impact of any symbolic attack.[64] Such a "no-action alternative" strategy will also allow the wastes to naturally decay and as time passes reduce some of the waste's radiotoxicity.[65]

Lastly, the whole shipment effort has the potential to create an oppositional culture similar to that seen in recent years regarding the negative effects of globalization. As stated elsewhere, most to almost all of the organized opposition to NPP and waste shipments is non-violent. The futuristic vision herein is that once shipments start, once the public is apprised of the transportation risks for their communities in the transport corridor, once an incident transpires (HIE or DBE), once consent that was granted is not allowed to be revoked, then mass opposition may develop.

It is judicious to assume that this form of oppositional social movement is what America will be facing in the future. After all this is what has already transpired in Germany, France[66] and other industrial nations:[67] widespread anti-nuclear protests from well-organized and highly motivated protest groups should be anticipated for the transport effort to, and the operations of, the CISF. These shipments have the symbolic value capable of sparking such protests and these in turn increase the risks when

---

[63] Hardened on-site storage (HOSS) is a term used for such SNF 'target' hardening procedures. For details on such procedures, including wet storage safety, see: https://ieer.org/wp/wp-content/uploads/2010/03/HOSS_PRINCIPLES_3-23-10x.pdf

[64] Interesting arguments for the viability and desirability of dry storage at NPP were articulated in the aftermath of Fukushima and as a result of the performance of dry cask storage given the BDBE of the massive earthquake and the tsunami. For one example see: http://issues.org/28-2/alvarez/

[65] The National Environmental Policy Act (NEPA) allows for the analysis of various alternatives, including the no-action suggested herein. See: https://ceq.doe.gov/

[66] For details on Germany and French opposition see: https://www.bbc.com/news/world-europe-13188507. Please note while disruptive, these protests were non-violent by choice.

[67] For an example see the development of protest/dissent in Japan post-Fukushima: http://ieas.berkeley.edu/events/pdf/2012.04.20_sustainability_oguma_en.pdf

transporting/storing the materials, not necessarily by the groups themselves, but by others implanted within these.[68]

## Lessons Learned

This section of the report looked at some of the many factors that could go into the analysis of HIE/DBE risk and the ISP proposed CISF in Andrews County, Texas. Despite the thousands of pages of writing in the ISP documentation and application, the scarcity of actual details in the proposal by ISP, the lack of NRC regulatory oversight allowing a proposal to be presented without transportation analysis and the uncertain role of DOE, coupled with lack of clarity about what types of, and exactly how much, of these wastes will be stored at the Texas CISF is problematic. Deliberately obfuscating details and/or allowing ISP to produce this document without accepting responsibility for such precursor analysis, these NRC regulatory actions and inactions are problematic. As such this section has attempted to articulate the various ways risks could be framed for the proposed facility and how those disclosures would benefit the public acceptance of this project.

[68] The protesters against nuclear power and associated activities like transportation of wastes are overwhelmingly non-violent. On occasion the anti-nuclear movement has been subject to law enforcement/intelligence infiltration activities seeking to promote such violence. One of those occasions saw the protests resisting the attempt by law enforcement. That is not always the case with social movements. The idea herein comes from other protest movements where violent social actors embed themselves in otherwise peaceful groups, only to act out during a protest. The example that has been scrutinized was the WTO protests in Seattle. Curiously, after the fact the protesters said it was the actions by law enforcement that prompted the violence the world witnessed.

## ISP PARTNERSHIP

ISP is a multinational organization with market leadership in many phases of end of the fuel cycle management for NPP produced SNF. ISP is the created corporate identity for the partnership of Wastes Control Specialists (WCS) and Orano, USA.[69] The ISP partnership has specific expertise for the on-site storage, packaging, transportation and interim/final storage of SNF/GTCC wastes.[70] Given the fact that this corporation has interests in decommissioning NPP, has designed storage systems, has developed transfer technology and now wishes to conduct interim storage, their operations would best be defined as a vertical integration form of operational control. In short, after the partnership was created ISP became one of the go to providers for outsourcing the end of the fuel cycle operations, has expertise that is hard to match in the industry and given these multiple layers of involvement has some unique liability in the case of a HIE or DBE.

The unique position this company holds in the nuclear industry has both positive and negative consequences for the proposed Texas CISF. On the plus side this company argues that it has unique expertise and knowledge that can help find solutions to the waste problems facing America.[71]

On the negative side, the partners in ISP have some questionable dealings in the past, have incentive to minimize risks of the facility to gain the contract for operations and hope the CISF proposal undergoes expedited scrutiny that may gloss over the real questions that arise when discussing such a remote site for the CISF and other serious questions that may arise for an interim facility.[72] WCS's history of work in the area of

---

[69] In 2016 WCS was partnered with AREVA and NAC International. In January 2018, AERVA was renamed Orano. NAC has recently intervened in the Holtec application (September 2018).

[70] For WCS details please see: http://www.wcstexas.com/about-wcs/overview/. For ORANO expertise please see: http://us.areva.com/EN/home-3835/about-orano.html

[71] Debate on how the CISF funding will work has begun. DOE would normally provide such funding but given that current law does not allow that agency to fund anything but a permanent repository, the ISP proposal does not address this critical issue directly. The recent financial trouble experiences by one of the partners in this proposed CISF facility call into question the financing of the total operation. The lack of specifics for financing of the CISF operations may be a way to avoid the DOE illegality until the law is changed by Congress.

[72] For discussions on a 'lost shipment' to WCS see: Strassman, N. "Uranium waste found on ranch". *Fort Worth Star Telegram*. For other issues see details on the potential contamination of water table below the existing WCS low level waste site, political contributions to Rick Perry when Governor of Texas and objections by staff at the Texas Commission on Environmental Quality. Orano, formerly AREVA, is partially owned by the government of France and has Kuwaiti financial interests. This company has proposed a uranium enrichment facility in Idaho. This attempt was placed on hold in 2011 after the company experienced what was termed "an investment freeze." Orano, formerly AREVA, was involved in the proposed Calvert Cliffs 3. Orano was the reactor vendor. However, a legal intervention in the NRC licensing proceeding blocked the proposal when it was ruled that French majority
*(Footnote continued)*

low level waste management is seem helpful for the operational side of the management of the proposed CISF but history has shown this company has some issues with operational decision making.[73]

Despite the wealth of experience this partnership brings to the CISF proposal, they neglect any real analysis of the efforts that must be accomplished for the loading from existing facilities, transport to the remote site, waste transfer over the transportation routes and finally the emplacement of the wastes in their proprietary storage systems (Orano's, NAC's, etc.) at the CISF in Texas. Likewise, financial arrangements may be problematic considering WCS's past filings for protections and Orano's previous freeze on investments for other nuclear related facilities in the United States.

Additionally, the partnership uses a similar argument to Holtec and their application for a CISF in New Mexico. The start clean/stay clean philosophy both use seemingly is done, so at the direction of, or at least with the complicity of, the NRC and as a means to limit the need for facility infrastructure that may be potentially problematic. This philosophy has serious implications for the national transportation of wastes since it would require rejected wastes (a.k.a. return to sender shipments) to be reshipped over open railways (or highways or waterways) with a known radiological hazard. Such return to sender provisions will increase shipments as casks are rejected. More importantly these shipments are returned because they may be excessively contaminated or otherwise suspicious. This means that while the CISF seemingly starts clean, it offloads the potential contamination and thus endangers those transportation corridor communities all the way back to the origination point. The morality of this philosophy and the potential ISP liability of such actions make sure a philosophy highly suspect.

Lastly, the proposal does not address the potential that a permanent repository may never open, raising the very serious question that if approved, will this CISF become a *de facto* permanent surface storage including the safety, security, health, and

---

ownership (including *Electricité de France*) was illegal under U.S. laws and regulations prohibiting majority foreign ownership of an NPP licensed by the NRC and located on U.S. soil.

[73] WCS has experienced serious operational lapses in its LLRW storage and disposal work. For example, after the Los Alamos National Lab barrel burst in the WIPP underground facility, WCS agreed to accept more than 100 potentially bursting barrels from LANL, on short notice. WCS decided to store the potentially bursting barrels in a concrete overpack painted black. This management choice exacerbated surface heat levels during the hot West Texas summer. LANL had to intervene, asking WCS to put a layer of soil over the concrete overpacks, to at least attempt to minimize the heat impacts on these potentially bursting barrels. Another sign of the operational judgment is found in WCS's acceptance of those barrels in the first place. Currently, more than 70 of these barrels remain at WCS since it is illegal to return them to WIPP given their potential to burse while in transit. This incident calls into question the proposed start clean/stay clean philosophy of the ISP CISF noted in the ISP License Application document (see pages 11, 83, 85 and 92 for examples).

environmental implications that derive from that potential and over extended time frames. If the CISF does open in the future, when is that expected and how exactly will those wastes be shipped to the CISF. Questions of liability given ISP's unique positon in the end of fuel cycle operations, foreign government ownership, issues with DOE waste title and so many other questions are left unanswered because of the paucity of analysis of the programmatic implications of this proposed facility.

The proposal offers few specifics, hides behind the secrecy of security regulations propagated by the NRC; the partnership limits its potential liability by legal ownership status (LLC) and uses other legal protections to give the NRC what they wish to hear.[74] NRC in procedure and ISP in application do not offer a cold eyed assessment of the issues. Not considering issues that communities will need to be apprised of to understand the risks, let alone give consent for the proposed facility to be sited, is neglect.

With respect to HIE on shipments and the proposed CISF, the details are completely lacking in the proposal. Obscuring the risks of transport and operational concerns like sabotage/terrorism by attempting to use generic analysis and presenting a Pollyannaish version of reality to gain a contract is not effective business; it is rent seeking behavior of the most dangerous type.[75]

The proposal as reflected in the current form of the ISP ER is not reasonably worthy of being considered as an EA given the ISP (and NRC, if simply incorporated as is) choice to not address the most critical component: **Transportation**. The proposal is rather more like a NRC endorsed propaganda document replete with missed opportunities to communicate risks to the public and gain informed consent for the project. It is just meant to secure a contract, seek rent from said contract, and does not address the real intent of NEPA and likeminded regulations propagated to protect the public interest.

The NRC process of siting this ISP is what could be termed an attempt to gerrymander risks by offloading the CISF site to remote communities with little or no economic opportunities. These communities are another example of this rent seeking. The NRC,

---

[74] Realistically the NRC should have insisted that the DOE be more prominently featured in the proposal since this federal entity is so intertwined with the transportation of these wastes, by mission and law. As an example of rent seeking, ISP may be looking to DOE to play the central, or perhaps even exclusive, role as sole customer to the proposed CISF. This presentation does not address that relationship fully given the recommendations of outside reviewers like NAS/BRC that suggest DOE be excluded from the operations of a facility and management of the transportation to that facility.

[75] Many definitions of rent seeking are in the public domain. One from a business website might help understand the concept: https://marketbusinessnews.com/financial-glossary/rent-seeking-definition-meaning/

as a government regulatory body, should consider environmental racism and economic opportunism as part of the evaluation.[76]

ISP has expertise in much of the end of the fuel cycle operations that are necessary to transport and store these wastes. The partnership has a history of questionable business practices, financial troubles and operational failures. Of course the proposal highlighted the more positive aspects, but downplaying or obscuring the negative aspects of the proposal is unethical and represents poor business practices since such avoidance behavior may increase future liabilities to the partnership if a radiological incident occurs. One means to offset such financial liability concern would be to require the partnership to establish a risk bond fund wherein the liability for malfeasance can at least be covered in the event of an incident and if not the partners decide to try and walk away from their joint responsibility for liabilities.

Any consideration by Andrews County as the end point of a supply chain to the CISF is not the only consent community that must be addressed. The state of Texas has preexisting agreements about wastes and WCS operations. The state also has oversight for transportation and inspection of cargoes. The state(s) will endure any return to sender shipments that result from start clean/stay clean rejects. As noted above, these shipments will be by definition contaminated or they will be of questionable structural integrity or have intact confinement of the radiological inventory. They represent an on-going, known and dangerous radiological hazard that ISP would be responsible for creating since the partnership will be the rejecting authority. Once a shipment is designated 'return to sender', the emergency response communities across the nation would need to be involved. The start clean/stay clean philosophy is hugely problematic and given the ISP proposal does not even try to estimate the number of shipments, nor possibility of rejects or impacts on those communities in the path of return, the proposal is deficient in the extreme on these points.[77]

States will be involved in any shipment effort – to the Texas CISF, with the returns from the CISF especially, and of course as shipments are arranged to the future final storage

---

[76] The idea of how such facilities would affect tribal communities has a long history in the Yucca Mountain proceedings and other publications in the public domain. One example: http://www.state.nv.us/nucwaste/news2005/wm/TribalImpacts.pdf . Additionally, local economic constituents like businesses, ranchers and agricultural enterprises have started to express concerns over the placement of the CISF. Such opposition might be assuaged with NRC/DOE consent based siting educational efforts prior to seeking permission for siting the storage operations. The opposition of these groups might also be intensified when actual risks are communicated to the local community, especially transportation details.

[77] The ISP License Application document notes the start lean, stay clean philosophy in various places (see p. 11, p. 83, p. 85 and p. 92).

and/or disposal facility. The experience with Nevada has shown that these stakeholders must be involved in shipments coming from the proposed CISF to their final resting place – be it at Yucca Mountain or elsewhere. This will possibly become an unfunded mandate as the original shipment, or the returns, would reasonably be expected to have cost recovery provisions, but what about funding for such decades from now or longer? Can future generations of state leaders expect funding and cost recovery to be paid once the original problem of wastes at reactors has been mitigated and all that is left is a CISF no one wants to pay to destock?

As noted, the start clean and stay clean operational philosophy is fraught with potential serious problems. With no infrastructure to handle this type of contamination problem, will ISP wish to return to sender any shipment that its own partner may have packaged or that the ISP group is somehow responsible for since it has such a large part of the end of the fuel cycle activities? Perhaps ISP managers would not address the issue and place the cask into storage so that future generations will be forced to handle the problem? What happens if damage is done to the cask while unloading? Is that incident ISP's responsibility or will it be deemed a shipment issue and thus the partnership attempts to offload the issue back to the origination point?

Because this will be a national (perhaps even international) transportation effort, and given the serious issues with returning contaminated cargoes back to the sender, shipment corridors and chokepoints for shipments should also be subject to a consent process as is argued elsewhere. It will not be just routine radiation emissions, accidents and other risks these communities face. No, given the intentions of ISP, these communities face real, known and dangerous potential contamination events as these rejected shipments return across their jurisdictions and to origination points. What about those origination points? Will those communities likewise be subject to forced contamination because ISP wants to start clean and stay clean?

Communities that will be heavily impacted range from Chicago where much of the train traffic will transit through to smaller communities like Buffalo, Detroit, and Kansas City.[78] The lack of a site specific EIS that addresses a fuller range of risks and of a programmatic EIS that addresses transportation, routine radiation emissions, training for first responder communities, equipment needs and many other aspects noted in this report, demand that the NRC and DOE conduct more detailed analysis. The siting process needs such analysis to be expanded to include all aspects of the end of the fuel

[78] Identification of affected communities is difficult since transportation planning for the proposed CISF was not done. Looking at the example set forth by Yucca Mountain analysis, these and many other communities would be directly affected by rail shipments.

cycle operations that this partnership and its proposed CISF facility will engage in during the totality of operations to stock/destock the storage of the wastes considered for the West Texas facility.

# CONSEQUENCES

Once an incident happens, the variety of consequences for communities in the transportation corridor, or near to the CISF site, would be significant. These include radiological, economic, social, political and legal consequences for the community, for ISP and for the agencies that oversaw the CISF process. As happens in the aftermath of a radiological emergency, economic consequence estimates are the most prominent in the media and these estimates will be varying greatly. Guesstimates of radiological impacts will be equally random and range from willful dreams of no environmental impacts to depictions of a radiological apocalypse. Such disparities in radiological release estimations and economic consequences rest on differing analytical assumptions, and ultimately, the motives of those reporting on the releases. The typical radiological and economic impacts reported in the aftermath of an incident do not account for other aftereffects that will be discussed below (social, political and legal).

Likewise lessons learned from radiological releases at Fukushima and the consequences that transpired in Japan, tells planners in America to focus on considerations of the short-term, moderate-term and long-term radiological impacts in conjunction with the economic, social, political and legal impacts. Currently no pre-existing protocol is in place that will allow local, state, tribal and national government agencies a prearranged methodological means to judge these risks, or assess them in the aftermath of an incident in-transit or at the proposed Texas CISF.

## Radiological Impacts

Assessing potential radiological consequences is predicated on knowing the radiological inventory history. For example the burn-up rate of the SNF, the number of years out of reactor for the fuel assemblies in the shipment, does the shipment encompass the oldest fuel in the inventory or newer fuel assemblies, are dedicated trains designated and used for the shipments, and many other variables that offer clues as to the radiotoxicity and risks the shipment poses in-transit.

The actual mode of transport is also important since legal-weight and heavy-haul truck cargoes differ in inventory size over rail cargoes or barge shipments. Intermodal cargoes, for example heavy-haul truck to rail, could be foreseen as similar to rail cargoes except for those road miles necessary to traverse given some NPP do not have rail access. Barge to rail intermodal transfer may likewise demonstrate a similar risk profile to rail, but so few details on this mode of transit are known that this is currently an assumption. One compounding factor in intermodal shipment is the actual transfer of the cargo – this is a potentially risky operation to physically handover such heavy

cargoes from one mode to another and adds risk complexity to the transportation effort.

All of this suggests that planning by transportation and storage managers must first determine the inventory to be shipped. Once that has been decided, details on the actual removal of the cargo from the reactor location, use of intermodal transfer when necessary, specifics on route planning for everyday shipments, alternative routes when interruptions occur, remain questions needing to be answered, and only then plans for the transportation of these cargoes can be assessed. This sounds easy but after decades of work on Yucca Mountain the DOE had little success in satisfying the concerns of the affected parties in Nevada, let alone the many transit corridor communities that such shipments would impact across the nation

It may be obvious but radiological contamination has significant consequences for the human animal and the lived environment. Direct human radiological health consequences include potential increases in cancer rates, genetic alterations, birth defects, increased risks of fungal/bacterial infections and so on. These should be anticipated prior to any shipment campaign and within the operational lifespan of the proposed storage facility. These types of consequences require immediate assessment by trained health professionals and thereafter, long- term tracking of the health of exposed workers, vulnerable populations and the public. These radiological exposure screenings typically look at radiation poisoning, thyroid cancer and certain other cancers, but in the case of a transportation emergency, pre-differentiation of groups and potential impact identification may help in such monitoring. Groups could include: the general population in the vicinity of the accident, vulnerable populations in the area (elderly, children, and most especially pregnant women) and the emergency response workers who will be tasked with minimizing the impacts of the incident. These are the most immediately evident groups that would need long-term monitoring after an incident involving a release fraction of the radiological inventory but others may arise as the circumstances dictate.

As noted in a previous study of post-Fukushima Japan,[79] some of the consequences are not directly related to radiological contamination *per se*, but rather could best be considered under a category called the social-psychological health affecting consequences of being caught in a radiological disaster. These include depression, anomie, alcohol abuse, drug abuse, increases in unhealthy lifestyles (smoking,

---

[79] The materials in this section are from an analysis done by the author: Ballard, J. D. 2013. "Japan's Fukushima Daiichi Disaster: Implications for Further Research on Terrorism and Sabotage." State of Nevada, Nuclear Waste Projects Office, Carson City, NV.

overeating, etc.) and many more. These would apply to both the civilian population and the first responder communities. The extensive body of research on post-disaster mental health consequences for emergency workers should inform the assessment of such factors, but also have applicability to the more directly impacted general population group.

Data collection procedures from such monitoring should be pre-determined and systematized; procedures to check the quality of the data set in place, financial support for long-term research established and institutionalized since it will be necessary to follow these populations for decades post-incident.

In the case of an HIE incident or BDBE with significant radiological release from transported or stored SNF/GTCC wastes the immediate groups would be:

- Monitoring of the general population in the surrounding areas that may have had contact with the radiological contamination.
- Monitoring of special populations with increased radiological vulnerability (e.g., children, elderly, pregnant women, etc.) in the surrounding areas that may have had contact with the radiological contamination.
- Monitoring of the workers (e.g., engineers/drivers/guards) at the incident site.
- Monitoring of the emergency response workers at the scene (e.g., fire/police/medical etc.) and in the background scenes relative to the disaster (e.g., medical/lab workers/testing etc.).
- Monitoring of the contamination to the environment over time to ensure these groups are representative of all that are at risk.
    a. Short-term isotopes
    b. Moderate-term isotopes
    c. Long-term isotopes
- Monitoring and maintenance of the data collected by such efforts and assurance of its quality across time.

In addition to the radiological consequences for an incident involving SNF or GTCC wastes, there exists an area in the literature that applies to this proposal and the transportation necessary to support the ISP facility – routine radiation exposures. First, the casks do not completely contain the penetrating radioactivity during transit. Each shipment will provide small doses of gamma and neutron radiation to those in or near the transit corridor. The long-term health effects of such small dose radiation exposures are of concern to communities and should be pre-determined by planners and communicated.

The next section will address the economic consequences of an incident involving these cargoes. Lessons learned from recent radiological emergencies in Japan should inspire policy makers and regulators to pre-plan for the variety of impacts for the ISP CISF, including the very real possibility of serious radiological contamination and the costs of such incidents. Thus, developing and then using a predetermined analytical matrix format is prudent public policy. At the end of this consequences section one such matrix example is offered in hopes it can assist in consequence assessment and emergency response planning by communities faced with shipments through their community and at the storage site in Andrews County, Texas. The matrix therein is one way to collect such information but again it is only potentially effective after the details on cargoes and transportation are known. Since DOE/NRC rarely accepts public criticisms of their efforts, this matrix is offered to promote the development of such analytical tools by those government agencies.

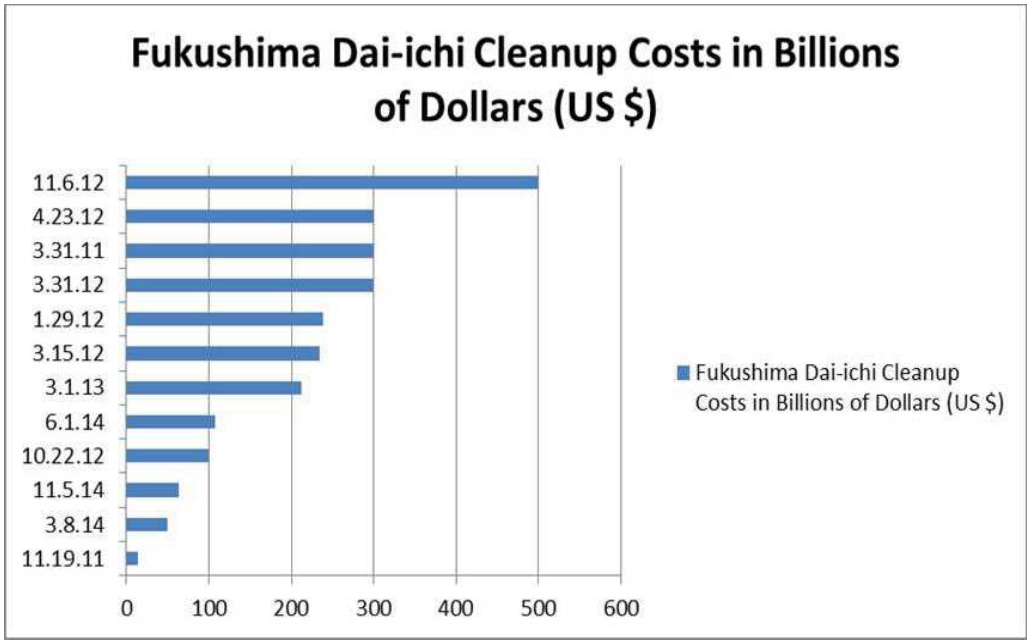
## Economic Impacts

This section will examine the implications of a radiological incident and assess the potential economic impacts of successful HIE acts, or BDBE accidents, related to waste shipments and storage. Why would this economic analysis become necessary? The estimation of costs from Fukushima varied widely and show the need for a social scientifically valid and reliable instrument to assess these impacts in the event of a BDBE accident or HIE concerning SNF/GTCC materials destined for the proposed storage facility, that may transpire within the confines of that facility and for the overall exit transportation effort that will be needed when the CISF is eventually shuttered.[80]

[80] Details on variable economic estimates for transportation incidents can be found in NRC Docket No. 63-001, High Level Waste Repository, December 19, 2008. STATE OF NEVADA'S PETITION TO INTERVENE AS A FULL PARTY. In a report prepared for the State of Nevada ("Potential Consequences of a Successful Sabotage Attack on a Spent Fuel Shipping Container: Updated Analysis Revised Final Version" (11/01/2008), Radioactive Waste Management Associates (RWMA) re-evaluated earlier cleanup cost estimates and prepared new estimates for a range of sabotage event scenarios. According to the authors, cleanup costs following sabotage events similar to those evaluated by DOE in the FSEIS, in which the casks are penetrated but not perforated, could range from $3.5 billion to $45.8 billion (2008$). Transportation sabotage events in which the casks are fully perforated could result in cleanup costs of $463 billion to $648 billion (2008$) (See p 1051). In contrast, DOE says "costs for cleanup after a severe accident in which radioactive material was released could be in the range of $300,000 to $10 billion." However, DOE admits that the $10 billion figure "was not based on a truck or rail accident, but rather was based on a National Aeronautics and Space Administration (NASA) study of potential reentry accidents for the Cassini space mission, which used a plutonium powered electricity generator" (p. 1054). The State of Nevada estimated that cleanup costs following a severe rail accident could be up to $189.7 billion. ("Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada" (08/01/2001) (p. 1055).

The estimates of damages from the Japanese disaster are disturbing in how varied they are on the economic impacts; they diverge widely and represent questionable methodologies of assessing consequences.[81]

This divergence of economic impact opinion can be visualized by longitudinally recording cost estimates for an actual disaster (Fukushima). For years the State of Nevada has tracked the cost estimates of the Fukushima Dai-ichi incident as part of their NEPA contentions.[82] The following chart is a representation of the variability of those estimates as found by Nevada research.




Post-Fukushima analysis shows that the economic cost estimates have begun to coalesce around ~180 to ~200 billion (USD). Importantly for communities in the transportation corridor, and near the CISF, the clean-up timeline has elongated towards 40 years. Thus, such immediate post-incident estimates should be considered fungible

[81] These estimates are for the set of disasters, earthquake and tsunami, at Fukushima. Separate costs for each are just as questionable and subject to political factors. For example TEPCO has offered various assessments and released a report that "shows" they were not necessarily at fault for underperforming assessments of potential disaster parameters. See June 20, 2012 *The New York Times* article by H. Tabuchi "Nuclear Operator in Japan Exonerates Itself in Report."

[82] J. D. Ballard. July 31, 2017. Report for the Nuclear Wastes Project Office titled: "Updated Testimony Preparation: Nevada NEPA Contention #NEV-NEPA-09." Available from NWPO, Carson City, Nevada.

as these are in current dollars, they may underreport the costs of social displacement and as more data becomes known, adjustments are to be expected.[83]

Many of the cost estimates reported in this chart are for the totality of the disaster and not just the radiological release as observers did not specify what they were estimating, how they did so or what variables were used. Thus they are more likely wild guesstimates on the part of non-neutral observers and in many cases represent hopeful propaganda by government and industry. Are they in any way social scientific? Not in the least. The real lesson to take away from this chart is that estimates vary, they change over time (most upward) and in this case, they grow as the full impact of the incident becomes known. Having a pre-existing economic impact model in place to estimate these impacts would make such wide fluctuations in estimates better regulated and lend some much needed methodological rigor to the process.

## Data

While there are many means to organize economic data for such an analysis, the effects of a radiological disaster are an underdeveloped area of social science. The economic impacts from such disasters could be identified by means of the thematic grouping of certain economic issues and into relevant analytical categories.[84] In the case of the CISF analysis the following categories are suggested:[85]

- Direct economic impacts
- Indirect economic impacts
- Stigma impacts

---

[83] Original data details can be found in a series of reports done for the State of Nevada by J. D. Ballard.

[84] This discussion is different from traditional economic analysis. Disasters, human initiated or natural, do not easily fit economic impact analysis (EIA) protocols. Due to social obligations and the lack of good data, cost-benefit analysis (CBA), is likewise not easy to accomplish. The planners for any effort at the transportation of nuclear waste need to move beyond traditional EIA and CBA to invent new economic models to assess the impacts of a radiological disaster prior to its occurrence. Perhaps they could build off of existing platforms like Transportation Economic Development Impact System (TREDIS) and the various agencies' assessment tools for impacts from transportation development. Likewise environmental impact assessment (EIA/EIS) procedures were designed to assess both the positive and negative impacts of projects. Transportation EIA/EIS's were designed to assist policy makers to decide the least impactful alternatives for a given transportation program. In the case of the Yucca Mountain EIS reports, the critics have argued that these documents were used more as propaganda in support of shipments and not as intended (see State of Nevada criticisms).

[85] In addition to the prevalent negative economic consequences from mass disasters are those impacts that could be considered more positive in nature. These are generally identified *ex post facto* and the economic impacts they represent transpire after an event. These should likewise be assessed when considering the overall impacts of natural and technological disasters. They include short-term positive economic impacts (i.e., direct government inputs to the economy to support rescue/recovery efforts, etc.); moderate-term positive economic impacts (i.e., rebuilding and economic stimulus efforts, etc.) and long-term positive economic impacts (i.e., investment in improved infrastructure and technology, etc.). The focus of this report is to develop a pre-incident mechanism to assess a radiological incidents impact and as such these potential positive impacts are not considered.

The discussion below will address these impact categories and concludes with the elaboration of a typology that is meant to promote the development of pre-existing economic impact assessment protocols in advance of any BDBE, or HIE, in relation to waste transport to, or storage at, the CISF facility.[86]

## Direct

Economic analysis of disasters typically focus on a limited number of calculations – morbidity, mortality, loss of homes, loss of businesses, etc. – what could be termed more individualized impacts of the disaster.

These calculations are not without controversy. The statistical value of life is one questionable calculation used by agencies to try and assess the impact of a loss of a single life. Interestingly these 'value of life' rates have been rising and thus are subject to concern by corporations, like ISP, who will be faced with potential liabilities in the event of an incident/lawsuit.[87]

Expansion of the discussion of direct economic impacts may be necessary to better capture the range of variables that will be necessary to create a truer picture of a radiological disaster. The Japanese experience offered some insight into what is necessary to assess as a community/society experiences a radiological emergency. These include:

- The disruption to the energy infrastructure/market shocks.
- Loss of industrial production for those industries that will be closed temporarily or permanently.
- Negative impacts on environmentally sensitive economic sectors like farming and fishing.
- Uncertainty risks/shock to capital markets.
- Impacts on GDP/GNP.
- Loss of temporary or long-term use of infrastructure components, including those associated with other transport modes that run near or on the same pathways as the transport pathway.
- Loss of physical plant for local, small, moderate and large business.
- Lower output for certain industrial segments that may be impacted by supply disruptions.

---

[86] These variables were identified from a variety of sources. They have been collated and summarized for use in the discussion.

[87] See http://www.nytimes.com/2011/02/17/business/economy/17regulation.html?_r=2. Download date June 29, 2012.

- Health care costs for the immediate, short-term, moderate-term and long-term needs of exposed individuals/communities.
- Reconstruction costs for homes, roads, telecommunications and other critical infrastructure.
- Measures to ensure safety of food stocks/food protections.
- Radiation monitoring.
- Resettlement and dislocation costs for local/downwind and down watershed populations.
- Emergency management/security costs for disaster area.
- Education costs for those displaced by the disaster.
- Costs of clean-up, waste remediation and soil/structure decontamination.

These and other direct impact variables represent what could be viewed as more aggregate economic impacts on the community. While they will transpire in the immediate geolocations of the disaster, they represent impacts on the larger social community – region, state, nation and internationally.

### Indirect

The indirect impacts of a radiological incident are equally as important, albeit perhaps much harder to quantify. These include:

- Economic ripple effects to local industry and economy.
- Revitalization costs.
- Domestic confidence.
- The economic costs associated with resiliency.
- Social disruptions.
- Opportunity cost increases.
- Loss of liquidity in the economy.
- Increased insurance costs.
- Heightened sovereign debt.
- Future mitigations for industry and regulatory agencies.
- Increased control and regulation of industry, transportation and critical cargoes.

### Stigma

In the aftermath of a radiological emergency involving SNF/GTCC wastes, stigmas of various sorts will arise and create negative economic impacts for the community when such a disaster occurs. The assessment of such is difficult to quantify since the analysis

of these variables would perhaps entail the need for fuzzy logic procedures.[88] These stigma impacts could include:

- Dread risks increasing costs.
- Increased anxiety by the public.
- Higher levels of risk awareness and aversion.
- Loss of quality of life for those affected by the disaster.
- Changes in social acceptance of nuclear power, waste shipments and storage facilities.
- Shadow evacuations by those not directly affected but nevertheless impacted.
- Post disaster victimization including crime, health care and loss of community.
- Property value losses due to negative perceptions of communities.[89]

The lessons learned from Fukushima should be incorporated prior to the commencement of shipment to, and storage activities at, the proposed CISF. Traditionally the NRC/DOE have neglected such impacts and focused on limited ways to visualize economic consequences. These 'consequence assessments' are typically a ranged amount, curiously a range that includes a collective upward bound that approaches that defined by the Price–Anderson Nuclear Industries Indemnity Act (~12 billion US dollars).[90] Such ranges fail to account for the fuller range of consequences impacts noted above and miss completely those noted below.[91]

The NRC/DOE consequences estimates are typically focused on NPP incidents not involving in-transit materials or CISF type facilities, except when DOE was forced to address such in the Yucca Mountain NEPA processes. As a lesson learned, such NPP estimates have proven severely undervalued for Fukushima. The same might be expected in the event of a radiological emergency while wastes are in-transit or at the CISF storage site. The NRC/DOE should preplan to assess these impacts and once an incident transpires, monitor those estimates over the short-term, moderate-term and

---

[88] To better understand the philosophical idea behind fuzzy logic (ideas normally used in engineering) see: https://plato.stanford.edu/entries/logic-fuzzy/

[89] Nevada communities have produced several of these analyses. For example see an analysis of Clark County, NV: http://www.state.nv.us/nucwaste/trans/uer2001dec.pdf

[90] NRC. Download date June 29. 2012. See: http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/funds-fs.html

[91] The ambiguous plans for the inventory levels make predictions of final inventories problematic. It might be safe to say the CISF could end up with a very large concentration of a wide variety of highly radioactive wastes. It is a given that transport to that facility would endure accidents/radiological events, what is not known until details are made available is how many and what contamination level these represent. Given this expected reality and the operation of the CISF by a private company with foreign investment, the limits of the PAA liability could be tested and perhaps no ready assurance of that insurance funding can be assured under current law/regulation.

long-term to assist modeling alterations based on the emerging science in the field of the economics of radiological disasters.

## Social Consequences

This section will examine the social implications of an incident related to the SNF/GTCC materials to be transported to, and stored at, the proposed Texas facility. This section is focused on assessing the potential social impacts of successful HIE acts against nuclear waste shipments/storage facilities. Once again the Japanese experiences offer lessons that program planners could benefit from in analyzing the proposed Texas facility.

In the case of the Japanese radiological disaster, the local population experienced enormous negative social impacts: deaths, families evacuated near the incident site, food/soil/environmental contamination and emerging radiological hotspots across the geoscape which are not within the exclusion zones – many of which will need attention in years to come.[92] These types of post-incident social impacts can be articulated and measured as short-term, moderate-term and long-term social disruptions.

Assessing these impacts is not easy and no readily available systematic analytical tool exists. The literature on impacts from large-scale natural disasters is fragmented and might not provide the awareness needed for a radiological incident. Typically resiliency is the term used to describe the ability of a society to withstand the consequences of adverse events. In this case understanding what the impacts are and how to define them is the goal of the pre-analysis suggested herein.[93]

The social impacts from technological failures like a radiological emergency (disaster) can be identified by means of the thematic grouping of certain sociological issues and then into relevant analytical categories. In the case of this analysis the following are suggested:

- Impacted social groups.
- Anomie/social ennui.
- Social dislocation.
- Social psychological effects.

---

[92] How many died as a result of the disaster and radiological release? Overall death totals are available at http://www.guardian.co.uk/world/2011/mar/21/japan-earthquake-death-toll-18000 (download date June 6, 2012). Additional details are available but parsing those deaths to radiological issues and the twin disasters experienced at Fukushima is an unresolved issue. See: (download date June 7, 2012): http://www.greenpeace.org/usa/en/media-center/reports/Lessons-from-Fukushima/

[93] For details on resilience preparations see: Comfort, L. K., A. Boin, and C. C. Demchak (Eds). 2010. *Designing Resilience: Preparing for Extreme Events*. Pittsburgh University Press.

In addition to the negative consequences, certain social cohesion impacts from mass victimization events could be observed.[94] These impacts transpire after a tragic event and should likewise be assessed when considering the overall influences of technological disasters. These include:

- Short-term social cohesion impacts.
- Moderate-term social cohesion impacts.
- Long-term social cohesion impacts.

The discussion below will address the more negative impacts of a radiological incident and add to the matrix at the end of this section. That matrix is meant to promote the development of pre-existing social impact assessment protocols in advance of any BDBE accident, or HIE, concerning SNF and GTCC transport and storage.

## Social Groups

Radiological disasters, like natural disasters, impact social groups in differing ways. The risk profile of some groups is differential than that of others. For example, in general during any disaster, the event has impacts on some groups (i.e., women, especially pregnant women, the elderly, children, economically disadvantaged, recently relocated, etc.) that exceed the impacts on certain other groups (men, economically advantaged, long-term residents with intact and robust social networks, etc.).[95] Such differential impacts are important to understand and plan for with a facility like the Texas CISF.

Additionally the impact on those social communities in closest proximity to the disaster, by location and/or by choice in the case of emergency responders, differs from other social communities outside of the immediate disaster area. Fire, police and medical personnel are prime examples – these first responders will be differentially impacted during and after a disaster.[96] Likewise, those in closest physical proximity to the center of a radiological materials incident suffer a variety of impacts that other groups distant from the incident site do not. All told these greatly impacted groups represent what could be termed high-risk social sectors of society that will need to be addressed during a disaster and especially during one involving these radiological materials.

---

[94] See Durkheim, E. (1997). *The Division of Labor in Society*. Trans. L. A. Coser. New York: Free Press,

[95] For an assessment example see: Liddell, M. K. and C. S. Prater. "Assessing Community Impacts of Natural Disasters." *Natural Hazards Review*, November 2003.

[96]. Alexander, D. A. and S. Klein, (2009). "First Responders after Disasters: A Review of Stress Reactions, At-Risk, Vulnerability, and Resilience Factors." *Prehospital and Disaster Medicine*, downloaded on June 12, 2012, available at http://pdm.medicine.wisc.edu.

## Anomie/Social Ennui

The impacts on each of the social groups discussed above can be further broken down into several sub-groupings of more specific social impacts, not all are mutually exclusive. The first grouping of social impacts is based in the idea of anomie and social ennui. Anomie is the lack of social norms, a breakdown of bonds between individuals and society, community, nation state and the individual's social identity.[97] Social ennui is the idea that once such a breakdown occurs, the human animal becomes lost and without purpose – they disconnect from social activities and disengage from the body social.[98]

Several symptoms/indicators of this disconnected social being have been noted: loss of confidence in social institutions; increases in generalized social conflict; and even suicide as a result of such social trauma. Incidents involving radiological materials represent the onset of multiple cascading traumas – the disaster itself is soon followed by the potential temporary or permanent loss of house/home, work, friends, social support systems, economic viability and so on. All of these factors and more can contribute to a loss of social stability and self-control in a community – all can impact the body social and all should be anticipated in the event of a radiological event.[99]

## Social Dislocation

The consequences of a severe dislocation of the social order of a society are profound.[100] On the more macro level, it represents a disruption in the functioning of social institutions, economic arrangements, and community relations and impacts large-scale social relationships. Mass evacuation resulting from radiological contamination is one such dislocation. Macro level risk impacts on social life after disasters (e.g., internal migration, stigma effects, lower property values, loss of social institutional supports and so on) are additional indicators of social dislocations. The result of such evacuations can cause more micro social impacts like social concerns over children (e.g., schooling, care, feeding, health, etc.). Social dislocations, like those resulting from a radiological

---

[97] See http://www.merriam-webster.com/medical/anomie, download date June 8, 2012.

[98] This particular subject is normally attached to topics like social media and technology. See http://www.mediapost.com/publications/article/172678/entering-the-era-of-social-ennui.html

[99] Gleaned from M. K. and C. S. Prater. "Assessing Community Impacts of Natural Disasters." *Natural Hazards Review*, November 2003 as well as FEMA webpages at www.fema gov.

[100] Social order is the basis of much of sociological theory. One good summary can be found in Hechter, M. and C. Horne (2003). *Theories of Social Order: A Reader*. Stanford University Press. Social disorder (a.k.a. social disintegration) then is a state opposite to, or at least far from, such order as hypothesized by social order theorists. Durkheim, E. and Tonnies, F. are two theorists closely associated with these ideas.

incident, also exacerbate existing social ills at the micro level (e.g., drug use, alcohol abuse, etc.).[101]

## Social-Psychological

Social psychology effects refer to those impacts that derive from social interactions and their intersections with social structures/cultural values.[102] One way to start to develop a gauge of these impacts in the aftermath of a radiological disaster is to look at after incident effects on police, fire, medical and other first responders. These more micro level impacts are not usually immediately evident and may take years to manifest. The personalized risks for these first responders include depression, anxiety, PTSD, drug and alcohol abuse, increases in domestic violence, grief, and social lethargy. On the more macro level, effects may manifest as alterations in the career pathways, negative effects on families/relationships and impacts on future generations.[103]

## Social Cohesion

The enumeration of the negative impact categories of anomie, social dislocation and social psychological effects would be reason enough to construct a measurement device/instrument that would assist in the aftermath of a radiological emergency. During the short-term aftermath of a disaster some temporary social good may also be noted. Examples include temporal increased social cohesion as people rally around community, short-term increased sense of national /regional pride for the response efforts, instances of unselfish behavior as people share scarce resources and maybe some increases in feelings of self-reliance.

These short lived impacts will dissipate and a return to more normalized behavior will result. The moderate-term effects may include sharing of grief (collective grief), collective action to mitigate future risks and discussions on increasing resiliency to social calamity. Like the short-term impacts, these moderate-term impacts will dissipate and a return to more normalized behavior will result.

---

[101] For a primer on what micro and macro levels of social impacts consist of please see: http://www.everydaysociologyblog.com/2011/05/micro-meets-macro-walking-in-your-community.html

[102] See C. H. Cooley. 1902. *Human Nature and the Social Order*, New York: Charles Scribner and additional theorists can be found in Coser, L. A. 1970. *Masters of Sociological Thought: Ideas in Historical and Social Context*. New York: Harcourt, Brace and Jovanovich.

[103] Noting their opposition to nuclear power, and defying traditional gender roles in Japanese society, a group of 100 Fukushima women protested nuclear power to protect their children, families and way of life. Downloaded June 12, 2012, see http://world.time.com/2011/11/03/fukushima-women-demand-better-protection-for-children-exposed-to-radiation/

Long-term impacts vary and could be positive or negative. They may include social mobilization, social movements and reconstruction. For example, in the aftermath of the Japanese experience at Fukushima, the newly formed Reconstruction Ministry was designed to facilitate response to such short-, moderate- and long-term impacts.[104] The fact that such a ministry needed to be created shows the need to preplan for such events. As suggested herein planning for the infrastructure of such an agency and having it ready prior to a radiological event may help mitigate negative consequences of an incident.

The lessons learned from Fukushima should be used to create a pre-determined social impacts assessment tool for radiological accidents/incidents. The categories above are one way to organize the variables that could be considered and begin the development cycle for an analytical instrument usable when a SNF/GTCC radiological accident, or HIE, transpires. Traditionally the DOE and NRC have failed to account for such impacts in their assessment of potential effects from a radiological incident, but the tragedy in Japan has proven these variables are critical to assess and they need monitoring in the short-, moderate- and long-term.

## Political Impacts

This section will examine the implications of a radiological disaster by assessing the potential political impacts of BDBE, or HIE acts, against nuclear waste shipments and/or storage facilities.

## Jurisdiction

Considerations of political impacts begin with a recognition of jurisdiction. In the event of any radiological emergency the various levels of political jurisdiction will each be challenged in the short-term, moderate-term and long-term. The Japanese experience helped demonstrate the variety of obligations, responsibilities and management/response the various levels of jurisdiction must address during a radiological emergency.

Political impacts encompass the need to manage a crisis and include the costs of failure to manage the crisis. These failures will exacerbate the risks and have career and personal costs for political authorities. During an incident in the United States, political authorities from local towns/cities, states, tribal goverments, regional confederations of states, national goverment and international agencies would reasonably be expected to

---

[104] The structure of such an agency is not without problems. Japan's efforts are illustrative on the pitfalls and need for such an agency. Please see http://www.bbc.co.uk/news/world-asia-pacific-14024206 download date May 30, 2012.

provide effective and timely responses. For example, these various political authorities would be expected to provide emergency response assets and will also have the need to assist in recovery from the incident, possible relocation of the community wherein the incident occurs and offer other mitigation efforts for the radiological consequences.

Much of the transport of wastes to the proposed CISF will traverse rural areas with few emergency response assets. Thus, depending on location, these first responder entites may represent standing professional emergancy response assets or in much of the transportation corridor, they will be volunteer departments designated to handle the emergency. While the discussion that follows is more esoteric than management of the everyday aftereffects of a disaster, this discussion can help provide the pathway by which political effects will be discussed, measured and politicians held accountable.

## Presumption of Response

Local authorities will be the first responders to a SNF/GTCC incident and bear the brunt of the initial impacts of that radiological incident. The public will expect timely and effective resposnes. To meet that demand, these political entities will quickly establish incident, and then unified, command structures to help enlist/organize the help of contingent jurisdictional assets to assist in their emergency response efforts.[105] These unified command structures will not only solicit mutual aid from surrounding communities, but start the process of requesting state and federal support from various agencies like the governor's office and federal agencies. Federal support could come from agencies like DOE, DOT, EPA and FEMA. International agencies like the IAEA will most likely offer help and may be allowed to assist. NRC will likewise have a hand in the aftermath of an incident, as will the ISP.

In general, a rule of thumb is that the higher the level of political authority needed to support an emergency, the longer the delay in getting assets to the incident site. The burden of managing the incident falls, at least in the critical initial phases, on local emergency management agencies like the fire departments in immediate proximity to the incident. Political authorities should recognize the emergency management related consequences of any campaign for the transportation of SNF/GTCC materials through their jurisdiction and to the proposed CISF in Texas.

---

[105] Typically a radiological incident would see the fire and rescue assets taking the response lead. During an incident that lead would come to incorporate many agencies and move from an initial incident command structure normally enacted at the front of a response to unified command structures used towards the end of a response cycle. Plans should be in place for the initial and subsequent response command. See: http://www.phe.gov/Preparedness/planning/mscc/handbook/chapter1/Pages/emergencymanagement.aspx

Impacts on the localized authorities can include:

- Contingency training for emergency response assets.
- Pre-staged response assets to handle such a radiotoxic incident.
- Specialized equipment necessary to protect response personnel.
- Evacuation planning and actual physical assets to accomplish evacuations in case of a large-scale radiological incident.

These are a few of the more visible public service functions that local political authorities should consider in advance of any shipment campaign. While the federal assets will most likely come after an emergency, the immediate need to respond and provide for public safety will become priority one for local authorities.

The following section details some of the functions that may be required during an incident. The discussion also includes consequences for those political entities/individuals that fail in planning and providing these.

## Political Consequences

Political authorities were expected to provide many functions before and during the Fukushima incident (and as lessons learned will be in the aftermath of a CISF related incident). These include reasonable political expectations such as :

- Truthful and accurate communications on the risks of radiological incident related activities.
- Provide for economic (re)development as a result of radiological incident activities.
- The provision for a safe and secure social enviroment.
- Assumption of govermental response in the case of a radiological disaster.
- Realistic risk informed planning.
- Support for the continuation of the geolocation's ways of life.
- Reliable post-incident decision making.

The consequences for local to national political authorities were severe in the aftermath of Fukushima. Because of failures to act, some of these local and national leaders lost their support from the community/nation. To paraphrase an old nuclear industry adage: 'an accident anywhere is a disaster everywhere.' The political consequences related to the energy industry that may arise in the aftermath of a radiological disaster include items like:

- Calls for nuclear industry regulatory reform.
- Increased safety culture for nuclear industry.
- Recognition and consequences for official disinformation/inaccurate information.

- Reassessment of the culture of self-regulation of risk by industry.
- Loss of political trust, political will and legitimacy of political institutions.
- Increased opposition to nuclear power.
- Change in political authority as one group loses political legitimacy.
- Support for recovery and cleanup costs being a priority.
- Subsidies to support the energy industry. The argument would be the energy industry is "too big to fail."
- Direct assumption of risk and liability by local and state governments.
- Increased support for emergency management.
- Funding for scientific and safety innovations.
- Loss of public confidence and resultant loss of power as change in political structures/parties is sought by the public.
- Investigations into post-incident response, recovery and communications.
- Investigations into the security, safety, training, regulation and other programmatic aspects of a transportation program or storage facility like the CISF.

These political issues can be summarized by means of a typology that has a focus on short-term, moderate-term and long-term impacts. That typology is incorporated into the matrix noted elsewhere and located at the end of this consequence section of the report.

## Legal Aspects

This section will include an exploration of compensation laws in the event of a radiological disaster. Additionally, the liability of large corporate entities/partnerships (e.g. energy, transportation, security, etc.) is discussed as it relates to radiological emergencies.

The Price-Anderson Nuclear Industries Indemnity Act (a.k.a., Price-Anderson Act, PAA) was passed in 1957 and designed to protect the energy industry from liability in the event of a radiological incident. This partial indemnification act provides limits for compensation in the event of a nuclear power generation related incident. As of 2011 the Act can fund up to ~$12.6 billion (US 2011 dollars) towards any incident (primary cost recovery).

The PAA was originally passed to assist in the development of a civilian nuclear power industry and has been subject to several legal challenges. Over the years the act has been revised and renewed periodically. The PAA provides funds above the insurance limits each NPP can obtain in the market and is self-funded by these same utilities as a hedge against risks and costs. If any event exceeds these limits, Congress and the

Executive Branch, have specific reporting mandates tied to the government's ability to pay compensation in excess of these funds. Thus, the self-funding PAA mandates have a backup mechanism to pay for an incident, effectively an unfunded liability on taxpayers. Given the focus, NPP, these funds may not necessarily cover an incident involving shipments to and storage at the Texas CISF.

DOE facilities also have similar liability limits, albeit slightly lower than the industry norm (~$11.6 Billion), that indemnify these operations from liability. This liability funding pool may, but not necessarily, cover CISF, licensees and contractors working with DOE projects like enrichment, weapons production and the national laboratories.[106]

Unlike normal judicial procedures, the jurisdiction automatically vests to federal courts in cases of compensation under PAA. Companies have a three-year time limit from discovery of damage to make claims. To date the PAA fund has paid ~$150 million (primarily due to Three Mile Island) and the DOE has incurred ~$65 million in payouts for its operations.

Critics of the PAA suggest it is a government subsidy for the energy industry, specifically privately owned nuclear power generation facilities. They argue that while it may have served some economic growth purpose in the initial years of the nuclear industry, some critics suggest that the continuance of this subsidy is not defensible given the mature state of the NPP industry.

As noted, PAA limits may also be challenged in the event of transportation related radiological incidents.[107] Transported materials are not fixed sites and while DOE is currently designated as the shipper of record, utilities that participate in the overall effort to stock a CISF - lobbying, design, testing and so on related to the shipment mechanisms – they may vest some of the liability as a result.

Radiological wastes have long been downplayed by industry and DOE/NRC and these self-motivated arguments may have established some precedence that could allow

---

[106] Current law may not cover the operation of the CISF. This brings into question if the facility would qualify for PAA funds in the event of a radiological incident. Given the lack of specifics for DOE involvement and management of the wastes in the proposal, liability money from the DOE may likewise be excluded. This then leaves ISP at the mercy of lawmakers who might need to enact legislation *ex-post-facto* to an incident, to "save" this company that is so embedded in the end of fuel cycle. The recent economic challenges this company faced, the involvement of foreign investors and other factors, do suggest that ISP has several unique factors that add risk to approval of the Texas CISF facility.

[107] This topic brings up a legal issue noted earlier – how can DOE take title to the waste, and liability for an incident, for shipments to a private run facility like the proposed CISF? The NWPA, as Amended (1987), limits the transfer of title, and thus the liability transfer, only for shipments to a permanent repository.

lawsuits based on a variety of liability claims. The next section of this report addresses these potential liability claims.

## Liability

One of the interesting developments coming from the Japanese experience is the idea of corporate liability in the event of a radiological emergency. Questions about the design of the physical plant, lack of training by TEPCO and deliberate obscuring of facts about the magnitude of the disaster (by the company and government) suggest that these entities may vest huge levels of liability in the form of public obligations/duty after the incident occurs.

These obligations can fall into several categories:

- Nonfeasance – neglect of the public duty.
- Misfeasance – incomplete, inappropriate and incorrect service of the public good.
- Malfeasance – deliberate and aggressive actions that cause injury to the public good.

In general, the legal liability in the United States, or an obligation to pay debts, is covered by the compensation laws noted above. Public liability is more the area these topics fall under and may exacerbate the liability of the corporations involved if a disregard for public good can be proven.[108]

As suggested in various places, liability is another important legal area and will be about those actions done by these entities and that increase the chance of something injurious happening.

- **Contingent liability** – those liabilities dependent on some future event – for example the incidence of cancer in a community in the long-term post-incident timeframe.
- **Manufacturer's liability** – those liabilities that accrue from the manufacture of products. In the case of SNF/HLW transportation it could suggest liability from design failures when faced with attacks, failures in testing to account for

[108] By logical extension, the same may be true of consent to transportation and storage activities. If it is not secured and an incident occurs, the company responsible for the storage, loading, cask design and so on may be liable. In this case, ISP's rent seeking at the CISF may generate serious liability risks for its various corporate partnerships that may do work at the beginning of, and during, the in-transit phases of the transportation process.

realistic threats and even liabilities for utilities that ship newer fuel first when an older fuel first shipment doctrine was proven to lower consequences.

- **Strict liability** - may likewise be an issue if utilities make the decision to ship fuel in less than optimal conditions and for reasons of inventory control, cost savings and so on.
- **Design defects and failure to warn** (market defects) are major concerns that should be considered when shipments are undertaken and given the known consequences of radiological emergencies.
- **Breach of warranty** – considering the stance of industry, spokespersons from industry and industry trade groups like NEI in their public advocacy and testimony, products claims and advocacy could be considered a warranty and thus liability incurs from their claims.
- **Consumer protections** may likewise be applicable given the utilities' use of dedicated fees/taxes on consumers for the disposal of these wastes.

The legal aspects of a disaster will become a major issue in the post-incident epoch. A company like ISP may not be as shielded as their investors or partners wish under PAA. Rather, they and any entity involved in any aspect of the efforts to transport or store wastes may face a litigious social environment in the aftermath of a radiological incident.[109]

As noted, the functional philosophy of the Texas CISF has serious flaws and these will result in increased liability to the overall partnership. Given the potential major support for transportation this company may engage in to supply the Texas ISF, the proposal as written exposes the partnership to serious business risk and functional accountability hazards.

The use of pre-existing analysis protocols for legal aspects of the transportation and storage phases of the CISF would seem warranted for the peace-of-mind of communities but also for the companies engaging in contracting for these shipments/storage. The idea that liability coverage would automatically vest to any sub-contractor for the transportation or storage efforts may become a specious, fallacious and potentially an unsound business practice.

[109] One interesting text on the American legal system and litigation potentials can be found in: Lieberman, J. (1981). The litigious society. New York: Basic Books. It is interesting that this 1981 book noted environmental and even NEPA suits.

## Analytical Typology

The following typology was discussed in each of the above sections and is offered to assist in development of pre-incident analytical protocols needed to help communities understand the risks of shipments/storage in their jurisdiction. This matrix can help in the establishment of a pre-incident analysis to assist in understanding a variety of consequences related to the transportation, or storage, of the wastes.

## Matrix Example

| | SHORT-TERM (30 days) | MODERATE-TERM (30 days to five years) | LONG-TERM (Beyond five years) |
|---|---|---|---|
| **Radiological Impacts** | Tracking of specific short-lived radionuclides (i.e., I-131, Cs-134, etc.) that have immediate impacts on the environment, human health and important infrastructure concern such as the food supply. | The human health consequences of immediate exposure, the cleanup and/or scrubbing decisions, elevated background radiation levels and other variables will be in need of monitoring. Examples include Cs-137 and I-131 as the most common radionuclides monitored but Cs-134, Sr-90, and Co-60 are other significant radioisotopes. | The accumulation of health effects, the need to monitor children and impacts on the human/environmental spheres are certainties. In addition to Cs-137, expect evidence of plutonium (Pu) with significant long-term implications. Expectations that Pu will be part of shipment cargoes are not an unreasonable and foreseeable risk to address. |
| **Economic Impacts** | In the short run economic impacts would be reflected by capital markets. Each variable should be detailed as to their short-, moderate- and long-term impact. | The moderate-term impacts may be characterized by rescue and recovery efforts. Government responses will be critical and likewise characterize this timeframe. | The long-term effects of a disaster could be summarized by the rebound of negative impacts and how long such rebounds take to transpire. For example the loss of real property values and time to rebound from such losses is one social-economic barometer. |
| **Social Impacts** | Anomie, dislocation and social psychological effects. These should be identified, assessed, data collected, data | Anomie, dislocation and social psychological effects. These should be identified, assessed, data collected, data | Anomie, dislocation and social psychological effects. These should be identified, assessed, data collected, data |

| | | | |
|---|---|---|---|
| | archived and data storage planned for longitudinal studies.<br><br>Additionally social cohesion impacts should be monitored. These should be identified, assessed, data collected, data archived and data storage planned for longitudinal studies. | archived and data storage planned for longitudinal studies.<br><br>Additionally social cohesion impacts should be monitored. These should be identified, assessed, data collected, data archived and data storage planned for longitudinal studies. | archived and data storage planned for longitudinal studies.<br><br>Additionally social cohesion impacts should be monitored. These should be identified, assessed, data collected, data archived and data storage planned for longitudinal studies. |
| **Political Impacts** | Immediate response management until additional assistance can be located, mobilized and deployed. | Moderate-term support for the victims, management of the economic, social and radiological consequences. | Management of the long-term community recovery efforts and the reestablishment of economic, social and radiological norms. |
| **Legal Impacts** | Immediate might include restraining orders. Not much would be expected in the immediate aftermath of an incident since it would require time to collect process and analyze data. | Moderate-term support for the victims, management of the economic, social and radiological consequences might well be predicated on the agreement to not seek legal remedies. This phase of the legal cycle would see data being collected, damages defined and so on. | Long-term legal damages would be the expected norm. The lengthy process of liability establishment in the United States might delay these cases for years, if not a decade or more. |

## INFORMED CONSENT [110]

The identification of risks from HIE and consequences from a range of attacks has been the focus of the above sections. ISP's partnership and the end of fuel cycle activities necessary to stock the CISF were likewise discussed and how this relationship of transport to storage argues for a more in-depth EA/EIS of the proposed facility in Texas is important enough to stop the process, redefine what will be shipped and how, and incorporate that knowledge into the process prior to requesting CISF proposals. This section will discuss the role of informed consent on the proposal and how to move forward towards gaining that consent by communities.[111]

The potential CISF should at a minimum adhere to the mandates of current policy, recommendations from non-partisan commissions/review bodies and seek consent-based siting (CBS).[112] That approval will take time and effort on the part of the NRC/ISP and/or other entity involved in this process. Typically CBS is thought of as a multi-faceted process – it involves issues related to ethics, politics, economics, time,

---

[110] Consent-based siting is a topic that directly relates to Informed Consent. The BRC report on America's Nuclear Future (2012) reviewed the policies for managing the nation's nuclear waste. This report noted that any repository for SNF and HLW should use a consent based siting process. This was because transportation and storage would affect groups of states, individual states, tribal communities, and local governments (see Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary Of Energy 47–58 (2012). In 2013, DOE adopted this recommendation for "consent-based siting." U.S. Department of Energy, Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste 10–14 (2013)). In January 2017, DOE issued a Draft Consent-Based Siting Process for Consolidated Storage and Disposal Facilities for Spent Fuel and High-Level Radioactive Waste. Consent-based siting that directly flowed from the BRC recommendations and DOE actions to date have reinforced this policy choice.

[111] As of May 29, 2017, the original request for comment on consent based siting can be found at https://www.federalregister.gov/documents/2015/12/23/2015-32346/invitation-for-public-comment-to-inform-the-design-of-a-consent-based-siting-process-for-nuclear. A criticism by the IEER on this process can be found at: https://ieer.org/resource/repository/comments-doe-consent-based-siting-nuclear-waste-2016/ (Makhijani 2016). Downloaded on May 29, 2017.

[112] The current legislation on this subject is different than what is proposed/and discussed herein. Currently two pieces of legislation have been introduced: The Nuclear Waste Informed Consent Act (H.R. 1364) and companion bill (S. 691) are proposals that guided the collection of data by the DOE and would inform NRC regulations if in their final version they are enacted into law and upheld after legal challenges. The DOE seemingly expects that state, tribal and local entities where a storage facility would reside are 'all in' once they agree to placement. Debates on consent in DOE hearings showed some sentiment for the ability of the state/local government to withdraw that consent (https://today.anl.gov/2016/03/doe-launches-consent-based-siting-public-meeting-in-chicago-march-29/). Additionally, the transportation corridor communities were not part of the DOE process *per se* and thus would have wastes transported through their communities with no consent given or revocation possible. Details on consent-based siting, as it became known, are available at: https://bipartisanpolicy.org/blog/doe-announces-steps-forward-on-consent-based-siting/ Current status (August 25, 2018) is up in the air with DOE's website reading "Thank you for your interest in this topic. We are currently updating our website to reflect the Department's priorities under the leadership of President Trump and Secretary Perry." This particular statement is available as of August 26, 2018 at: https://www.energy.gov/ne/consent-based-siting

technology, socio-economic impacts, culture and many other factors.[113] Given the current Texas CISF proposal and NRC's motive to find and secure interim sites (to date in New Mexico and Texas), time is a critical factor – delays may equate to a loss of consent. CBS is not just about the communities in the immediate geolocation of the CISF; it involves destination communities, tribal units, and the state where the facility will be located. The CBS should include other in-transit communities and states/state groups from origination communities to those along the totality of the transportation corridor.

A few truisms should be recognized in the efforts to gain viable consent.[114] One of the critical aspects not addressed in current policy, or actively excluded, is that once consent by communities is given, it can be withdrawn.[115] This is unlike what is codified in current consent-based siting policy discussions and the inclusion rationale is that maintaining agreements/relationships is a critical aspect for any CBS program as well as transportation effort and storage facility.

Consent in the case of transportation and storage of these highly radioactive wastes presents several challenges to transportation and siting planners. These can be summarized as the four T's.

## $T_1$ – Transportation

Transportation will continue to be the Achilles heel for any repository or interim storage facility as long as the DOE/NRC fails to address the concerns of stakeholders.[116] So a truism should help understand this statement: Safety and security professionals understand that origination points are generally safer that wastes in-transit. Once the wastes leave the confines of a guarded and secure NPP, or DOE facility, the risks of a

---

[113] This report builds off of the NAS recommendations. This organization published a report that calls for more involvement by communities in decisions about nuclear waste. For more details see: http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10119

[114] The materials in this section evolved from a presentation by the author of this report given at the DOE Consent Based Siting Meeting, Sacramento, CA on April 26, 2016 titled: "The Four T's to Consider." The issues identified were generic in orientation at the hearing and have been adapted to the context of the Texas CISF proposal.

[115] It seems logical that the current generation of political leaders who consent may not represent the wishes of future generations. Likewise changing demographics for the destination county and even for in-transit communities may have an alternative perspective on risks of such shipments. Informed consent comes from a scientific backstory and not allowing the consentee to change their minds is antithetical to the scientific methodology agencies pride themselves on for decisions about nuclear activities. Not allowing a change in consent goes against the canons of science and is potentially illegal under federal law. For some insight see the Code of Federal Regulations (CFR) Title 21: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=50.25

[116] The Western Governors Association and the State of Nevada have repeatedly noted their concerns about transportation planning for the proposed permanent geologic storage facility in Nevada. For a summary of their concerns see: http://www.state.nv.us/nucwaste/news2009/pdf/nv090421ntp.pdf

BDBE or HIE rise. Transportation issues are critical to siting, as demonstrated by experiences with the current WIPP facility and the former proposed facility at Yucca Mountain.

The wastes are highly radioactive and shipments create potential radiological hazards including those from routine exposures, BDBE accidents and HIE. In preliminary analysis of routes and impacted communities by Nevada for the previously proposed Yucca Mountain storage facility, approximately 50% of the current American population lives in counties potentially affected by the shipments to potential interim site(s). Demographic shifts in American society could increase the impact on these populations, be they normal populations or the more vulnerable groups like the elderly, children and pregnant mothers.

Public perception of risks and hazards is high, may not be equal to the reality of the situation, but cannot be overlooked by transportation planners and/or siting process administrators. NAS[117] and BRC[118] have recommended detailed risk management measures, including cask testing, route identification, accident prevention, and emergency response preparations. These risk reduction measures should be adopted early in the process (i.e., prior to proposals or EA's) to enhance safety and address public concerns (i.e., long before shipments begin).

A pre-proposal education campaign will be necessary to alert communities to risks and address their concerns. Once the community has been advised of these risks, then and only then can consent be sought and confirmed. Maintaining consent is critical and annual reporting of any incident involving these wastes, in-transit or at the origination/destination points, should be readily available for public review. This needs to be a proactive effort on the part of NRC/DOE and become systematized so that communities can make longitudinal assessment of the quality of the risk reduction programs these entities employ.

## $T_2$ – Terrorism (HIE)

A potential terrorism (HIE) campaign is an issue and it must be planned for and addressed by any potential facility. As noted, fixed facilities like NPP/CISF and the waste

---

[117] To view details contained in the full NAS report, as of August, 26, 2018, see the document at: http://www.state.nv.us/nucwaste/news2007/pdf/nv070625caciepr.pdf. Full report reference is as follows: NATIONAL ACADEMY OF SCIENCES, Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States, Washington, DC: The National Academies Press (2006).

[118] To view details contained in the full BRC report, as of August, 26, 2018, see the document at: https://www.energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf

shipments between them will potentially face accidents, protests, sabotage and terrorism. Likewise, facilities and shipments will have important symbolic value to domestic and international groups as HIE targets (see discussion above).[119]

The American public is concerned about such risks, and these concerns will impact consent processes for all aspects of the end of fuel cycle operations discussed herein. NRC studies have assessed the vulnerabilities, typically in a reactive manner, of such potential risks. NRC has developed *ex-post-facto* counter-measures and adopted new post-incident regulations to better protect shipments and facilities. Considering the dynamic nature of terrorism, that work needs to be continually updated as the threat environment changes, adapts and morphs.

As a first step, NAS has recommended additional measures, which could be adopted to enhance security and address public concerns. The routing and siting process should likewise look to reduce risks of HIE in an on-going proactive process that uses the community as a sounding board for concerns and uses ISP as a data provider for on the ground experiences if that facility is approved.

## $T_3$ - Tribal Lands

Depending on the location of the routes and site(s) chosen for an interim facility, a significant number of reservations/tribal lands and communities of color may be disproportionally impacted by waste shipments and the proximity of a site storing wastes. One estimate for the former site at Yucca Mountain was that from 20 to 50 reservations/tribal lands may be impacted depending on route selection decisions. A like universe, perhaps even larger, of tribal entities would be expected for the Texas CISF since many of the transportation routes would be essentially the same and given the tribal diversity of the state and adjacent states. In fact given the need to move these materials multiple times, this universe of tribal lands may actually be larger.

Native populations have some unique traditions and issues with the highly radioactive wastes. The cultural issues associated with tribal consent actions may become significant, such as the "seven generations" timeframe (Iroquois tradition) as these

---

[119] Generally those within the nuclear industry, supportive lobbying groups, regulators and companies serving the nuclear industry consider the risks minimal. One example is the Brookings Institution which sees little, or no, risks at the NPP or storage facilities but fails to consider the whole of the transportation effort needed to move wastes from Point A (NPP) to Point B (Interim or Permanent storage facilities, CISF). For their somewhat limited perspective see: https://www.brookings.edu/articles/terrorism-and-nuclear-energy-understanding-the-risks/. Additionally, the transportation issue is not unique to America – Australia had similar concerns expressed by John Large (https://www.smh.com.au/national/nuclear-waste-site-a-target-for-terrorists-expert-warns-20100510-uor7.html) as well as those documented domestic issues found in the State of Nevada's Agency for Nuclear Projects office website: http://www.state.nv.us/nucwaste/

tribal conventions impact native council decisions (a.k.a. consent). Potential native religious impacts will need to be considered and addressed as part of planning and operations. Socio-economic impacts for tribal communities and associated environmental justice issues for communities of color need to be considered and addressed in the proposal, environmental assessment, environmental impacts and in the planning for the CISF proposal, and if later approved, operations. One issue rarely discussed is Indian nation sovereignty. This will likewise be an important legal issue in any CBS process.

The local communities near the proposed facility and their current and future racial/ethnic composition may also be relevant. An exploration of the communities in the estimated transportation corridor may likewise yield significant environmental justice impacts. Thus, transportation is critical to a NEPA process considering the movement and storage of these materials through tribal lands.

## $T_4$ - Trust

The public distrust for the energy industry, nuclear power, federal regulators like the NRC, operational agencies like the DOE and all things nuclear, is profound. Past experiences with Hanford, Rocky Flats, West Valley and many other DOE managed projects has left the public skeptical of anything to do with wastes and by extension the programs and NRC regulatory oversight about how to move or store them. NRC response to threats like 9/11 and the aftermath of Fukushima is on-going. What has transpired to date means that NRC/ISP must first invite public comments on how to build the trust relationship needed for consent-based siting before they charge forward with siting proposals and public comments. This endeavor must account for the totality of the end of the fuel cycle efforts needed to stock said facility, not just for the proposed CISF storage in isolation as evidenced in the ISP proposal. For example the NRC/ISP could first acknowledge a range of risks, propose measures to minimize/manage those risks and thereafter communicate these risks to the public in everyday language, not regulatory double speak.[120]

[120] The legal and regulatory environment regarding nuclear waste is byzantine at best. The regulations include many agencies and issues. For example some that may apply include: 10 CFR Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste; 10 CFR Part 20, Standards for Protection Against Radiation; 10 CFR Part 73, Physical Protection of Plants and Materials; OSHA Regulations, 29 CFR Part 1920, Procedure for Variations from Safety And Health Regulations Under the Longshoremen's and Harbor Workers' Compensation Act; OSHA Regulations, 29 CFR Part 1910, Occupational Safety And Health Standards and Emergency Planning and Community Right to Know Act of 1986, Title III, Pub.L.99-499.

To secure community consent for siting, this report would recommend NRC/ISP engage in actions to build and maintain trust with local, tribal, state and regional governmental entities as a precursor to proposal generation. The NRC, ISP and DOE should acknowledge past failures with storage facilities/operations and what measures they will have undertaken to mitigate their failures.

NRC, ISP and DOE have trust issues with many stakeholders and some of these issues have been articulated by independent evaluators like NAS and BRC. These federal-level agencies and the ISP partnership must deal with that reality as part of the CBS process. For example, BRC recommended that an entity other than DOE should take over the nuclear waste program because of trust issues. Similarly, NAS recommend taking the transportation program away from DOE.[121] As a prerequisite to any EA proposal, NRC should decide who will manage the program to transport wastes, what is the status of title to the wastes and given the ISP partnership's unique position in the end of the fuel cycle activities, they should be directly involved in a programmatic assessment (EIS/EA). An additional question for NRC to articulate is would it be good public policy/regulation to encourage the monopolization of the waste industry by focusing so much of the end of the fuel cycle activities in one or two companies?

As part of CBS, or just as good policy, NRC should invite public comment on the pros and cons of alternative management entities (i.e., Federal Corporation, Private Corporation, or an Independent Federal Agency) and other transportation issues (many noted herein).

## Implications

This subsection of the report does not necessarily offer solutions to the issues associated with informed consent, rather it attempts to build a public record of concerns, ideas and comments that should help the NRC/DOE/ISP identify/codify issues associated with the process of gaining CBS for the transport and storage of America's inventory of wastes in an interim facility like that proposed for Andrews County, Texas.

Besides public hearings, NRC should consider using a group of experts external to that agency, and external to DOE, to help articulate the issues, processes and goals of a long-term transportation, storage and security schemata. This external programmatic review committee should be an essential part of CBS processes and not be stacked with energy

[121] A good question arises from this distrust of DOE. With the recommendations from the BRC and NAS in the public record, why is the DOE still a primary player in the CISF proposal but not featured as such? As of now the DOE would be sole supplier of SNF and GTCC wastes to the ISP's CISF.

industry 'experts' or ex-government agency personnel. Variety in the selection of experts will help minimize the effects of echo chambering and risk blindness within the industry.

Additionally, identification of issues that have in the past been problematic, or that could be problematic in the future, is critical. To help identify, understand and problem solve such issues, NRC should consider using a 'red team' approach. Transportation planners, security experts, socio-economic assessors and many other experts might be assembled into a research/assessment team and used to assist NRC CBS efforts. Again, this group should not be stacked with insiders to offer a wider range of expertise to be used.

NRC/DOE should be tasked with defining the parameters of CBS but the process may better be understood as setting the agenda for the planning of this proposed project, understanding of the importance of communication of the risks/consequences and identification of meaningful costs of the project. These pre-program activities must be transparent if they are to assist in securing consent, and eventually work towards the implementation of transportation planning, site selection and safety/security assurance.

Additionally, the NRC/DOE is seemingly tasked with regulating and securing the shipments and facilities as well as aspects of creating and maintaining a safety/security culture. If NRC/DOE were to set forth a specific plan for all phases of the proposed program from start to finish, and prior to any action or proposal, this action will facilitate CBS informed route selection, site selection, and security/safety for these. Most importantly this action would assist in securing and maintaining consent for the length, breadth and depth of the program.

## RECOMMENDATIONS

The observations of the author are codified in this listing of recommendations relative to the CISF proposal, as well as the involvement of DOE and NRC. These include issues associated with the relationships between ISP partners, DOE and NRC, transportation of wastes across the United States and the proposed storage facility. These suggestions are derived from the analysis herein and based in part on the background of the author (see next section).

1. The NRC process that solicited a proposal, and the actual ISP proposal, should require the perpetration of a site specific and programmatic EA/EIS for the totality of the processes required to stock the proposed CISF. This partnership exhibits many of the supply and transportation elements from the end of the fuel cycle and could reasonably be expected to seek approval for many of the transportation related activities necessary for the stocking of the CISF. As such the proposal presented is insufficient to address all of the aspects of this partnership with respect to the packaging, transportation and storage of wastes. This deficiency is significant because the proposal does not address key elements of the totality of efforts needed to stock the CISF, does not address the risks of transportation and does not seek consent for the activities that would logically be necessary and sufficient to stock the CISF.

2. The NRC should first define the following information and then seek proposals for an interim facility proposal. Considerations of exact number of shipments to the CISF by specific transportation modalities (rail, highway, and barge); expected numbers of start clean/stay clean shipments (return to sender) and the number of shipments from the CISF to a permanent repository based on operational lifespan of the CISF. Such data would be necessary to make a best estimate of risks to communities in the transportation corridor and for the operational lifespan of the CISF. Additional details on any foreign shipments that may be sent to the CISF should be identified and communicated prior to the creation of an application. This deficiency is significant because the resultant proposal does not address the key element of transportation and thus, communities near the CISF and along the transportation corridors cannot make reasonable considerations of risks.

3. Prior to the solicitation of a proposal, or the filing of an application to construct and operate, the NRC should identify BDBE's and DBT's for the whole of the effort needed to stock a CISF. Such exemplars are necessary so that

communities can actually make informed consent to what they may realistically be expected to face over the lifespan of the program. Additionally, as part of this process, NRC should publicly define a range of scenarios for both HIE and cascading natural hazards, including release fractions that reasonably approximate the full range of consequences – no release, moderate releases and catastrophic releases. One additional aspect is the threats such shipments would face over time and how proactively NRC regulations could help mitigate those risks, even those that are BDBE/DBT. The role of the IAEA in the process should be defined, especially if the shipments to stock this facility are foreign in origin. This deficiency is significant because the publically available proposal components do not consider the prospect of HIE. Likewise, the potential for BDBE with cascading multiple disaster scenarios are not discussed by ISP because the regulations have failed to ask for such analysis, even after the multiple disasters experienced at Fukushima.

4. NRC should define exactly which NPP, DOE facilities and other origination sites will ship to the proposed facility and how (e.g., heavy-haul truck for some of the journey; rail for whole journey; barge for part of the journey and then rail, etc.). If the Texas CISF anticipates a future receipt of foreign wastes, details on those shipments need to be forthcoming now and not at a future date. Such an inventory of origination sites and transportation modalities will help communities to better understand the shipment numbers going through their communities by rail, truck and barge. This deficiency is significant because the NRC has not made the ISP consider these issues in the proposal, even though such details are necessary for the safe, secure and legal operation of the CISF.

5. Prior to the initiation of a proposal process, the NRC should define exactly which routes the shipments will take to the CISF. If in the alternative NRC decides not to negate the ISP proposal and proceeds with licensing, such details should be made public at the CISF Draft EIS stage, in order to provide the concerned public and intervening groups with an opportunity to submit comments under NEPA. As part of this analysis, and considering the length of the shipment campaign, alternative routes and transport methodologies (contingencies) must be articulated.

6. The NRC should define specific operational details such as use of dedicated trains and specific security procedures for waste shipments. This information would help communities understand the risks they face in any effort to stock the CISF. NRC should make these available as part of the scoping process so that

communities can make informed decisions as to the shipment campaign and what risk levels they are willing to allow. This deficiency is significant because the proposal does not address this key component as a result of the neglect of the NRC's premature proposal process.

7. The NRC must define the wastes to be shipped to this facility – exact details on burn up history; years out of reactor for each shipment or part thereof; procedures regarding oldest fuel first; and percentages of cargoes/shipments for SNF/GTCC and these should reflect other lessons learned from the proposed Yucca Mountain Project. The lessons learned from Yucca Mountain show this is an NRC deficiency that is significant because the proposal does not articulate these important details that would affect safe and secure operations at the CISF.

8. Given the variety of "inventory" that the CISF may accommodate, NRC specifically defining what types of fuels and how far each will travel for each inventory level seems prudent policy and regulation. For example at ____ inventory level (number of tonnes of SNF/GTCC) the NRC would expect that rail miles would total _____, truck miles total ____ and barge miles _____. Of these shipments, SNF would be expected to be ____%, HLW ____% (if anticipated) and GTCC _____%. This level of detail would allow the construction of accident rates for each transport mode for the totality of the shipment effort needed to stock the CISF and relative to each waste type. This deficiency is significant because the proposal does not offer any discussion of the accident rates for necessary transportation to the facility.

9. The NRC should define shipments, transportation routes and radiological cargo. Such an inventory and details may assist emergency responders to know what they face when asked to respond to a radiological incident and how best to mitigate the risk in the event of an incident. This critical deficiency is significant because the local emergency responders will be first on scene and will need to mitigate the radiological hazards without assistance for an unspecified length of time until state and federal assets arrive.

10. Given the need to train, provide equipment and provide the necessary protocols to first responders, the NRC/DOE should be specific as to the *longitudinal* funding sources (40-60 year life expectancy for the interim facility, or even significantly longer?) for such first responder efforts in those communities along the transportation corridor and at the end point CISF. Additionally, ongoing funding must be provided the exact training procedures for initial shipments,

start clean/stay clean returns to sender and eventually shipments to a permanent repository. DOE does administer the 180c funding but that funding stream is not guaranteed in this case and if that agency is excluded from a role on the interim or final facility as suggested in various reports, what funding stream would pay for the on-going emergency response equipment, training and other related expenses? This deficiency is significant because these agencies, many volunteer based, will need to conduct initial training, updates to that training and new volunteer/employee training on a continuous cycle.

11. NRC must define the actual routine radiation exposures the public will face per shipment and over the lifespan of the operational life of the CISF. This includes but is not limited to workers involved in the shipment process, workers aligned to shipments/operations, the public who live within 800 meters of each side of any transportation route; and vulnerable populations of elderly, children/in-utero children/expectant mothers within that 800 meter zone on each side of the routes. This deficiency is significant because the health effects of such routine radiation are not completely known and health effects due to long-term exposures to daily/weekly/monthly doses are not well understood.

12. NRC must define the beyond routine radiation exposures the public will face as a result of any return to sender shipments based on the start clean/stay clean operational philosophy. This information needs to be calculated over the operational lifespan of the CISF. These contaminated shipments will increase exposures and the regulations for such are different than for routine exposures. Impacted populations include workers involved in the shipment process, workers aligned to shipments/operations, the public who live within 50 miles of any transportation route; and vulnerable populations of elderly, children/in-utero children/expectant mothers within that 50 mile zone. This deficiency is significant because the proposal does not address such shipment returns and this has placed the ISP at a liability disadvantage the NRC should have anticipated. The start clean and stay clean philosophy used in the proposal has radiological, financial and liability implications and those should be addressed in the proposal.

13. NRC must provide details on secure in place locations for shipments in the event of a radiological incident involving rail, truck or barge. This deficiency is significant because the NRC has not addressed this reasonably expected security feature that would impact operations at the CISF and along the transportation corridor.

14. NRC must define the exact organizational structure responsible for the shipment and storage facility. BRC has suggested DOE is not to be involved, so who and what will replace this entity? If, as planned, the DOE is the primary supplier, then what will be its role in the financing, regulation and determination of awarding contracts given limitations under the Nuclear Waste Policy Act and Nuclear Waste Policy Act, as amended. This deficiency is significant because perhaps the NRC must first get legislative approval for shipments, then change its regulatory structure and finally seek out a service partner capable of meeting those expectations. The current proposal is deficient because it was not given this opportunity to address the concerns since the NRC and DOE have not done the work necessary to bid the CISF properly.

15. The NRC must define the role reprocessing may play at this or a nearby geolocation. Reprocessing is currently not allowed but if that was to change and a local facility was constructed, by ISP or other CISF provider, if these entities wanted to engage in that activity, the whole question of retrieval, shipment, storage and reprocessing of wastes should be pre-determined. A similar programmatic and site specific NEPA process should be required. This deficiency is significant because the NRC would be required to change American policy and create regulations to address the significant additive/cumulative risks such reprocessing brings to the CISF proposal.

16. The NRC must define the consequences for a range of HIE/DBE and have in place such analysis plans in the event of a radiological incident. At a minimum this would include assessment protocols for radiological, social, economic, political and legal impacts. It should also address the BDBE procedures in the event of a cascading sequence of events like what happened at Fukushima. This deficiency is significant because the details for such analysis do not exist in the public domain, NRC has engaged in obscuring of these details under the guise of security and the information is needed for the public to make informed decisions about risks.

17. The NRC should specifically report on the differential impacts on tribal communities/populations and generalized environmental justice concerns for the proposed CISF. This deficiency is significant because of the unique nature of tribal approval processes, the cultural aspects of such approvals and the fat that tribal lands do not necessarily have the same applicable legal provisions under the Interstate Commerce Clause as do non-tribal corridor communities.

18. NRC should define with regulations what specific penalties for attenuation of vigilance over the shipment phases and the operational lifespan of the CISF will apply to ISP if mismanagement occurs. This deficiency is significant because the NRC has failed to plan for the extended lifespan of the facility and failed to recognize the fragility of corporate structures when faced with liability and long-term obligations to the public.

19. NRC/DOE needs to specify the exact procedures and financing mechanism that communities will undergo to recover costs associated with any DBE/HIE. This deficiency is significant because these agencies will need to finance the operations for decades of operational lifespan and recognizing the political nature of funding for such activities before, during and after the storage activities are completed.

20. NRC/DOE should define exact procedures and financing mechanisms that communities will undergo to receive compensation associated with the CISF transportation and operation. This deficiency is significant because these agencies do not offer any guarantees of economic relief for acceptance of the wastes and no benefits for communities in the event of BDBE and HIE.

21. NRC should provide corridor communities regular communications on the number of shipments necessary to stock the Texas CISF, percentage of the CISF filled to date, types of wastes shipped/stored, accidents/incidents involving shipments to, and operations at, the proposed CISF, and details on any remediation efforts for risks identified during the timeframe discussed. Past experience and contemporary problems demand that ISP submit emergency reports on any event within 48 hours of an incident/accident for all of their operations and events that transpire. This deficiency is significant because the communities in the transit corridor and at the end point in Andrews County, Texas, must have this information to make decisions on emergency responder support levels and even to consider on-going support by means of continued consent to operations.

22. The NRC should specifically incorporate the BRC and NAS report recommendations on consent based siting, waste transport and storage. The BRC (2012) conveyed to regulators, agencies and the public that ***any*** future repository for SNF and HLW should be sited based on the consent of the affected state, tribal, and local communities. In 2013, DOE adopted this recommendation for "consent-based siting." As of December 2015 DOE issued their document

titled "Draft Consent-Based Siting Process for Consolidated Storage and Disposal Facilities for Spent Fuel and High-Level Radioactive Waste" and thereafter sought public comment. The actual policy for consent based siting has not been incorporated into any current legislation or rule, but, rather, reflects the non-binding recommendations of the BRC and DOE. As for transportation of nuclear waste, this activity poses risks for any community that these materials may cross. This deficiency is significant because the recommendations represent public safety, security, environmental, and health protection best practices.

23. The ISP proposal (USNRC Docket # 72-1050) focuses on SNF and GTCC wastes from NPP operations. The Yucca Mountain Project included high-level wastes (HLW) not listed by ISP.[122] This waste type was not specifically listed by ISP despite the applicability of 10 CFR, Section 72 which notes "Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste." The exclusion of HLW makes the proposal ambiguous as to the materials that will be transported to, and stored at, the proposed facility. This deficiency is problematic since safety and security considerations might be different for these dissimilar types of wastes.

24. Specific accident scenarios relative to the CISF proposal are beyond design basis events and could be exacerbated by human interference. An exemplar event was the Baltimore Tunnel Fire (July 2001). This tunnel fire was analyzed by a Nevada contractor. See: http://www.state.nv.us/nucwaste/news2001/nn11459.pdf The NRC/DOE should demonstrate situational awareness of these events and demonstrate specific plans to mitigate said risks as part of the request for proposal process. This requires that NRC/DOE detail the transportation infrastructure and planning necessary to stock the CISF. This deficiency is significant because the analysis of events in the ISP proposal is not sufficient to cover cascading impacts as noted elsewhere.

25. Transportation of wastes to the proposed CISF is an issue that NRC/DOE must address. This ISP proposal does discuss on-site transportation but does not address the totality of transportation needed to stock the CISF. This deficiency is significant because the proposal then does not present a realistic risk profile for the proposed facility since transportation is necessary to stock the CISF.

---

[122] For specific details on what types of wastes the State of Nevada expected to receive at Yucca Mountain see: http://www.state.nv.us/nucwaste/yucca/trfact01.htm

26. The NRC must provide details on the complexity of the potential different waste streams (NPP, defense operations, commercial operations, perhaps even reprocessing), from the many potential origination sites, and for all forms of potential wastes (SNF, HLW, GTCC/liquid/solid/assemblies, etc.). That level of differential analysis is not found within the ISP CISF proposal and NRC/DOE should undertake this inventory effort prior to the proposal let alone the EIS process so as to allow the bidders for interim storage facilities to plan for the full range of wastes that could be stored at the proposed CISF. Likewise, this analysis should therefore be part of the NRC evaluation so that stakeholders can fully comprehend the scope of activities necessary to stock the proposed facility. This includes the planned additional requests for waste inventory additions, both domestic produced and the potential for the storage of foreign wastes that may be requested by ISP in years or decades to come. This deficiency is significant because the vendors are ill-informed and the resultant proposal does not address the real risks of operations.

27. Identification of affected communities is difficult since transportation planning for the proposed CISF was not done. NRC/DOE should identify the primary and secondary transport/storage communities prior to any proposal. This deficiency is significant because the ISP proposal does not do so and thus, is of no help in mitigation of adverse effects that could be planned for and mitigation efforts implemented from the onset of transportation to and from a storage facility.

28. NRC/DOE should recognize that disasters, human initiated or natural, do not easily fit economic impact analysis (EIA) protocols. Due to social obligations and the lack of good data, a reasonable cost-benefit analysis (CBA) is likewise not easy to accomplish. The transportation policy planners and federal regulators for any effort needed for the movement of nuclear waste must move beyond current EIA and CBA methods to invent new economic models to assess the impacts of a radiological disaster. Perhaps they could build off of existing platforms like Transportation Economic Development Impact System (TREDIS) and the various agencies' specific assessment tools for impacts from transportation development. In this case the focus should be on those pre-existing models on transportation impacts from a radiological incident during transit activities. This deficiency is significant because the exclusion of such recognition places communities at risk from cascading BDBE and HIE.

29. NRC should engage in full disclosure of the transportation details behind the proposed CISF environmental reports necessary to site a CISF (EIA or EIS). These procedures were designed to assess both the positive and negative impacts of projects like the proposed CISF in Andrews County, Texas. Transportation EIA/EIS's were designed to assist policy makers to decide the least impactful alternatives for a given transportation program. In the case of the Yucca Mountain EIS reports, the critics have argued that these documents were used more as propaganda in support of shipments and not as intended to inform effective policy. For example see State of Nevada criticisms for the decision on Yucca Mountain: Case Number 02-1179, State of Nevada v. Spencer Abraham et al. in the United States Court of Appeals for the District of Columbia Circuit. The Nevada petition says "The FEIS fundamentally distorts and misrepresents the nature of the "proposed action" itself, failing to inform Nevada, other agencies and members of the public of essential details necessary to make an elementary comparison between the "proposed action" and the "no project" alternative. It fails to disclose that the Yucca Mountain site would not be a "geologic" repository as defined in the NWPA. It arbitrarily excludes from the "proposed action" the handling, transportation and disposition of radioactive waste from at least 54 sites in the United States." (Section 11 of the petition). This deficiency is significant because the process engaged in by bidders is incomplete since the NRC has failed in disclosing details that are of substance to any decision on bidding and especially on approvals by communities.

30. Given the partnership involved in this CISF and the sensitive details relative to DOE defense wastes that might be stored at the CISF, assessment of the potential national security related aspects of this proposal are critical. For example, how such national security related information would be shielded from the foreign partner(s). Additionally, what specific data and information on security safeguards will be the disclosure parameters of such a partnership given this sensitive material and foreign involvement in the wastes from weapons production activities (HLW) now and in the future? This deficiency is significant because the DOE is responsible for maintaining safeguards for the nation's nuclear arsenal.

## AUTHOR'S BIOGRAPHY

Starting in 1994 when James David Ballard was a graduate student at UNLV, he developed an interest in Yucca transportation security. While he had been interested in terrorism for several years, and having taught classes on the subject, he had little detailed knowledge of the Yucca Mountain Project and shipment discussions up until that point. The author was aware of Yucca given his geographic location (Las Vegas), but not the details of the transportation related safety and security issues that would come to dominate his scholarship over the decades.

He approached the NWPO (State of Nevada Agency for Nuclear Projects, Nuclear Waste Projects Office) for funding to conduct an examination of the terrorism related issues of the Yucca project – this was in anticipation of a dissertation level research project. While funding was secured for the writing of the initial report, that report was not viable for a dissertation topic according to his dissertation committee. That initial scholarship, a ~200 page report, was prepared over the next 25 months. This initial document was entitled "Preliminary Study of Sabotage and Terrorism as Transportation Risk Factors Associated with the Proposed Yucca Mountain High-level Nuclear Waste Facility." The preliminary study was published in 1997 but the arguments date to 1994 when the author started his collaboration with Nevada's NWPO.

At that time, and continuing today, the concerns were that the DOE was underplaying the risks of terrorism, they had underestimated the risks of multiple weapons (shaped charges) as suggested by a US Army report on potential attack scenarios and that the DOE failed to consider tactics that may be relevant (e.g., Tow Missile). For details please see: Ballard, J. D. 1997. "Preliminary Study of Sabotage and Terrorism as Transportation Risk Factors Associated with the Proposed Yucca Mountain High-level Nuclear Waste Facility." *Nuclear Waste Projects Office*: Carson City, NV.

While this initial report was being readied for publication by the Nevada NWPO, Halstead and Ballard undertook a much more detailed and focused report on threats, risks and sabotage/terrorism related issues. This report, "Nuclear Waste Transportation Security and Safety Issues" was a more refined articulation of the concerns Nevada had over the Yucca Mountain transportation planning. These authors expanded the basic arguments to include attacks using shaped charges, missiles and deliberate releases of the inventory of radionuclides. For details please see: Halstead, R. J. and J. D. Ballard. 1997. "Nuclear Waste Transportation Security and Safety Issues." *Nuclear Waste Projects Office*: Carson City, NV.

These two reports, and additional work done in the years before the author was involved with Yucca Mountain studies, were the basis of a training seminar. In 1996, just prior to the official publication of the two reports noted above, FEMA held a conference to address the first responder issues Nevada had concern with. A co-author presented a summary of the

work done to date at the "Southwest Counter-Terrorism Symposium." This presentation was important in that it directly connected terrorism and the potential radioactive waste shipments to Yucca shipments – a connection that word choices by DOE had minimized (DOE uses sabotage, or extra regulatory event, to distance the arguments from the more politically charged term of terrorism). Please see: Halstead, R. J. and J. D. Ballard. 1996. "*Southwest Counter-Terrorism Symposium.*" FEMA Provided Training for First Responders. Las Vegas, NV.

During the timeframe for the writing of the above reports, two congressional bills arrived for public debate. Ballard et al. provided arguments on terrorism, tactics, scenarios and weapons as part of the discussion of these bills in a policy paper "Nuclear Waste Transportation Security and Safety Issues: Potential Transportation Impacts of S.104 and H.R.1270." Please see: Halstead, R. J. and J. D. Ballard. 1997. "Nuclear Waste Transportation Security and Safety Issues: Potential Transportation Impacts of S.104 and H.R.1270." *Nuclear Waste Projects Office*: Carson City, NV.

In the year after the initial reports noted above became public (1997) the author distilled the various arguments into an academic paper for a national criminology conference. This public presentation offered a tri-phase risk assessment format - attacks against transportation infrastructure used to move waste materials; cargo capture and potential release based attacks; and direct attacks using modern ordinance designed to release the radioactive inventory from their shipment casks. These three scenario epitomes represent the beginning of a spectrum of attacks and imply that a variety of possibilities exist for a combination of attackers, weapons and consequences. Please see: Ballard, J. D. 1998. "The Transportation of Nuclear Waste, First Responders, and Terrorism Policy." *American Society of Criminology*. Washington, D.C.

The State of Nevada petitioned the NRC for rulemaking on the threats against potential Yucca shipment containers around the same time frame. Ballard's work was incorporated into the petition. This rulemaking petition references the documents and collaborations above. In particular this petition questions the DBT and assumptions underlying regulations that would support Yucca Mountain safety and security procedures. Please see: Ballard, J. D. 1999. "*Nuclear Regulatory Commission Documentation for Petition*. Agency petition for Rulemaking pursuant to 5 U.S.C. § 553 and 10 C.F.R. § 2.800 - 2.804."

Soon after this rulemaking petition, the DOE published its DEIS for Yucca Mountain. A group of scholars were asked to review relevant portions of this very large DOE report and analyze its arguments for Yucca transport. The result was a report that reiterated several previously identified flaws in the DOE's safety and security discussions. Weapons, tactics and scenarios were discussed at great length. Please see: Ballard, J. D. 1999. "The Impacts: Department

of Energy Draft Environmental Impact Statement" post-publication review. *Nuclear Waste Projects Office*: Carson City, Nevada.

During the summer of 2000 the author directed a group of UNLV graduate students in the construction of the "Nuclear Waste Transportation Accidents: State of Nevada's Curriculum Guide for Law Enforcement, Public Safety and Medical Personal." This DOT funded effort was focused on developing curriculum for Nevada state patrol officer training - fact sheets, training materials and a detailed schedule for a multiple year training. The result was a weeklong training suggestion (40-hour curriculum). This training regimen held a focus on terrorism on a training day when the officers would be asked to envision training tactics, weapons and terrorism. Please see: Ballard, J. D., D. Stewart, K. Kerrigan, and J. Schneider. 2000. "Nuclear Waste Transportation Accidents: State of Nevada's Curriculum Guide for Law Enforcement, Public Safety and Medical Personal." *Nuclear Waste Projects Office*: Carson City, Nevada.

After the summer project with UNLV graduate students was completed, the author was invited to attend a UN conference on terrorist victimization. He used Yucca illustrations to underscore the threats to shipments and so they could be visualized. The conclusion of this presentation was that victimization has multiple dimensions. The paper used Yucca Mountain illustrations to underscore the need for scenario and transportation risk study reconsiderations based on a wider range of threats and how these various scenarios could differentially impact communities. Please see: Ballard, J. D. 2000. "Weapons of Mass Victimization: Considerations for the 21st Century." *United Nations Congress on Terrorist Victimization*: Prevention, Control, and Recovery. Vienna, Austria.

In September of 2001, a group of authors presented a summary of Nevada's positions at an industry conference in Chicago. The paper asked critical questions on sabotage – for example the research asked are the DOE scenarios creditable? A week after this presentation the attacks of September 11, 2001 transpired. Please see: Halstead, R., F. Dilger and J. D. Ballard. 2001. "State of Nevada Studies of Potential and Sabotage: Critical Issues." 13th Annual Symposium on Packaging and Transportation of Radioactive Materials (PATRAM 2001), Conference CD Rom. *PATRAM*: Chicago.

Directly after the attacks of 9/11 several authors reconsidered the impacts of these attacks and arguments being made by DOE and the nuclear industry that power plants were a target and this justified Yucca Mountain approval. The author was invited to Stanford University to present a paper – "Shelter-In-Place: The Logic of High-Level Nuclear Waste Security." This paper was focused more on the bureaucratic culture of DOE and how this culture was defined by the Cold War era and that this legacy hinders the agency from refocusing on threats like those posed to SNF shipments, especially in a post 9/11 world. Extensive reiterations of arguments from above are noted, but within the new reality of a post 9/11

threat environment. Please see: Ballard, James David. 2002. "Shelter-In-Place: The Logic of High-Level Nuclear Waste Security." State of Nevada's *Agency for Nuclear Projects*: Carson City, NV.

About six months after the 9/11 attacks, Ballard was asked to testify in both the U.S. House of Representative and U.S. Senate on Yucca Mountain issues. The reason, President Bush had directed congress to go forward with Yucca Mountain. These hearings were part of the authorizing process for the facility and mandated by law. In the House hearings, extensive discussion on scenarios and risks associated with transportation can be seen in the testimony. These included discussions on both accidents and human initiated events. Weapons were also part of these discussions, albeit in forms with no specific details, since the author was careful not to focus on a "how to" attack but offered more generic scenarios to educate lawmakers on potentials. Please see: Ballard, James David. 2002. "Testimony of James David Ballard." *United States House of Representatives*, Subcommittee on Highways and the House Subcommittee on Transportation and Infrastructure.

During this same time frame Nevada decided to withdraw some of the web based terrorism related scholarship due to security concerns. Following the House testimony, the U.S. Senate also held hearings on Yucca security and safety. Here Ballard refined the House testimony arguments and addressed some questions that arose as the result of House testimony. Once again scenarios, weapons and tactics were discussed. Please see: Ballard, James David. 2002. "Testimony" before the *United States Senate*, Committee on Energy and Natural Resources, One-Hundredth Seventh Congress regarding S. J. Res.34 Approving the Site at Yucca Mountain, Nevada, for the Development of a Repository for the Disposal of High-level Radioactive Waste and Spent Nuclear Fuel, Pursuant to the Nuclear Waste Policy Act of 1982.

After the House and Senate testimony the author collaborated with a group of international scholars to analyze the impacts of terrorism on nuclear power generation facilities and transport of wastes across the EU. Funding was provided by NATO and the principle investigator was situated at Stanford University. After the authorization for Yucca Mountain was approved by Congress in 2002, Ballard also focused on developing the arguments for those most immediately affected by this congressional policy decision, the first responder community. During the process, F. Dilger joined the NATO project and helped extensively with the modeling of the radiation release data. Please see: Steinhausler, F., M. B. Maerli, S. Rydell, G. Bunn and J. D. Ballard. 2004. Terrorist Attacks on Nuclear Power Plants and Nuclear Materials Transports. *NATO*: Brussels, Belgium.

About the same time, the National Academies of Science initiated an assessment project to understand the transportation of SNF. The Academy held hearings where the author presented testimony to this body. This presentation was used to summarize various Nevada

arguments, augmented by the knowledge gained from the NATO project. Scenarios were more refined and weapons choices expanded as a result of that involvement. Please see: Ballard, James David. 2003. "Nuclear Waste Transportation: Lessons from 9/11/2001 Applicable to Nuclear Waste Transportation Program Planning, Security, and Emergency Response." Testimony in Las Vegas hearing before the *National Academies of Science*, Committee on Transportation of Radioactive Waste.

As a result of the collaborations on the NATO project a conference was convened in Austria that was focused on nuclear facilities and security issues. The author presented at this international conference and used his NATO research on scenarios and weapons to argue that asymmetrical tactics apply to shipments in the EU, FSU and USA. To summarize, the NATO project allowed the author to build off of Nevada studies, sharpen the focus of that research and this process was critical because the scenarios were vetted in an unusual collaborative process – the NATO group red teamed these with weapons experts, arms dealers, radiation health experts, physics professionals and so on. The result was that new ideas on weapons, tactics and scenarios were added into existing arguments. Please see: Ballard, James David. 2002. "Asymmetrical Sabotage Tactics, Nuclear Facilities/Materials, and Vulnerability Analysis." *European Union High Level Scientific International Conference on Physical Protection* (NUMAT Conference). Salzburg, Austria.

By 2004, a group of researchers were able to summarize the various arguments on transportation and security risks. The presentation at a nuclear industry conference gave the chance to reiterate Nevada's arguments on scenarios, weapons and tactics. This paper summarized a host of arguments the DOE had "forgotten" when discussing Yucca Mountain as a repository. Please see: Halstead, R. J., F. Dilger and J. D. Ballard. 2004. "Beyond the Mountains: Nuclear Waste Transportation and the Rediscovery of Nevada." *Waste Management* 2004. Tucson, AZ.

The following year another EU conference was held and two authors presented a paper on these issues. This presentation was built off of a combination of Nevada and NATO arguments. Please see: James David Ballard and Fred Dilger. 2005. "Transporting Nuclear Wastes from Energy Production Sites: What Can Terrorists Do And How?" *Nuclear Energy and Security* (NUSEC). Salzburg, Austria

Also in 2005, Halstead, Dilger and Ballard offered "Planning for an Unpredictable Event: Response to Terrorist Attack against SNF Shipments" at the Waste Management conference. This summary of previous work was a reminder to the industry, DOE and others that any state that is targeted for transportation through it, or a waste storage facility within it, should do their due diligence on research about weapons, tactics and consequences for waste shipment attacks. This is because DOE/NRC has not done so to date and these affected communities should continue to develop those arguments. Please see: Halstead, R. J., F.

Dilger and J. D. Ballard. 2005. "Planning for an Unpredictable Event: Response to Terrorist Attack against SNF Shipments." *Waste Management*. Tucson, AZ.

In 2007, the DOE released its Draft SEIS for Yucca Mountain. Nevada asked various contractors to analyze this document (a process that was similar to that done for the DEIS). The author prepared an analysis of the DOE document looking at HIE and weapons, tactics and consequences. DOE failed to mount an effective argument against Nevada's research and still continued to disregard Nevada's arguments in many respects, not the least of which were scenarios. Please see: Ballard, J. D. 2007. "Assessment of Supplemental Environmental Impact Statement (SEIS) Developed by DOE." *Nevada's Agency for Nuclear Projects*: Carson City, NV.

This same year the author was tasked to use open source data to analyze various scenarios for attacks against a NPP and its dry storage facility. The result was a 'red team' assessment of the known threats for a fixed site storage facility for nuclear waste. Scenarios, weapons and tactics were intertwined with this analysis. Please see: Ballard, James David. 2007. "Threat Assessment of Diablo Canyon Nuclear Power Plant in California." *Nevada's Agency for Nuclear Projects*: Carson City, NV.

In 2008, Nevada tasked a team approach to the issues noted above and the author articulated a new methodology to assess risk in transportation for sabotage and terrorism. This triangulated methodological approach used a national labs alternative risk assessment procedure to help in creating this multi-dimensional approach to threats. Please see: Ballard, J. D., R. J. Halstead, F. Dilger, M. Resnikoff and H. Collins. 2008. "Assessing the Vulnerability of Yucca Mountain Shipments: A Threat Matrix for Human-Initiated Events." *Waste Management* 2008. Tucson, AZ.

In 2008 the author was once again asked to testify in the U.S. Senate for the Committee on Commerce, Science and Transportation: Hearing on Safety and Security of Spent Nuclear Fuel Transportation. This presentation used the methodologies developed in the Waste Management paper noted above to summarize Nevada arguments against transport and also argued for a shelter-in-place alternative like dry storage. Please see: Ballard, J. D. 2008. "Terrorism Risk and the Transportation of Spent Nuclear Fuel and High Level Radioactive Waste." Testimony before the *United States Senate*, Committee on Commerce, Science and Transportation. Hearing on Safety and Security of Spent Nuclear Fuel Transportation, September 24, 2008.

In preparation for Waste Management 2008, Halstead et al. crafted a document entitled "State of Nevada Perspective on the U.S. Department of Energy Yucca Mountain Transportation Program." This presentation summarized the work of the last 14 years on transportation issues, including sabotage/terrorism issues, weapons and scenarios. Halstead

worked as lead author and guided the group as they constructed these arguments. Please see: Resnikoff, M. , R. J. Halstead, F. Dilger, J. D. Ballard and H. Collins. 2008. "State of Nevada Perspective on the U.S. Department of Energy Yucca Mountain Transportation Program." *Waste Management*. Tucson, AZ.

In 2009 the GAO asked the author to review their "General Accounting Office (GAO) Request for Feedback on Radioactive Waste Management." The author provided a written review of the proposed methodology to study various waste storage and transport alternatives. This criticism of GAO methods of scenario development was offered and based on years of Nevada arguments against uncreative attack parameters and as an alternative to the industry perspective the GAO seemed to have used to construct their document. Please see: Ballard, James David. 2009. "General Accounting Office (GAO) Request for Feedback on Radioactive Waste Management." *GAO*: Denver, CO.

The scholarship continued with a focus on transportation planning and security/safety of wastes. A review of the 25-year history of Yucca Mountain transportation planning was undertaken with two co-authors and presented at the Waste Management conference. Please see: Halstead, R. J., F. Dilger and J. D. Ballard. 2011. "Yucca Mountain Transportation Planning: Lessons Learned, 1984-2009." *Waste Management* 2011. Phoenix, Arizona. Additionally, the NRC was busy with rulemaking on physical protection regulations for SNF shipments. Ballard, J. D. 2011. "Report on the status of the NRC proposed rulemaking for 10 CFR 73.37, Physical Protection of Irradiated Reactor Fuel In Transit, and a compilation of written comments submitted to the NRC in response to the October 13, 2010 Federal Register notice (75 FR 62695-62716). Report includes comments submitted to NRC on the associated guidance document, NUREG-0561, Rev.2." *Nuclear Waste Projects Office*, Carson City, NV.

Soon after the waste management conference the Japanese disaster struck and Fukushima became known to the world. Nevada was very interested in the performance of the cooling pools, the status of the SNF and later would learn about the performance of the dry casks at the site of this disaster. A great deal of the scholarship used in the presentation on the proposed CISF came from this research. Please see: Ballard, James David. 2011. "Report Reviewing Safety and Security Aspects of the March 2011 Fukushima Daiichi Nuclear Disaster, Identifying Human-Initiated Events Before and After the Earthquake And Tsunami. *Nuclear Waste Projects Office*, Carson City, NV.

Of interest to the proposed CISF proceedings was a presentation on the NRC acceptance of rulemaking contentions by the State of Nevada. This report out on the final settlement of the NRC petition (1999) noted above showed that Nevada had almost all of its issues settled by rulemaking and they represented a significant change of policy.

Please see: Dilger, F., J. D. Ballard and R. J. Halstead. 2012. "Physical Protection of Spent Fuel Shipments: Resolution of Stakeholder Concerns through Rulemaking." *Waste Management*. Phoenix, AZ.

Still the issues were not finalized, nor had all of the concerns brought forth, in the author's research, been addressed. Neither were those associated with Nevada's concerns. Once again three researchers conversant in the subjects presented a paper on these issues. Please see: Dilger, F., R. J. Halstead and J. D. Ballard. 2012. "Full-scale Cask Testing and Public- Acceptance of Spent Nuclear Fuel Shipments." *Waste Management*. Phoenix, AZ.

Two researchers used their knowledge of the Yucca Mountain issues to address those in a different state and for a NPP of concern. Please see: Dilger, F. and J. D. Ballard. 2013. "Comments on the Waste Confidence Generic Environmental Impact Statement Draft Report for Comment (NUREG-2157), September 2013." Prepared for the States of Vermont and Connecticut, *Attorney General's Office*. Montpellier, Vermont.

The Fukushima disaster was teaching all the safety and security professionals working on SNF/HLW issues something to think about. This incident offered a unique opportunity to reconsider DBE and DBT's in light of the cascading and compounding nature of the disaster. It challenged accepted engineering and operational wisdom on waste security and safety. Please see: Ballard, J. D. 2013. "Japan's Fukushima Daiichi Disaster: Implications for Further Research on Terrorism and Sabotage." *Nuclear Waste Projects Office*, Carson City, NV.

The tie to Nevada's Yucca Mountain transportation contentions with the NRC was the subject of the next several reports on Fukushima. Please see: Ballard, J. D. 2014. "Fukushima Dai-ichi and Nevada's Contentions under NEPA." *Nuclear Waste Projects Office*, Carson City, NV and Ballard, J. D. 2016. Update: Fukushima Dai-ichi and Nevada's Contentions under NEPA." *Nuclear Waste Projects Office*, Carson City, NV.

The Holtec CISF application for a potential New Mexico facility was analyzed in August/September 2018. The history of work above helped to inform that analysis. This document was submitted to the NRC as part of the contentions offered on behalf of several groups. The contentions were collated and authored by Terry Lodge, Esq. As of the submission date of this report the Holtec document was only submitted to the NRC, not published by the author.

The author has long argued that the choice of weapons and tactics in threat analysis matters, the use of multiple scenarios is not only possible but desirable, and argues against the static DBT baseline and risk assessment methodologies used by DOE/NRC. Multiple variable risk analysis is a more robust way of gaining understanding. What is typically offered in public

settings by DOE/NRC are methods less than robust considering the threat environment we face in a post 9/11 world and after the Fukushima disaster. These same arguments underlie the analysis and the suggestions in this report.

# Curriculum Vita

**James David Ballard**
**January 2018**

California State University, Northridge
Department of Criminology and Justice studies
Mail Code 8457
Northridge, California 91330-8457

Phone: 001.818.677.2009
Fax: 001.818.677.6936
Email: ballard@csun.edu

## Education

Ph.D. University of Nevada, Las Vegas. August 2000. Dissertation – " Terrorism and Political Policy: Crisis and Policy Making Indicators in the Media Prior to Legislative Action."
M.A. Jacksonville State University. August 1992. General Studies: Economics/Political Science
B.S. Jacksonville State University. June 1991. Major: Sociology, Minor: Management.

## Professional Experience

Professor, Department fo Criminology and Justice Studies. August 2017 to present.
Professor, Department of Sociology – CSUN. Aug. 2010 to August 2017.
Associate Professor, Department of Sociology – CSUN. Aug. 2005 to Aug. 2010.
Assistant Professor, Department of Sociology – CSUN. Aug. 2002 to Aug. 2005.
ABD/Assistant Professor, Criminal Justice Department - GVSU. Aug. 1997 to Aug. 2002.

## Specialization and Research Areas

Energy Security Terrorism Criminology
Nuclear Waste Security Research Methodology Qualitative Research
Quantitative Research

## Classes Taught

*CSUN:* Undergraduate

SOC 305 (Culture and Personality, hybrid); SOC 408 (Criminological Theory, traditional, enhanced, hybrid and on-line); SOC 485B (Cultural Awareness and Policing, on-line), SOC 485B (Crime Analysis, on-line); SOC 485B (Human Terrain and Urban Policing, on-line), SOC 485B (Terrorism Analysis, on-line); SOC 485B (Internet Radicalization, hybrid); SOC 485B (Radicalization, on-line); SOC 485B (Community Policing, on-line); SOC 485A (Prison Radicalization, on-line); SOC 497/L (Soc. Research, hybrid); Population Dynamics (Soc 350), Criminology (Soc 355), Social Statistics/Lab (Soc 364/364L), Class, Organization Theory (Soc 400, traditional and on-line); Status and Power (Soc 401, traditional and on-line), Corrections (Soc 474), Criminological Minds: Sociological Profiling (Soc 485A), Criminology and Terrorism (Soc 485B), Sociology of Terrorism (Soc 485B), Terrorism: The Role of CJ Professionals (Soc 485A), Methods of Political Research/Lab (Pols 372/372L), Terrorism: Nuclear Waste Security (CJS 452 TR).

Graduate

Thesis Administration (SOC 698S); Independent Study (SOC 699); Public Sector Labor Relations (MPA 642b, enhanced/hybrid/on-line), Research Methods for Public

Administration (MPA 620
traditional and on-line), Complex Organizations (Soc 622), Social Research (Soc 690), Public Policy Analysis (MPA 640), MPA Independent Study (MPA 699C), MPA Comprehensive Exam Preparation courses (MPA 697C).

*COC:* Sociological Analysis (Soc 202 Co-taught); Scared Senseless: The Threat of Domestic and Global Terrorism seminar; Serial Murder: Profiling the Crime and Social Response seminar

*Bristol:* Micro Economics, Macro Economics and Managerial Economics (Graduate).

*GVSU:* Case Study Methods, Criminal Justice Policy, Criminology, Domestic Terrorism, Freshman Seminar, Introduction to Criminal Justice, Introduction to Statistics, Qualitative Methods, Research Methods, Terrorism – General Education, International Terrorism Information Systems for CJ (Graduate) Criminal Justice Data Analysis (Graduate).

*UNLV:* American Terrorism, Introduction to Sociology, Analytical Methods and Statistics (Co-taught Graduate).

**Publications**

***Articles in Journals:***

Dilger, F., R.J. Halstead and J. D. Ballard. 2015. "The Transportation Factor in Site Evaluations for Spent Nuclear Fuel Storage and Disposal Facilities." *Waste Management*. Phoenix, AZ. Reviewed proceedings.

Ballard, James David, Dilger, F., and R.J. Halstead 2015. "A Whole Wilderness of Warning: Assessing Economic Consequences of Nuclear Release." *Waste Management*. Phoenix, AZ. Reviewed proceedings.

Dilger, F., R.J. Halstead and J. D. Ballard. 2014. "Toil and Trouble." *Waste Management*. Phoenix, AZ. Reviewed proceedings.

Dilger, Fred, James David Ballard and Robert Halstead. 2012. "Physical Protection of Spent Fuel Shipments: Resolution of Stakeholder Concerns through Rulemaking." *Waste Management*. Phoenix, AZ. Reviewed conference proceedings.

Dilger, Fred, Robert Halstead and James David Ballard. 2012. "Full-scale Cask Testing and Public Acceptance of Spent Nuclear Fuel Shipments." *Waste Management*. Phoenix, AZ. Reviewed conference proceedings.

Halstead, Robert J., Fred Dilger and James David Ballard. 2011. "Yucca Mountain Transportation Planning: Lessons Learned, 1984-2009." *Waste Management 2011.* Phoenix, Arizona. Reviewed conference proceedings.

Johnson, Roger, Morten Bremer Maerli, Eddie Bitzer and James David Ballard. 2008. "Two Simple Models of Nuclear Transparency." *International Journal of Social Inquiry* 1(2): 201-237.

Ballard, James David and Fred Dilger. 2008. "Scenario Development in Oil and Gas Management: Envisioning the Future by Means of Analytical Techniques." *Strategic Insights,* VII. 15 pages Available on-line at http://www.ccc.nps.navy.mil/si/2008/Feb/ballardFeb08.pdf

Ballard, James David and Fred Dilger. 2008. "Using Social Scientific Methodological Approaches to Reducing Risk: How the Risk Reduction Approach Works with Oil and Gas Faculties." *International Journal of Social Inquiry,* 1(1): 105-119.

Ballard, James David. 2007. "Perceptions and the Social-Political Aspects of Nuclear Power and Nuclear Waste Disposal." *The Journal of Physical Security*, 2(1). 18 pages. Available on-line at: http://jps.anl.gov/v2iss1.html

Halstead, Robert J., Fred Dilger and James David Ballard. 2004. "Beyond the Mountains: Nuclear Waste Transportation and the Rediscovery of Nevada." *Waste Management 2004*. Tucson, AZ. Conference proceedings.

Boyns, David and James David Ballard. 2004. "Developing a Sociological Theory for the Empirical

Understanding of Terrorism." *The American Sociologist,* 35: 5-25. Published in 2005.

Ballard, James David and Kristine Mullendore. 2003. "Weapons of Mass Victimization, Radioactive Waste Shipments and Environmental Laws: Policy Making and First Responders." *American Behavioral Scientist*, 46: 766-781.

Ballard, James David. 2003. "Asymmetrical Sabotage Tactics, Nuclear Facilities/Materials, and Vulnerability Analysis." *Osterreichische Militarische Zeitschrift*, 2: 26-30.

Ballard, James David, Joseph Hornik and Douglas McKenzie. 2002. "Technological Facilitation of Terrorism: Definitional, Legal, and Policy Issues." *American Behavioral Scientist*, 45: 989-1016. Reprinted in A. O'Day, 2004. *Cyberterrorism.* London: Ashgate Publishing Limited.

Ballard, James David, Barbara Brents and **Amanda Dean**. 2002. "The Oklahoma City Bombing and Policy Maker Presentations in the Media." *Popular Culture Review, .*13: 89-101.

Halstead, Robert, Fred Dilger and James David Ballard. 2001. "State of Nevada Studies of Potential Terrorism and Sabotage Against Spent Fuel Shipments." *Waste Management 2001.* Conference proceedings.

***Books/Collected Works/Compendiums:***

Ballard, James David and Vickie Jensen. 2007. *Teaching Qualitative Methods: A Collection of Syllabi and Instructional Materials, 4th edition.* Compendium co-editor and contributor. 206 pages. Washington, DC: American Sociological Association.

Ballard, James David. *2005. Terrorism, Media and Public Policy.* Cresskill, NJ: Hampton Press.

Steinhausler, Friedrich, Morton Bremer Maerli, Stan Rydell, George Bunn and James David Ballard. 2004. *Terrorist Attacks on Nuclear Power Plants and Nuclear Materials Transports.* Brussels, Belgium: NATO.

Ballard, James David. 2001. *Qualitative Research Methods: Syllabi and Instructional Materials*, *2nd Edition.* Compendium editor and contributor. 220 pages. Washington, DC: American Sociological Association.

***Book Chapters:***

James David Ballard and Fred Dilger. 2012. "Energy-related Counterterrorism." In *Counterterrorism: From the Cold War to the War on Terror.* Eds. Frank Shanty. Santa Barbara: ABC-CILO.

Ballard, James David and Kristine Mullendore. 2007. "Legal Policy to Counteract the Threat of Catastrophic Terrorism." In *NATO and Terrorism: On Scene: New Challenges for First Responders and Civil Protection,* pages 32-44. Eds. Friedrich Steinhausler and Frances Edwards. Dordrecht, Netherlands: Springer.

Ballard, James David. 2007. "Where is my Package - Exactly? Nuclear Waste Transportation, Public Safety and ITS." In *Bringing ITS all Together,* pages 45-56. Ed. Sheila H. Conway. Las Vegas, NV: Clark County Comprehensive Planning, Nuclear Waste Program.

Mullendore, Kristine and James David Ballard. 2005. "Presumption of Response to Terrorism: Potential Legal Aspects Relative to First Responders." In *NATO and Terrorism: Catastrophic Terrorism and First Responders,* pages 82-99. Eds. Friedrich Steinhausler and Frances Edwards. Dordrecht, Netherlands: Springer.

Becker, Larry and James David Ballard. 2005. "Federal Programs and their Potential to Incite Political Violence: The Transportation Program for Yucca Mountain and Terrorist Adversaries." In *Terrorism: Readings, Research, and Realities*. Eds: Lynne Snowden and Brad Whitsel. Upper Saddle River, NJ: Prentice-Hall. Republished as e-book in Jan. 2009 by Pearson Custom Publishing.

Little, Dominic and James David Ballard. 2005. "Organizational Characteristics for Groups who would use Weapons of Mass Victimization." In *Terrorism: Readings, Research, and Realities*. Editors: Lynne Snowden and Brad Whitsel. Upper Saddle River, NJ: Prentice-Hall. Republished as e-

book in Jan. 2009 by Pearson Custom Publishing.

Ballard, James David. 2000. "Counter Terrorism Security Survey for Commercial Facilities." *Principles of Security*, 4th. Eds: Ricks, T. A., B. G. Tillett, and C. W. Van Meter. Bethesda, MD: Anderson Publishing.

***Contributions/Book Reviews/Encyclopedia Entries:***

Ballard, James David. 2010. "Conflict Theory and Religious Violence." Ross, Jeffrey Ian (ed.). 2010. *Religion and Violence: An Encyclopedia of Faith and Conflict from Antiquity to the Present.* Armonk, NY: M. E. Sharpe, Inc. Encyclopedia Entry.

Ballard, James David. 2010. "The World Trade Center Bombing and Religious Violence." Ross, Jeffrey Ian (ed.). 2010. *Religion and Violence: An Encyclopedia of Faith and Conflict from Antiquity to the Pres*ent. Armonk, NY: M. E. Sharpe, Inc. Encyclopedia Entry.

Ballard, James David. 2010. "Organizational Profiling." In *Protecting the Homeland from International and Domestic Terrorism Threats, eds. Fenstermacher, Laurie, Larry Kuznar and Anne Speckhard.* National Security Institute (Joint Staff): Washington, DC. Contribution.

Ballard, James David. 2008. "Terror, Culture and Politics: Rethinking 9/11." *Political Communication*. 25: 103-104. Book review.

Ballard, James David. 2003. "Clean-up and Rebuilding." *Encyclopedia of World Terrorism.* ME Sharpe: Santa Barbara, CA. Encyclopedia Entry.

Ballard, James David. 2002. "Yucca Mountain, Terrorism, and Shipments of Nuclear Waste." *Nuclear Neighborhoods*. State of Nevada, Agency for Nuclear Projects: Carson City, NV. Advocacy collection.

Halstead, Bob, James David Ballard and Fred Dilger. 2001. "Nuclear Waste Transportation Terrorism and Sabotage: Critical Issues." *13th Annual Symposium on Packaging and Transportation of Radioactive Materials* (PATRAM 2001), Conference CD Rom. Chicago: PATRAM, Inc. Conference proceedings.

Ballard, James David. 1997. "One for All: The Logic of Group Conflict" by R. Hardin. *Studies in Conflict and Terrorism*, 20: 128-130. Book review.

***Expert Witness/Consultation:***

Dilger, Fred and James David Ballard. 2013. "Comments on the Waste Confidence Generic Environmental Impact Statement Draft Report for Comment (NUREG-2157), September 2013." Prepared for the States of Vermont and Connecticut, Attorney General Office. Montpellier, Vermont. Submitted by Vermont to Secretary, United States Nuclear Regulatory Commission.

Ballard, James David. 2008. "Terrorism Risk and the Transportation of Spent Nuclear Fuel and High Level Radioactive Waste." Testimony before the *United States Senate, Committee on Commerce, Science and Transportation.* Hearing on Safety and Security of Spent Nuclear Fuel Transportation, September 24, 2008. Available at http://commerce.senate.gov/

Ballard, James David. 2003. "Nuclear Waste Transportation: Lessons from 9/11/2001 Applicable to Nuclear Waste Transportation Program Planning, Security, and Emergency Response." Testimony in Las Vegas hearing before the *National Academies of Science*, *Committee on Transportation of Radioactive Waste.*

Ballard, James David. 2002a. "Testimony" before the *United States Senate, Committee on Energy and Natural Resources*, One-Hundredth Seventh Congress regarding S. J. Res.34 Approving the Site at Yucca Mountain, Nevada, for the Development of a Repository for the Disposal of High-level Radioactive Waste and Spent Nuclear Fuel, Pursuant to the Nuclear Waste Policy Act of 1982. Available at http://www.yuccamountain.org/leg/ballard052202.html.

Ballard, James David. 2002b. "Testimony of James David Ballard." *United States House of Representatives, Subcommittee on Highways and the House Subcommittee on Transportation and Infrastructure*. Available at

http://gopher.house.gov/transportation/highway/04-25-02/ballard.html.
Ballard, James David. 1999a. "Nuclear Regulatory Commission Documentation for Petition. Agency petition for Rulemaking pursuant to 5 U.S.C. § 553 and 10 C.F.R. § 2.800 - 2.804." Download date: September 28, 2009. Available at: http://www.state.nv.us/nucwaste/news/ag990622b.htm
Ballard, James David. 1999b. "Expert Testimony, Injunction Hearing." Qualified and testified as an expert witness, *United States District Court*, Western District of Michigan, Southern Division. Testimony focused on terrorism and the movement of nuclear materials across Michigan.

Ballard, James David. 1993. "Affidavit in Support of Plaintiffs' Motion for Class Certification." District Court, case # A317730. Provided supporting statistical and qualitative documentation for class action lawsuit. *Superior Court*, Clark County, Nevada.

***Government/Agency Reports:***

Ballard, James David. 2016. Update: Fukushima Dai-ichi and Nevada's Contentions under NEPA." State of Nevada, Nuclear Waste Projects Office, Carson City, NV
Ballard, James David. 2014. Fukushima Dai-ichi and Nevada's Contentions under NEPA." State of Nevada, Nuclear Waste Projects Office, Carson City, NV
Ballard, James David. 2013. "Japan's Fukushima Daiichi Disaster: Implications for Further Research on Terrorism and Sabotage." State of Nevada, Nuclear Waste Projects Office, Carson City, NV.
Ballard, James David. 2011. "Summary of Risk Perception Research Regarding Nuclear Waste Transportation." State of Nevada, Nuclear Waste Projects Office, Carson City, NV.
Ballard, James David. 2011. "Radicalization." Los Angeles County Sherriff's Department, Operations Bureau. Service learning project – Soc 485, Summer 2011.
Ballard, James David. 2011. "Report on the status of the NRC proposed rulemaking for 10 CFR 73.37, Physical Protection of Irradiated Reactor Fuel In Transit, and a compilation of written comments submitted to the NRC in response to the October 13, 2010 Federal Register notice (75 FR 62695-62716). Report includes comments submitted to NRC on the associated guidance document, NUREG-0561, Rev.2." State of Nevada, Nuclear Waste Projects Office, Carson City, NV.
Ballard, James David. 2011. "Report Reviewing Safety and Security Aspects of the March 2011 Fukushima Daiichi Nuclear Disaster, Identifying Human-Initiated Events Before and After the Earthquake And Tsunami. State of Nevada, Nuclear Waste Projects Office, Carson City, NV.
Ballard, James David. 2011. "Prison Radicalization." Los Angeles Joint Regional Intelligence Center. Los Angeles, CA. Service learning project – Soc 485, Winter 2010/2011.
Ballard, James David. 2010. "Report on Methodologies Used in Preparation of Transportation Sabotage Scenarios from 2001 to 2010: Research for NRC Hearing Testimony." Tri-phase project including literature review, analytical matrix and application of risk assessment methodology. State of Nevada, Nuclear Waste Projects Office.
Ballard, James David. 2009. "General Accounting Office (GAO) Request for Feedback on Radioactive Waste Management." Written review of proposed methodology to study various storage alternatives. GAO: Denver, CO.
Ballard, James David. 2009. "Internet Threats Project." Los Angeles County Sheriff's Department: Los Angeles, CA. Service learning project done with two classes – Soc 485 Summer 2008 and Fall 2008.
Ballard, James David. 2007. "Assessment of Supplemental Environmental Impact Statement (SEIS) Developed by DOE." Nevada's Agency for Nuclear Projects: Carson City, NV.
Ballard, James David. 2007. "Threat Assessment of Diablo Canyon Nuclear Power Plant in California". Nevada's Agency for Nuclear Projects: Carson City, NV.
Ballard, James David. 2003. "Comparative Review of Technical, Security, and Terrorism Related Issues Addressed in the United States General Accounting Office, 'Spent Nuclear Fuel: Options Exist to Further Enhance Security', Report # GAO-03-426." Nevada's Agency for Nuclear Projects:

Carson City, NV.

Ballard, James David. 2002. "Shelter-In-Place: The Logic of High-Level Nuclear Waste Security." State of Nevada's Agency for Nuclear Projects: Carson City, NV.

Ballard, James David, **Donald Stewart**, **Kristine Kerrigan**, and **Jennifer Schneider**. 2000. "Nuclear Waste Transportation Accidents: State of Nevada's Curriculum Guide for Law Enforcement, Public Safety and Medical Personal." *Nuclear Waste Projects Office:* Carson City, Nevada.

Ballard, James David. 1999. "The Impacts: Department of Energy Draft Environmental Impact Statement" post-publication review. *Nuclear Waste Projects Office:* Carson City, Nevada.

Ballard, James David. 1998. "Non-Human Assessment Technology." *Nuclear Waste Projects Office:* Carson City, NV.

Halstead, Robert J. and James David Ballard. 1997. "Nuclear Waste Transportation Security and Safety Issues." *Nuclear Waste Projects Office*: Carson City, NV.

Ballard, James David. 1997. "Preliminary Study of Sabotage and Terrorism as Transportation Risk Factors Associated with the Proposed Yucca Mountain High-level Nuclear Waste Facility." *Nuclear Waste Projects Office*: Carson City, NV.

Halstead, Robert J. and James David Ballard. 1997. "Nuclear Waste Transportation Security and Safety Issues: Potential Transportation Impacts of S.104 and H.R.1270." *Nuclear Waste Projects Office*: Carson City, NV.

**Presentations**

***International Level:***

Ballard, James David. 2011. "Yucca Mountain Transportation Planning: Lessons Learned over 25 Years for the Safe Transport of Nuclear Waste." *International Conference on Social Sciences*. Honolulu, Hawaii.

Ballard, James David and Fred Dilger. 2007. "Scenario Development in Oil and Gas Management: Envisioning the Future by Means of Analytical Techniques." *Petrosec SEIF-CV* Conference. Salzburg, Austria.

Dilger, Fred and James David Ballard. 2007. "Using Social Scientific Methodological Approaches to Reducing Risk: How the 'Risk Reduction' Approach Works With Oil and Gas Facilities." *Petrosec SEIF-CV* Conference. Salzburg, Austria.

Ballard, James David and Fred Dilger. 2006. "Emergency Response Technology: Terrorism, GIS and Planning." *NATO Joint STS-CNAD Workshop*. Ericeira, Portugal.

Mullendore, Kristine and James David Ballard. 2006. "Catastrophic Terrorism: Legal Aspects of Emergency Situations." *NATO Joint STS-CNAD Workshop*. Ericeira, Portugal.

Pattee-Ballard, Donna R., James David Ballard and Fred Dilger. 2005. "Transporting Nuclear Wastes from Energy Production Sites: What Can Terrorists Do And How?" *Nuclear Energy and Security* (NUSEC). Salzburg, Austria.

Ballard, James David and Fred Dilger. 2005. "Surreptitious Pathways." *Nuclear Energy and Security* (NUSEC). Salzburg, Austria.

Dilger, Fred and James David Ballard. 2005. "Transweb: A Real Time Transportation Threat Assessment Analysis Tool: Look What the Future may Bring for Energy Related Infrastructure?" *Nuclear Energy and Security* (NUSEC). Salzburg, Austria.

Mullendore, Kristine and James David Ballard. 2004. "The Presumption of Response to Terrorism: Potential Legal Aspects Relative to First responders." *NATO Advanced Research Workshop*. Stuttgart, Germany.

Ballard, James David. 2003. "The Future of Radiological Terrorism: Analysis of Organizational Characteristics." *The International Policy Institute for Counter Terrorism.* 3rd International Conference. Herzlyia, Israel.

Ballard, James David. 2002. "Asymmetrical Sabotage Tactics, Nuclear Facilities/Materials, and Vulnerability Analysis." *European Union High Level Scientific International Conference on Physical Protection* (NUMAT Conference). Salzburg, Austria.

Ballard, James David. 2000. "Weapons of Mass Victimization: Considerations for the 21st Century." *United Nations Congress on Terrorist Victimization: Prevention, Control, and Recovery*. Vienna, Austria.

***National Level:***

Dilger, F., R.J. Halstead and J. D. Ballard. 2015. "The Transportation Factor in Site Evaluations for Spent Nuclear Fuel Storage and Disposal Facilities." Waste Management. Phoenix, AZ.

Ballard, James David, Dilger, F., and R.J. Halstead 2015. "A Whole Wilderness of Warning: Assessing Economic Consequences of Nuclear Release.." Waste Management. Phoenix, AZ

Dilger, F., R.J. Halstead and J. D. Ballard. 2014. "Toil and Trouble." *Waste Management*. Phoenix, AZ.

Dilger, Fred, Robert Halstead and James David Ballard. 2013 "Stakeholder Transportation Scorecard: Reviewing Nevada's Recommendations for Enhancing Safety and Security of Nuclear Waste Shipments." *Waste Management*. Phoenix, AZ.

Dilger, Fred, Robert Halstead and James David Ballard. 2013 "Walk the Line: The Development of Routing Regulations for Spent Fuel and High-Level Radioactive Waste Shipments in the United States. *Waste Management*. Phoenix, AZ.

Dilger, Fred, James David Ballard and Robert Halstead. 2012 "Physical Protection of Spent Fuel Shipments: Resolution of Stakeholder Concerns through Rulemaking." *Waste Management*. Phoenix, AZ.

Dilger, Fred, Robert Halstead and James David Ballard. 2012 "Full-scale Cask testing and Public Acceptance of Spent Nuclear Fuel Shipments." *Waste Management*. Phoenix, AZ.

Ballard, James David, Fred Dilger and Antonio De La Cruz. 2008. "Terrorism Risk Reduction for the Oil and Gas Industry: Protecting Corporate Infrastructure." *Rand Corporation 3rd Annual Conference: Terrorism and Global Security.* Santa Monica, CA.

Ballard, James David. 2008. "Sociological Considerations of IED Usage and Diffusion of IED Knowledge." *United States Department of Defense Joint Improvised Explosive Devices Defeat Organization* (JIEDDO) Expert Elicitation presentation. John Hopkins University Applied Physics Laboratory, Laurel Maryland.

Ballard, James David Ballard, Robert Halstead, Fred Dilger, Marvin Resnikoff and Hank Collins. 2008. "Assessing the Vulnerability of Yucca Mountain Shipments: A Threat Matrix for Human-Initiated Events." *Waste Management 2008.* Tucson, AZ.

Resnikoff, Marvin, Robert Halstead, Fred Dilger, James David Ballard and Hank Collins. 2008. "State of Nevada Perspective on the U.S. Department of Energy Yucca Mountain Transportation Program." *Waste Management.* Tucson, AZ.

Ballard, James David, Robert Halstead, Fred Dilger and Hank Collins. 2007. "Yucca Mountain Transportation Security Issues: Overview and Update." *Waste Management 2007.* Tucson, AZ.

Ballard, James David. 2006. "Terrorology." Office of the Director of National Intelligence *Summer Hard Problem Program: SMART*: Boston, MA.

Halstead, Robert, Fred Dilger and James David Ballard. 2005. "The Curious History of Transportation Planning HLW Repositories in the US." *Waste Management 2005.* Tucson, AZ.

Halstead, Robert, Fred Dilger and James David Ballard. 2005. "Planning for an Unpredictable Event: Response to Terrorist Attack Against SNF Shipments." *Waste Management.* Tucson, AZ.

Dilger, Fred, Robert Halstead and James David Ballard. 2005. "Measures of Community Impact for Transportation: Native American Tribes and HLW." W*aste Management.* Tucson, AZ.

Ballard, James David and **Amanda Dean**. 2004. "Perceptions and the Socio-political Aspects of Environmental Issues like Nuclear Power and Nuclear Waste Disposal." *American Sociological Association.* San Francisco, CA.

Ballard, James David. 2004. "Nuclear Waste Transportation: Training Issues for Yucca Mountain."

*Natural Hazards Research and Applications Workshop*. Boulder, CO.

Ballard, James David and Doug McKenzie. 2002. "Legal and Policy Issues Surrounding Cyber-terrorism." *Academy of Criminal Justice Sciences*. Anaheim, CA.

Ballard, James David. 2001. "The Oklahoma City Bombing and Policy Maker Presentations in the Media." *Far West Popular and American Culture* meetings. Las Vegas, NV.

Ballard, James David, Kristine Mullendore. 2000. "WMD's, Radioactive Cargos, and Environmental Laws: Issues for Policy Makers and Law Enforcement." *American Society of Criminology*. San Francisco, CA.

Ballard, James David. 1999. "Tracking Terrorism Related Events: A Call for a National Reporting Standard." *Academy of Criminal Justice Sciences*. Orlando, FL.

Ballard, James David. 1998. "The Transportation of Nuclear Waste, First Responders, and Terrorism Policy." *American Society of Criminology*. Washington, D.C.

Ballard, James David. 1998. "Transportation Technology, Nuclear Waste, and Terrorism." United States Department of State, Department of Transportation, and Department of Justice's *International Land Transportation Security Technology Conference*. Atlanta, GA.

Ballard, James David. 1998. "The Oklahoma City Bombing Case: The Media." *Academy of Criminal Justice Sciences*. Albuquerque, NM.

Halstead, Robert and James David Ballard. 1996. "Southwest Counter-Terrorism Symposium." Training seminar. *FEMA* provided training for first responders. Las Vegas, NV.

Ballard, James David. 1995. "Applying Sociology to the Study of Terrorism." *Society for Applied Sociology*. San Diego, CA.

Ballard, James David. 1994. "Sociological Considerations of Terrorism: Politically Defining Criminal Behavior." *Association for Humanist Sociology*. Raleigh, NC.

***Regional Level:***

Ballard, James David. 2009. "Service Learning and the Intelligence Community: Lessons Learned on a NSA Service Learning Project." *California State University, Symposium on University Teaching.* San Luis Obispo, CA.

Ballard, James David, **Ioana Meteescu** and **Kathleen Coleman**. 2009. "Los Angeles and High Level Radioactive Waste Transport: Implications for the Community, Surrounding Counties and Local Transportation Infrastructure." *Pacific Sociological Association.* San Diego, CA.

**Jayasena, Karunya** and James David Ballard. 2009. "Female Suicide Bombers and Sociological Analysis." *Pacific Sociological Association.* San Diego, CA.

Ballard, James David. 2009. "Treble Hooking: Open Source Research for Policing and Intelligence Operations." *Western Society of Criminology*, annual meetings. San Diego, CA.

Ballard, James David. 2009. "Co-optation or Cooperation: How United States Intelligence is Seeking Academic Buy-In." *Critical Criminology* meeting. San Diego, CA.

**Gonzalez, Jesus**, **David Saldana**, **Ioana Meteescu**, and James David Ballard. 2008. "Transit Countries as Surreptitious Pathways for the Illegal Movement of Goods, People and Social Threats." *California Sociological Association.* Riverside, CA.

**Meteescu, Ioana**, **David Saldana**, **Jesus Gonzalez** and James David Ballard. 2008. "Big Bang or Slow Diffusion? Social Factors Associated with IED use by Terrorists." *California Sociological Association.* Riverside, CA.

James David Ballard, Roger Johnson, **Eddie Bitzer** and Morten Bremer Maerli. 2008. "Two Simple Models of Nuclear Transparency." *Western Social Science Meetings,* Las Vegas, Nevada.

Dilger, Fred, Robert Hallstead and James David Ballard. 2008. "Gimme Two Steps." *Western Social Science Meetings,* Las Vegas, NV.

Ballard, James David. 2005. "Terrorism and Transportation Scenarios: Thinking about the Unthinkable." *The ABC's of Integrating Intelligent Transportation Systems (ITS): Public Safety, Security and Emergency Management Conference.* Las Vegas, NV.

Ballard, James David and **Erin Harbaugh**. 2004. "Weapons of Mass Victimization: Potential Environmental Impacts of Certain Terrorism Tactics..." *Pacific Sociological Association.* San Francisco, CA.

Ballard, James David and Dominic Little. 2003. "Social and Political Factors Related to Radiological Terrorism." *California Sociological Association*. Riverside, CA.

Boyns, David and James David Ballard. 2003. "A Sociological Theory of Terrorism." *California Sociological Association*. Pasadena, CA.
Ballard, James David. 2003. "Asymmetrical Sabotage Tactics and the Post-Modern Terrorist." *Pacific Sociological Association*. Pasadena, CA.
**Dean, Amanda** and James David Ballard. 2001. "Cyber Crime and Security: Dimensions and a Typology." *Midwest Criminal Justice Association*. Chicago, IL.

***Local Level:***

Ballard, James David. 2012. "Criminal Profiling." Seminar presented at College of the Canyons.
Ballard, James David. 2011. "Treble Hooking: Strategic, Tactical and Situational Awareness from Academic and Internet Sources." Presentation for CSUN-Moodle-Community: *Teaching and Learning Byte* seminar.
Ballard, James David. 2008. "Sociology of Terrorism." *CSU Intelligence Community Center for Academic Excellence, Summer High School Institute*. Training of teaching staff for WMD exercise at CSU Long Beach, May. Also lecture and presentation to high school students, CSU Long Beach, June.
Ballard, James David. 2007. "Yucca Mountain: Safe Transportation." *University Club of Claremont*. Pomona, CA:
Ballard, James David. 2006. "Spent Nuclear Fuel as Potential Radiological Dispersion Devices." *Los Angeles County National TEW Resource Center*, Norwalk, CA.

Ballard, James David. 2003. "Social Work and Terrorism." *San Fernando Valley Social Work Group* (Region G, Local Unit). Encino, CA.
Ballard, James David. 2003. "Terrorism: Nuclear and Radiological." San Fernando Valley *SAGE* Fall Forum. Porter Ranch, CA.
Ballard, James David. 2003. "Organizational Analysis for Radiological and Nuclear Threats." *Monterey Institute of International Studies, Center for Nonproliferation Studies.* Monterrey, CA.
Ballard, James David. 2002. "Potential Transportation Terrorist Incidents along the (Yucca Mountain Transportation) Corridor." *HAZMAT EXPLO* 2002. Las Vegas, NV.
Ballard, James David. 2002. "Gazing at the Future of Terrorism: The Amorphous in a Post-September 11 World." *UNLV Department of Sociology Colloquium*. Las Vegas, NV.
Ballard, James David. 2001. "Terrorism and Multiple State/Jurisdictional Attacks." *HAZMAT EXPLO 2001*. Las Vegas, NV.
Ballard, James David. 2001. "The Symbolism of Terrorism: Connecting Art and Political Violence." *Urban Institute for Contemporary Arts*, Grand Rapids, MI.
Ballard, James David. 2001. "Background on the Current Terrorism Attacks." GVSU, *Grand Forum*. Grand Rapids, MI.
Ballard, James David. 2001. "Round Table on Terrorism." *Michigan Conference of Political Science Annual Meetings*, Grand Rapids, MI.
Ballard, James David. 2001. "What can we do?" GVSU *Grand Forum*. Grand Rapids, MI.
Ballard, James David. 2001. "Terrorism Attacks Last Week: What Should we Talk About." *Kendall School of Art and Design*, Ferris State University. Grand Rapids, MI.
Ballard, James David. 1999. "Power Point for Criminal Justice Agencies." Training seminar. *West Michigan Criminal Justice Training Consortium*. Grand Rapids, MI.
Ballard, James David. 1999. "Terrorism Summit - Nuclear Terrorism." Training seminar. *Michigan State Police*. East Lansing MI.
Ballard, James David. 1998. "Advanced Terrorism Training Seminar - WMD's." Training seminar. *Michigan State Police*. East Lansing, MI.
Ballard, James David. 1998. "Nuclear Waste, Terrorism, and Public Safety." Faculty Lunch Series, GVSU University Club. Allendale, MI.
Ballard, James David. 1995. "Notes from the Field: Terrorism in Northern Ireland." *UNLV Social Science and Humanities Conference*. Las Vegas, NV.

**Research Funding**

***Institutional Awards*: Total $ 58,109.43**

College of Social and Behavioral Sciences. Summer research stipend. Stipend total $3,500.00. June to July 2011.
Undergraduate Studies. Award for Summer 2011. WASC related preparation work and undergraduate student employment. Total $9,400.00 January 2011 to June 2011.
College of Social and Behavioral Sciences. Faculty research competition. Total $4,872.00 for Fall 2008.
College of Social and Behavioral Sciences. Summer research stipend. Total $3,500.00. June-July 2007.
College of Social and Behavioral Sciences. Summer research stipend. Total $2,500.00. June-July 2006.
College of Social and Behavioral Sciences. Funded conference presentation. Total $2,500.00. July 2005.
College of Social and Behavioral Sciences. Summer research stipend. Total $2,544.00. June - July 2005.
Office of Graduate Studies and International Programs. Total $700.00. July 2005
College of Social and Behavioral Sciences. Total $2,500.00. July 2004-March 2005.
Office of Graduate Studies, Research, and International Programs. *Probationary Faculty Development Program.* Total $4,400.00 for three units of release time. Spring 2004.
Office of Graduate Studies and International Programs. Total $1,000.00 for travel support. August 2003.
College of Social and Behavioral Sciences. *New Faculty Research Competition*. Total $4,400.00 for Fall 2003 release time.
College of Social and Behavioral Sciences. Funding for research. Total $1,000.00. November 2002.
GVSU Scholarly Grants-In-Aid; GVSU ALERT Laboratories; GVSU Johnson Center for Philanthropy. 1997 – 2002. Multiple grants totaling $15,293.43 for travel, research, and presentations.

***External Awards/Research Support:* Total $ 814,006.28**

*Urban Environmental Research/State of Nevada.* Research on Nevada NEPA Contentions and the Japanese Nuclear Disaster at Fukushima Dai-ichi – Lessons Learned. June 2014. Award amount $16,000.00. Research for Nevada Contentions on transported used nuclear fuel. June 2015. Award amount $18,000.00. Update on Contentions. June 2016. Award amount $6,400.00.
*State of Vermont.* Comments presented to the Secretary of the Nuclear Regulatory Commission on behalf of the states of Vermont and Connecticut. December 2013. $16,400.00.
*Pacific World History Institute/State of Nevada, Agency for Nuclear Projects.* Pre-testimony preparation for expert witness in Federal Court. April 2013. $7500.00. Principle investigator for five work products. April 2012 to June 2012. Total Award: $15,000.00. Principle investigator for three work products. October to December 2011. Total Award: $15,000.00. Principle investigator. Review of NRC proposed rulemaking for 10 CFR 73.37 and responses to Federal Register notice (75 FR 62695-62716). Additionally, generation of preliminary analysis of the security aspects of the March 2011 *Fukushima Daiichi* nuclear disaster. June to July 2011. Total Award: $5,000.00. Principle investigator. Review of methodologies and reports 2001 to 2010. January 2010 to June 2010. Total award: $22,000.00.
*Grand Valley State University.* Criminal Justice Graduate Program redesign consultant. March 2013 to November 2013. Total Award: $10,000.00.
*United States Office of the Director of National Intelligence.* Campus program director. *Intelligence Community Academic Center for Intelligence (IC-ACE).* Seven CSU campus consortium grant with San Bernardino as lead. Campus direct budget of $110,578.00. July 2007 to July 2009.
*Haynes Foundation Fellowship.* Principle investigator. Fellowship for initial study of transportation of nuclear waste in Southern California counties. Total award $12,000.00. Aug. 2009.

*State of Nevada, Agency for Nuclear Projects.* Principle investigator. Supplemental Environmental Impact Statement (SEIS) developed by DOE. This contract project was an evaluation of the terrorism threat assessment procedures for rail access to Yucca Mountain and in direct response to DOE's SEIS contentions. Total award $12,000.00. December 2007. Threat assessment on Diablo Canyon nuclear power plant. Additional development work on standardized threat assessment methodology and categorical precursor analysis protocol. Total award $6,000.00. June 2007. Principle investigator. Review of transportation related studies add on work for presentation of review of transportation related studies relative to high level nuclear waste programs and development of longitudinal assessment methodologies. Total of add on award $ 3,786.88. March 2007. Original contracted review of transportation related studies relative to high level nuclear waste programs around the world. Original award $8,250.00. January 2007. Review of National Academy of Sciences report on nuclear waste transport. Total award $2,250.00. May 2006.

*MITRE Corporation (re: United States Office of the Director of National Intelligence).* Total award $20,941.40. *Summer Hard Problem Institute* (SMART Program) on researching potential terrorist organizations and threat identification methodology. Boston, MA. July/August 2006.

*Inyo County, California.* "Inyo County Yucca Mountain Transportation Risk Assessment." Research team member. County of Inyo and Radioactive Waste Management Associates (RWMA) for the provision of transportation risk assessment services. This team research effort was undertaken to assist Inyo County in planning for transportation related emergency efforts if the Yucca Mountain project was to go forward. PI's Radioactive Waste Management Associates, E. U. Research, Black Mountain Research, E. J. Bentz and Associates, and Rick Moore - P.E., F.NSPE. Total award $300,000. August 2005 to July 2006.

*North Atlantic Treaty Organization (NATO).* Research team member. Total $100,000. Project # SST.CLG.978964, "Terrorism Attacks on Nuclear Power Plants and Nuclear Materials Transports." This multiple institution grant was led by PI Dr. Friedrich Steinhausler, Institute for International Security, Stanford University. October 2001 to July 2004.

*Pacific World History Institute/State of Nevada, Agency for Nuclear Projects.* Principle investigator. PWHI total of all awards $48,000.00. Various as PI: September 2003, July 2003, April 2002 to December 2004. State of Nevada total: $54,500. Various awards as PI: January 2002, May 2000, January 2000, December 1999, October 1999, March 1999, Fall 1995 and Spring 1996.

**Professional Service**

*California Faculty Association* – Representation Committee. August 2012 to December 2013.
*California Sociology Association*, CSU Representative. October 2010 to December 2011.
*California Sociological Association,* Session chair. Riverside, CA. November 2010.
*California Faculty Association* - Contract bargaining team member, May 2005 to June 2010.
*California Faculty Association* – Board of Directors, June 2006 to June 2007, June 2009 to June 2010.
*California Faculty Association.* Statewide Religious Accommodation Committee. Aug. 2007 to June 2010.
Session chair. *Hawaii International Conference on Social Sciences*. Honolulu, HI. May-June 2008.
*Petrosec SEIF-CV conference.* Session co-chair. Salzburg, Austria. September 2007.
*Pacific Sociological Association*, Endowment Committee, 2003 – 2007.
Session chair. *California Sociological Association*. Berkeley, CA. November 2003.
Session chair. *Far West Popular and American Culture.* Las Vegas, NV. February 2001.
Session chair. *Academy of Criminal Justice Sciences*. Orlando. March 1999.
Session chair. A*cademy of Criminal Justice Sciences.* Albuquerque, NM. March 1998.
*Association for Humanist Sociology*, Regional representative: 1995 - 1997.
Presider. *Society for Applied Sociology*. San Diego, CA. October 1995.
Presider. *American Sociological Association*. Los Angeles, CA. August 1994.
Moderator. *Association for Humanist Sociology*. Raleigh, NC. October 1994.
*Association for Humanist Sociology*, Regional co-representative 1993 - 1994.

**Peer Reviewer**

*Critical Studies in Terrorism.*
*Teaching Sociology.*
*Social Forces*
*Youth Violence and Juvenile*

*Justice.*
*Journal of Criminal Justice.* *Journal of Criminal Justice Education.*
*Journal of Criminal Justice.* *Symbolic Interaction.*
*International Journal of Social Inquiry.* *Nuclear Energy and Security* (NUSEC).
*State and Local Government Review.* *Journal of Physical Security.*
*Criminal Justice: International Journal of Policy and Practice.*
*International Journal of Risk Assessment and Management.*
*European Union High Level Experts* (NUMAT).
*Journal of Contemporary Criminal Justice.*
*International Journal of Nuclear Knowledge and Management.*
*International Conference on Information Systems.*

**Reviews of Texts for Publishers**

*Counterterrorism: Cutting the Gordian Knot.* Pre-publication review. Jones and Bartlett. March 2011.
*Risk Assessment and Governance in Criminology and Criminal Justice: Operations in Crime Control and Counter-terrorism.* New proposed text pre-publication review. Taylor and Francis. March 2009.
*Identity and the Terrorist Threat: Theory, Culture, Self, and Society.* Pre-publication review of text. Publisher: New York University Press. January 2005. Title change to *The Terrorist Identity* on final review in June 2005.
*Understanding terrorism.* Pre-publication review of next edition. Publisher: Sage. February 2005.
*Introduction to Political Terrorism.* Pre-publication review. Publisher McGraw-Hill. February 2002.
*Criminal Investigations, 5th.* Pre-publication review. Publisher: Prentice Hall. January 2002.
*Introduction to Security, 7th.* Co-authored with **Amanda Dean**. Pre-publication review. Publisher: Butterworth-Heinemann. November 2001
*Handbook of Loss Prevention and Crime Prevention, 4th Edition.* Pre-publication review. Publisher: Butterworth-Heinemann. October 2001.
*Investigating Terrorism*. Pre-publication proposal review. Publisher: Prentice-Hall. January 2001.
*Investigating Terrorism.* Pre-publication proposal review. Publisher: McGraw-Hill. March 2000.

**Teaching Related Honors**

Outstanding Faculty of the Year Award, CSUN. May 2012.
Outstanding Faculty Award. CSUN Center on Disabilities recognition award. May 2009.
Nominated for GVSU Teacher of the Year award (2002).

**Professional Memberships**

California Sociology Association, Pacific Sociological Association, Western Criminology Association

**Items in Red and Bolded indicate student co-authors.**

# Tab 13

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**Before the Atomic Safety and Licensing Board**

| | | |
|---|---|---|
| In the Matter of | ) | Docket No. 72-1050<br>NRC-2016-0231 |
| WCS Consolidated Interim Spent Fuel Storage Facility | ) | November 13, 2018 |
| | ) | |
| | ) | |

* * * * *

**DECLARATIONS AND *CURRICULUM VITAE* OF GORDON THOMPSON, PH.D.**

Terry J. Lodge, Esq.
316 N. Michigan St., Ste. 520
Toledo, OH 43604-5627
(419) 205-7084
Tjlodge50@yahoo.com
Counsel for Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, Petitioners

IRSS. | INSTITUTE FOR RESOURCE AND SECURITY STUDIES

Declaration of 12 November 2018
by Gordon R. Thompson
for submission to the
US Nuclear Regulatory Commission
regarding an application by
Interim Storage Partners LLC
for a license to construct and operate a
Consolidated Interim Storage Facility
in Andrews County, Texas

Themes of this declaration:
**Adverse Impacts, Alternative Options, and the Definition and Assessment of Risk**

I, Gordon R. Thompson, declare as follows:

## I. Introduction

(I-1) I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. IRSS was founded in 1984 to conduct technical and policy analysis and public education, with the objective of promoting peace and international security, efficient use of natural resources, and protection of the environment. My professional qualifications and experience are discussed in Section II, below.

(I-2) I have been retained by a group of public-interest organizations to prepare this declaration.[1] This declaration addresses a proposal by Interim Storage Partners LLC (ISP) to construct and operate a Consolidated Interim Storage Facility (CISF) in Andrews County, Texas. The proposed CISF would provide interim storage of spent nuclear fuel (SNF) and related material. That project is referred to hereafter, in this declaration, as

[1] These organizations include: Sustainable Energy & Economic Development (SEED) Coalition; Don't Waste Michigan; Citizens for Alternatives to Chemical Contamination; Public Citizen, Inc.; San Luis Obispo Mothers for Peace; Nuclear Energy Information Service; Citizens' Environmental Coalition; and Nuclear Issues Study Group.

"the proposed ISP facility". ISP has submitted a license application, for the proposed ISP facility, to the US Nuclear Regulatory Commission (NRC).[2]

(I-3) The proposed ISP facility is a type of facility that is often described as an independent spent fuel storage installation (ISFSI). A number of ISFSIs are in operation in the United States and elsewhere. The proposed ISP facility, like most existing ISFSIs, would store SNF assemblies in dry conditions inside containers.

(I-4) In this declaration I present information drawn from a number of sources. One of those sources is a generic environmental impact statement (GEIS) prepared by NRC, regarding continued storage of SNF.[3] That GEIS was published in September 2014. Hereafter, that GEIS is referred to as "NRC's GEIS".

(I-5) I provided comments on a September 2013 draft version of NRC's GEIS, in a declaration dated 19 December 2013.[4] That declaration is referred to hereafter as "the Thompson December 2013 declaration". This, my present declaration, incorporates, by reference, the Thompson December 2013 declaration, which accompanies this declaration as Exhibit #1. Moreover, the Thompson December 2013 declaration was accompanied by forty-nine Exhibits, and this declaration incorporates, by reference, those of the forty-nine Exhibits for which I was the sole author.[5] Other Exhibits of the Thompson December 2013 declaration provide supporting information for this declaration.

(I-6) In preparing this declaration, I obtained information about the proposed ISP facility from four sources, unless designated otherwise. The first source is the ISP license application to NRC, referred to hereafter as "the ISP Application".[6] The second source is the ISP Safety Analysis Report.[7] The third source is the ISP Environmental Report.[8] The fourth source is the ISP Emergency Response Plan.[9]

(I-7) This declaration addresses selected issues. Absence of discussion of an issue in this declaration does not imply that I view the issue as insignificant, or that I have no professional opinion on the manner in which others have addressed the issue.

---

[2] ISP, 2018a.
[3] NRC, 2014.
[4] Thompson, 2013.
[5] Exhibits of the Thompson December 2013 declaration for which I was the sole author are: #1, #3, #5, #8, #9, #10, #26, and #27.
[6] ISP, 2018a.
[7] ISP, 2018b.
[8] ISP, 2018c.
[9] ISP, 2018d.

(I-8) The selected issues addressed in this declaration pertain to:

(i) adverse impacts from operation of the proposed ISP facility;
(ii) alternative options for managing SNF, especially options that could pose lower likelihoods and/or magnitudes of adverse impacts than would the proposed ISP facility; and/or
(iii) the definition and assessment of risk.

(I-9) The adverse impacts that I address in this declaration would be impacts on:

(i) the general welfare, as stated in the Atomic Energy Act;
(ii) the common defense and security, as stated in the Atomic Energy Act; and/or
(iii) environments and human populations affected by the proposed ISP facility.

The terms "the general welfare" and "the common defense and security" appear in Sec. 1. (Declaration) of The Atomic Energy Act of 1954, as amended, which says:[10]

> "Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that –
> a. the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and
> b. the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise."

(I-10) This declaration has the following narrative sections:

I. Introduction
II. My Professional Qualifications and Experience
III. SNF Management as a National Undertaking
IV. Adverse Impacts of ISFSIs
V. Alternative Options at ISFSIs
VI. Definition and Assessment of Risk
VII. Features of the Proposed ISP Facility
VIII. Conclusions

(I-11) In addition to the above-named narrative sections, this declaration has two appendices that are an integral part of the declaration. Appendix A contains tables that support the narrative. Appendix B is a bibliography. Documents cited in the narrative or in Appendix A are listed in Appendix B unless otherwise identified.

[10] NRC, 2013, page 15.

**II. My Professional Qualifications and Experience**

(II-1) As stated in paragraph I-1, above, I am the executive director of the Institute for Resource and Security Studies. I am professionally qualified by education and experience to discuss all issues addressed in this declaration.

(II-2) I received an undergraduate education in science and mechanical engineering at the University of New South Wales, in Australia, and practiced engineering in Australia in the electricity sector. Subsequently, I pursued graduate studies at Oxford University and received from that institution a Doctorate of Philosophy in mathematics in 1973, for analyses of plasma undergoing thermonuclear fusion. During my graduate studies I was associated with the fusion research program of the UK Atomic Energy Authority. My undergraduate and graduate work provided me with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering.

(II-3) My professional work involves technical and policy analysis in the fields of energy, environment, sustainable development, human security, and international security. Since 1977, a significant part of my work has consisted of analyses of actual and/or potential adverse impacts from the operation of commercial and military nuclear facilities. These analyses have been sponsored by a variety of non-governmental organizations and local, state and national governments in North America, Western Europe, and elsewhere. Drawing upon these analyses, I have provided expert testimony in legal and regulatory proceedings, and have served on committees advising government agencies.

(II-4) My professional qualifications and experience are discussed at greater length in Section II of the Thompson December 2013 declaration. My Curriculum Vitae, as of June 2011, appears as Appendix D to that declaration. That declaration is incorporated here by reference, and accompanies this declaration as Exhibit #1. A later version of my Curriculum Vitae, as of January 2016, accompanies this declaration as Exhibit #2.

**III. SNF Management as a National Undertaking**

(III-1) To provide a context for discussing adverse impacts from operation of the proposed ISP facility, I discuss here some issues related to management of SNF created in the United States. These issues apply to SNF from commercial reactors.

(III-2) NRC has, in the past, argued that a repository for SNF will – with "reasonable assurance" – be available during coming decades.[11] NRC's GEIS abandons that argument. It evaluates the environmental impacts of continued storage of SNF in three timeframes, one of which is the indefinite future. In discussing the respective likelihoods of the three timeframes, NRC's GEIS says:[12]

[11] Thompson, 2009, Section 1.
[12] NRC, 2014, Section B.2.

> "Based on the analysis below and elsewhere in this GEIS, the NRC believes that the most-likely scenario is that a repository will become available to dispose of spent fuel by the end of the short-term timeframe (within 60 years of the end of a reactor's licensed life for operation). The NRC's belief is based on the resolution of two questions: whether a repository is technically feasible and, if so, how long will it take to site, license, construct, and open a repository."

Thus, NRC concedes that storage of SNF for the indefinite future is a likely, although perhaps not the most likely, outcome of creating SNF. Moreover, NRC's "belief" that availability of a repository is "the most-likely scenario" is based entirely on considerations of technical feasibility. Yet, experience shows that social and political factors have played important roles in retarding the establishment of a repository in the United States.[13]

In addition, a likely future for nuclear power in the United States is that, over coming decades, commercial reactors will cease operation and not be replaced.[14] Likely features of that future include:

(i) SNF would be removed from reactor spent-fuel pools and placed in ISFSIs;
(ii) fee revenue from reactor licensees to pay for establishment of a repository would cease;
(iii) reactor and/or ISFSI licensees would fade away; and/or
(iv) the net political momentum for transport of SNF and establishment of a repository would decline over time.

Thus, it is reasonable to conclude that storage of SNF for the indefinite future is a likely outcome of creating SNF in the United States.

(III-3) NRC's GEIS assumes that institutional controls would continue even if SNF were stored for the indefinite future. NRC argues for that assumption as follows:[15]

> "The assumption that institutional controls will continue enables an appropriate and reasonable evaluation of the environmental impacts of continued storage over an indefinite timeframe. Absent the stability and predictability that follows from institutional controls, including but not limited to NRC licensing and regulatory controls, few impacts could be reliably forecast. The "hard look" required by NEPA would quickly become unfocused, highly speculative, and ill-defined. Analyzing the impacts that might result from a permanent and total loss of institutional controls would require NRC to reach unsupportable conclusions about how and when our nation, and its government, institutions, and social cohesiveness might degrade or even collapse. Such speculation would preclude

[13] Thompson, 2008.
[14] Schneider et al, 2018.
[15] NRC, 2014, Section B.3.4.

> meaningful calculations of impacts for the timeframes envisioned in the GEIS."

NRC's argument that "few impacts could be reliably forecast" for a scenario involving lack of institutional controls is proven false by analysis done by the US Department of Energy (DOE). In 2002, DOE published its final environmental impact statement (EIS) for the proposed Yucca Mountain repository.[16] That document is referred to hereafter as "the Yucca Mountain EIS".

Section 7.2.2 of the Yucca Mountain EIS provides estimates of adverse impacts arising in No-Action Scenario 2, which would involve continued storage of SNF in the absence of institutional controls. That is precisely the scenario for which NRC argues that "few impacts could be reliably forecast". DOE describes its consideration of No-Action Scenario 2 as follows:[17]

> "DOE and commercial utilities intend to maintain control of the nuclear storage facilities as long as necessary to ensure public health and safety. However, Scenario 2 assumes no effective institutional control of the storage facilities after approximately the first 100 years to provide a basis for evaluating an upper limit of potential adverse human health impacts to the public from the continued storage of spent nuclear fuel and high-level radioactive waste. After about 100 years, Scenario 2 assumes that there would be no effective institutional control and that the storage facilities would be abandoned."

(III-4) NRC's GEIS discusses the role of a Dry Transfer System (DTS) or equivalent capability to repackage SNF. As part of that discussion, the GEIS says:[18]

> "Although there are no dry transfer systems (DTSs) at U.S. nuclear power plant sites today, the potential need for a DTS, or facility with equivalent capability, to enable retrieval of spent fuel from dry casks for inspection or repackaging will increase as the duration and quantity of fuel in dry storage increases. A DTS would enhance management of spent fuel inspection and repackaging at all ISFSI sites and provide additional flexibility at all dry storage sites by enabling repackaging without the need to return the spent fuel to a pool. A DTS would also help reduce risks associated with unplanned events or unforeseen conditions and facilitate storage reconfiguration to meet future storage, transport, or disposal requirements (Carlsen and Raap 2012)."

(III-5) NRC's GEIS acknowledges that SNF could be damaged prior to entry into storage, or during storage. The GEIS discusses that issue in connection with the provision of a capability to repackage SNF, saying, in part:[19]

---

[16] DOE, 2002.
[17] DOE, 2002, Section 7.2.2.
[18] NRC, 2014, Section 2.1.4.
[19] NRC, 2014, Section 2.2.2.1.

> "As stated in Section 2.1.4, one reason DTSs may be needed in the future is to reduce risks associated with unplanned events (e.g., the need to repackage spent fuel that becomes damaged or that becomes susceptible to damage while in dry cask storage). The NRC defines damaged spent fuel as any fuel rod or fuel assembly that can no longer fulfill its fuel-specific or system-related functions (NRC 2007). These functions include criticality safety, radiation shielding, confinement, and retrievability of the fuel. Appendix B of this GEIS describes spent fuel degradation mechanisms that could occur during continued storage. These include a mechanism (i.e., hydride reorientation) in which high-burnup spent fuel cladding can become less ductile (more brittle) over time as cladding temperatures decrease. Taking actions (e.g., repackaging or providing supplemental structural support) can reduce risks posed by damaged fuel by maintaining fuel-specific or system-related safety functions."

A similar statement could be made in regard to damage to SNF containers.

NRC's GEIS acknowledges that the DTS design it describes, to illustrate present or anticipated capability to repackage SNF, "does not have the capability to handle damaged spent fuel." Nevertheless, says the GEIS, "international experience provides a broad understanding of the technical feasibility of various methods for handling damaged fuel".[20] In other words, the GEIS does not identify any available design of a DTS or equivalent system that could repackage SNF in the event of damage to SNF and/or an SNF container.

(III-6) NRC's GEIS discusses the establishment of a DTS or equivalent system at an away-from-reactor ISFSI, such as the proposed ISP facility. In that context, the GEIS says:[21]

> "Should storage at an away-from-reactor ISFSI continue for a long enough time for bare fuel handling to be required for inspection or maintenance, then a DTS could be constructed at the facility."

A differing perspective is evident in a 2012 report, prepared at Idaho National Laboratory (INL), that is cited in NRC's GEIS. The INL report discusses, among other matters, the establishment of a DTS or equivalent system at an ISFSI, such as the proposed ISP facility, where SNF from across the United States would be "consolidated". In that context, the INL report says:[22]

> "**Recommendation 2:** A repackaging and remediation capability should be integrated into the design of future facilities where UNF [used nuclear fuel = SNF] will be consolidated.

[20] NRC, 2014, Section 2.2.2.1.
[21] NRC, 2014, Section 2.2.1.4.
[22] Carlsen and Raap, 2012, page 24.

> *A key objective is to ensure that UNF is transported to its final destination, or a destination with the necessary repackaging capabilities, before the need for repackaging arises. Although presently small, the likelihood of the need for a DTS to enable retrieval of UNF for inspection or repackaging will increase as the duration and quantity of fuel in dry storage increases. Stored fuel will eventually require remediation and/or repackaging for transport. Any large-scale repackaging operations that may eventually be necessary can be more safely and effectively conducted at a consolidated facility.*"

While the GEIS envisions the establishment of a DTS at a consolidated-storage ISFSI as a potential future requirement, the INL report says that a DTS or equivalent system should be "integrated into the design" of such an ISFSI. Thus, the INL report goes beyond the GEIS by calling for design of a DTS during the design of a consolidated-storage ISFSI. Neither document, however, calls for pro-active deployment of a DTS.

Here, I use the term "pro-active deployment" to mean that licensing preconditions for receipt of SNF at a consolidated-storage ISFSI would include the establishment at the site of a DTS or equivalent system, and the successful testing of that capability using actual damaged SNF.

Several factors, additional to those discussed in the GEIS and the INL report, call for pro-active deployment of a DTS at a consolidated-storage ISFSI. These additional factors include:

(i) storage of comparatively aged SNF at the site;
(ii) likely receipt at the site of damaged SNF assemblies and/or damaged SNF containers;
(iii) likely occurrence, at the site, of damage to SNF assemblies and/or SNF containers; and
(iv) the substantial lead time required to design, construct, and successfully test a DTS or equivalent system that could repackage SNF, including damaged SNF.

(III-7) The United States lacks a coherent national strategy for managing SNF.[23] A UK-based team of researchers has described that lack in the following terms:[24]

> "Examples of countries without any current long-term vision or plan include Germany and the USA. These countries have (in the past) had plans, but for various reasons, mainly political, the plans have been disrupted and spent fuel management is now much more reactive, responding to external factors rather than based on a well-defined vision or strategy."

[23] Thompson, 2008.
[24] Hambley et al, 2016, Section 4.

One manifestation of the United States' lack of a coherent SNF strategy is the lack of standardization of SNF containers. In 1992, the US Secretary of Energy promised the rapid development of a standardized container for SNF assemblies. In 2005, DOE announced that most of the SNF sent to the proposed Yucca Mountain repository would be delivered to the site "in standard canisters which are then placed in a waste package for emplacement, without handling individual fuel canisters". That arrangement would replace a previously-envisioned process in which SNF would be re-packaged after delivery to Yucca Mountain.[25]

Neither promise was fulfilled. There is no standardization of SNF containers. Table III-1 illustrates the extent to which present SNF containers are non-standardized and are incompatible with the disposal packages that were proposed for emplacement in the Yucca Mountain repository.

Most containers used for dry storage of SNF in the United States are similar to the two examples described in Table III-1. A typical SNF container has a comparatively large capacity for holding SNF assemblies, and a thin wall. Clearly, these containers were designed to minimize licensees' short-term expenditures on SNF storage. They were not designed to:

(i) maximize container lifetime;
(ii) be highly robust during transportation or storage;
(iii) facilitate monitoring of container integrity or the condition of SNF inside a container; or
(iv) be suitable for direct emplacement in a repository.

A coherent national strategy for managing SNF would strive to correct and/or offset these deficiencies in design. The strategy would take a long-term approach to all aspects of SNF management, including each phase of storage, transport, and disposal. An important expression of that approach would be the early establishment of capability to repackage SNF, including damaged SNF.

**IV. Adverse Impacts of ISFSIs**

(IV-1) A substantial body of analysis and experience shows that operation of an ISFSI, such as the proposed ISP facility, would create a significant potential for adverse impacts. Some items of information pertaining to that potential are discussed here.

(IV-2) NRC's GEIS summarizes findings from two studies that estimated radiological consequences of potential accidents at an ISFSI.[26] The GEIS says that one study – NUREG-1864 – found that the radiation dose to an individual at a distance less than 1 mile (1.6 km) could be as high as 185 rem (1.85 Sv). The GEIS says that another study –

[25] Thompson, 2006, Section V.
[26] NRC, 2014, Section 4.18.2.2.

by EPRI – found that the radiation dose to an individual at a distance of 0.25 miles (0.4 km) could be as high as 19.4 rem (0.194 Sv).[27]

The GEIS contends that the probabilities of accidents leading to such doses would be small. In that context, the GEIS says:[28]

> "Therefore, although the consequences would exceed NRC public dose standards contained in 10 CFR Part 20 (e.g., 100-mrem/yr dose limits for members of the public), the likelihood of the event is very low."

In the above-quoted statement, the term "likelihood" refers to an annual probability. That probability would accumulate over time, and an ISFSI could operate for many years, potentially into the indefinite future. Thus, even a comparatively small annual probability of an adverse impact could imply a substantial likelihood of that impact over the operating lifetime of an ISFSI.

(IV-3) One type of scenario for atmospheric release from an SNF container would involve mechanical loading of the container in a manner that creates a comparatively small hole. The loading could arise, for example, from the air blast produced by a nearby explosion, or from the impact of an aircraft or missile. Thus, the scenario could apply to an accident or an attack. If the loading were sufficient to puncture the SNF container, that loading would also shake the SNF assemblies and damage their cladding.

Table IV-1 addresses the "blowdown" (i.e., escape of helium and other gases) of an SNF container that has been subjected to a loading pulse sufficient to cause a comparatively small hole. The table shows, for example, that if a hole with an equivalent diameter of 2.3 mm were created, radioactive gases and particles released during the blowdown would yield an inhalation dose (CEDE) of 6.3 rem (0.063 Sv) to a person 900 m downwind from the release. Most of that dose would be attributable to release of two-millionths (1.9E-06) of the SNF container's inventory of radioisotopes in the "fines" category.[29] This finding illustrates the hazardous nature of SNF.

(IV-4) NRC's GEIS discusses potential attacks on ISFSIs. In that context, the GEIS discusses analyses done by the NRC Staff for the Diablo Canyon ISFSI. The GEIS quotes findings from those analyses, including the statement:[30]

> "Based on these considerations, the [radiation] dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios – would likely be below 5 rem."

---

[27] NRC's GEIS does not state the modes of exposure leading to the individual radiation doses estimated in NUREG-1864 and by EPRI. Presumably, the exposure would include an inhalation component.
[28] NRC, 2014, Section 4.18.2.2.
[29] The overall release fraction would be the product of the Fuel Release Fraction, the MPC Blowdown Fraction, and the MPC Escape Fraction.
[30] NRC, 2014, Section 4.19.2.

I have critiqued the NRC Staff's analyses of potential attacks on the Diablo Canyon ISFSI. I have said, for example:[31]

> "The NRC Staff reluctantly prepared an EA [environmental assessment] that examines the potential for an attack on the Diablo Canyon ISFSI. Most of the analyses and assumptions underlying the EA are secret. However, it is clear that the Staff limited its examination to Type III releases. The Staff may have been misled by the comparatively dramatic appearance of the attack scenarios associated with Type III releases, leading to the false conclusion that Type IV releases would yield comparatively small environmental impacts."

Table IV-2 explains the types of atmospheric release that I refer to in the above-quoted statement. At an ISFSI, a Type IV release could take the form of a "cask fire", which I discuss below.

A 2003 paper by German experts – Pretzsch and Maier – provides a perspective that differs from the NRC Staff's analyses of potential attacks on the Diablo Canyon ISFSI.[32] Two manifestations of these differing perspectives are especially relevant here. First, Pretzsch and Maier show that technical analysis regarding potential attacks on ISFSIs can be openly published without assisting potential attackers. By contrast, the NRC Staff's analyses were secret. Second, Pretzsch and Maier show how radiation dose to an exposed individual could vary by distance. By contrast, the NRC Staff hid that information.

Pretzsch and Maier consider a Type III release, involving an attack on an SNF container using a shaped charge. They estimate the conditional probability of a downwind individual experiencing a given level of inhalation dose at a given distance. They find, for example, that an individual at a distance of 500 m would have a 2% conditional probability of experiencing an inhalation dose of 30 rem (0.3 Sv). Distances up to 5 km are considered.

(IV-5) As mentioned above, a Type IV attack-induced release at an ISFSI could take the form of a "cask fire". That event would involve sustained burning in air of the zircaloy cladding of SNF, causing release from SNF to the atmosphere of radionuclides including cesium-137 (Cs-137). That isotope accounts for most of the offsite radiation exposure attributable to the Chernobyl and Fukushima reactor accidents.

I have discussed the potential for a cask fire in various documents that I have authored.[33] For example, in the Thompson December 2013 declaration, I say:[34]

---

[31] Thompson, 2009, Section 7.5.
[32] Pretzsch and Maier, 2003.
[33] See, for example: Thompson, 2009, Sections 6 and 7.
[34] Thompson, 2013, paragraph XI-10.

> "A successful attack on an ISFSI, in which attackers expended an effort roughly the same as the effort needed to successfully attack a spent-fuel pool and cause a pool fire, could cause a cask fire in one or perhaps two casks. For illustration, let us assume that two casks would experience a fire and the fractional release of Cs-137 to the atmosphere would be 50%. In that case, the total atmospheric release from two typical casks holding 32 PWR fuel assemblies per cask would contain 67 PBq of Cs-137. That would be a substantial release, with a magnitude between the Fukushima release (36 PBq) and the Chernobyl release (85 PBq), as shown in Table V-1."

(IV-6) As discussed in Section III, above, the Yucca Mountain EIS provides estimates of adverse impacts arising in No-Action Scenario 2, which would involve continued storage of SNF in the absence of institutional controls.[35] Those estimates were made on a US-wide basis. Similar estimates could be made for specific ISFSIs, such as the proposed IPS facility.

(IV-7) NRC's GEIS acknowledges that SNF assemblies could be removed from an ISFSI for the purpose of extracting plutonium for use in nuclear weapons. In that context, the GEIS says:[36]

> "In general, the potential for theft or diversion of light water reactor spent fuel from the ISFSI with the intent of using the contained special nuclear material for nuclear explosives is not considered credible because of (1) the inherent protection afforded by the massive reinforced concrete storage module and the steel storage canister; (2) the unattractive form of the contained special nuclear material, which is not readily separable from the radioactive fission products; and (3) the immediate hazard posed by the high radiation levels of the spent fuel to persons not provided radiation protection (NRC 1991c, 1992)."

The GEIS concedes that the "radiation barrier" surrounding SNF would decline over time. In that context, the GEIS says:[37]

> "Thus, additional security requirements may be necessary in the future if spent fuel remains in storage for a substantial period of time. Under those circumstances, it is reasonable to assume that, if necessary, the NRC will issue orders or enhance its regulatory requirements for ISFSI and DTS security, as appropriate, to ensure adequate protection of public health and safety and the common defense and security."

---

[35] DOE, 2002, Section 7.2.2.
[36] NRC, 2014, Section 4.19.2.
[37] NRC, 2014, Section 4.19.2.

The above-quoted statement assumes the continuation of institutional controls. Yet, those controls could fade away at some future time. DOE considered that situation in the Yucca Mountain EIS.

Similar arguments can be made regarding the removal of SNF assemblies, and/or components of SNF assemblies, from an ISFSI for the purpose of constructing radiological weapons. One difference in this case is that the radionuclides responsible for SNF's radiation barrier would be sought after by malevolent actors, for use in radiological weapons.

In the absence of institutional controls, SNF containers, and the concrete overpacks or structures that surround these containers during storage, would be comparatively minor obstacles to well-equipped groups seeking to remove SNF assemblies, and/or components of SNF assemblies, from an ISFSI.

The effectiveness of the radiation barrier surrounding SNF could be partially offset by makeshift shielding, tools, and procedures. In that way, the radiation doses to intruders could be kept below levels that would cause mortality or disabling morbidity in the short term. Experience in the modern world, where suicide attacks have become routine, suggests that sufficiently-skilled intruders could be recruited to work under these conditions.

**V. Alternative Options at ISFSIs**

(V-1) The design of the proposed ISP facility is similar to the designs of most ISFSIs in the United States. Thin-walled SNF containers would be located inside concrete overpacks or structures that would be placed on concrete pads in the open air.

(V-2) Alternative options are available for the design and operation of an ISFSI. Some options could pose lower likelihoods and/or magnitudes of adverse impacts than would an ISFSI such as the proposed ISP facility.

(V-3) In the context of a proposed ISFSI, the no-action option would be to abandon the proposal. In that case, the potential for adverse impacts arising from operation of the proposed ISFSI would disappear. However, adverse impacts could arise elsewhere, as a result of the no-action decision, and the potential for such impacts deserves careful consideration.

(V-4) Storage of SNF at high density in water-filled pools, which now occurs at nuclear power plants across the United States, is a dangerous practice that is likely to yield severe adverse impacts. I have written about this practice in a variety of documents, including the Thompson December 2013 declaration.[38] I strongly recommend that the practice be

[38] Thompson, 2013.

terminated. To achieve that outcome, the pools would be re-equipped with low-density, open-frame racks, and surplus SNF would be stored elsewhere.[39]

(V-5) When SNF is removed from a pool at a nuclear power plant, the most obvious place to store the SNF is in an at-reactor ISFSI. Accordingly, ISFSIs are being constructed and operated at reactor sites across the United States. In the context of such an ISFSI, the no-action option would yield severe adverse impacts arising from continued storage of SNF at high density in one or more water-filled pools. Thus, the no-action option should be rejected.

(V-6) In the context of a proposed away-from-reactor ISFSI, however, the no-action option would not have the same implications. If that option were implemented, then at-reactor ISFSIs could be expanded to offset the unavailability of away-from-reactor storage capacity. Thus, there is no logical reason why the rejection of a proposed away-from-reactor ISFSI should imply continued storage of SNF at high density in water-filled pools.

(V-7) In addition to the no-action option, alternative options that could be implemented at an ISFSI include:

(i) establishment at the site of a Dry Transfer System or equivalent capability to repackage SNF;
(ii) modification of the site's Emergency Response Plan to include preparations for emissions mitigation (i.e., reduction of emissions to the surrounding environment of radiation and/or radioactive material from SNF as a result of damage to SNF assemblies and/or SNF containers);
(iii) modification of the ISFSI design so that SNF stored at the facility would be more robust against accident, attack, and/or removal of SNF assemblies or their components for malevolent purposes; and/or
(iv) ownership, design, and control of the facility by the US federal government.[40]

**VI. Definition and Assessment of Risk**

(VI-1) The concept of risk is used in the NRC licensing process for a proposed nuclear facility. It is used, for example, in determining if an adverse impact is significant, or if an alternative option should be adopted. Thus, the definition and assessment of risk are significant issues that affect the licensing process for the proposed ISP facility.

[39] If a reactor were shut down, re-equipment of its associated pool with low-density, open-frame racks might not be necessary. SNF could simply be removed from the pool.
[40] Ownership, design, and control of an ISFSI by the US federal government could imply that the government takes title to SNF stored in the ISFSI. That transfer of title would require changes in present federal policy and legislation.

(VI-2) I have addressed the concept of risk, in the context of nuclear facilities, in a number of documents. Discussion here is based on the Thompson December 2013 declaration, especially its Sections IV and V.

(VI-3) NRC has set forth differing definitions of risk. In the licensing process, however, NRC prefers an "arithmetic" definition in which risk is the arithmetic product of:

(i) a numerical indicator of harmful consequences (i.e., adverse impacts); and
(ii) a numerical indicator of the probability (i.e., likelihood) that those consequences will occur.[41]

(VI-4) The arithmetic definition of risk is flawed from at least three overlapping perspectives:

(i) numerical estimates of consequences and probability are typically incomplete and highly uncertain;
(ii) significant aspects of consequences and probability are not susceptible to numerical estimation; and
(iii) larger consequences can be qualitatively different than smaller consequences.

(VI-5) Moreover, devotees of the arithmetic definition typically argue that equal levels of "risk", as they define it, should be equally acceptable to citizens. Their argument may be given a scientific gloss, but is actually a statement laden with subjective values and interests. An informed citizen could reject their argument on reasonable grounds.

(VI-6) The arithmetic definition of risk should be repudiated. Risk should be assessed by compiling a set of qualitative and quantitative information about the likelihoods and characteristics of potential adverse impacts.

**VII. Features of the Proposed ISP Facility**

(VII-1) The proposed ISP facility is described in the ISP Application and its supporting documents (i.e., ISP Safety Analysis Report, ISP Environmental Report, and ISP Emergency Response Plan).

(VII-2) In discussing the alleged need for the proposed ISP facility, the ISP Environmental Report says:[42]

> "At present, 3 [nuclear] power plants have been shutdown and 9 nuclear power plants across the U.S. have been decommissioned (referred to hence forth as 12 decommissioned shutdown sites) to levels that would allow for unrestricted release of the site in accordance with the NRC's License Termination Rule (10

[41] Often, the arithmetic product is calculated for each of a range of scenarios, and these products are summed across the scenarios to yield an overall "risk".
[42] ISP, 2018c, Section 1.1.

> CFR 20, Subpart E). Even though the nuclear power plants, including the spent fuel pools have been dismantled and decommissioned, the SNF remains and continues to be stored in onsite ISFSIs. Many policymakers and stakeholders in the communities that host shutdown reactors want to have the SNF removed to complete decommissioning of the site and to allow for more beneficial uses of the land.
>
> While decommissioning activities have been completed at 9 locations across the U.S. (except for removing the SNF from dry cask storage), other financial pressures are expected to cause utilities to begin decommissioning at other commercial nuclear reactors. A CISF [consolidated interim storage facility] is needed to ensure that the SNF at these commercial reactor sites can be safely removed so that the remaining lands can be returned to greenfield status. This point is further underscored with the announcement by other electric utilities of their plans to decommission additional commercial reactors located throughout the U.S."

The above-quoted statement does not identify any urgency or compelling need to establish the proposed ISP facility. Instead, it argues that establishment of the facility would allow land occupied by some at-reactor ISFSIs to be reallocated to "more beneficial uses".

(VII-3) Later, the ISP Environmental Report says:[43]

> "Developing a CISF [consolidated interim storage facility] in Andrews County, Texas, would serve a national strategic need by providing for an orderly transfer of SNF from the twelve shut down reactors to a **safer and more secure** [emphasis added] centralized storage location (NRC, 2003). Not only would the CISF serve the needs of the 12 shutdown reactors, it would also be available to serve the needs of the existing 99 operating commercial nuclear reactors in the U.S., including those located in Texas, until a permanent repository becomes available."

The ISP Environmental Report does not provide evidence to support its assertion, in the above-quoted statement, that storage of SNF at the proposed ISP facility would be "safer and more secure" than continued storage of that SNF in at-reactor ISFSIs. The citation "NRC, 2003" is to an NRC guidance document that does not purport to make findings about safety and security at specific facilities.[44]

---

[43] ISP, 2018c, Section 1.1.

[44] The citation "NRC, 2003" in the quoted text refers to NRC document NUREG-1748, published August 2003, titled *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs: Final Report*.

(VII-4) Elsewhere, the ISP Environmental Report asserts that establishment of the proposed ISP facility would financially benefit the US federal government. In that context, the ISP Environmental Report says:[45]

> "Because the federal government does not have a storage or disposal facility for spent nuclear fuel, the DOE has been successfully sued by plant operators to reimburse them for their storage costs. The estimated benefit of the proposed action was measured as the cost of continuing to reimburse operators of shutdown plants for storing spent nuclear fuel over the next 40 years under a "no action" scenario and subtracting the reduced reimbursement schedule, if the CISF [consolidated interim storage facility] is built. Based upon the very conservative assumptions in this benefit-cost analysis, the proposed action would create a benefit to the federal government of $5,401,062,500 (not discounted), as shown in Table 7.4-1."

The ISP Environmental Report provides no citation to a "benefit-cost analysis" as mentioned in the above-quoted statement.

(VII-5) In addressing the duration of storage of SNF at the proposed ISP facility, the ISP Environmental Report says:[46]

> "ISP **anticipates** [emphasis added] the SNF would be stored at the CISF for 60-100 years before a permanent geologic repository is opened consistent with the NRC's Continued Storage Rule."

The above-quoted statement sets forth an outcome that ISP "anticipates". Thus, given the discussion in NRC's GEIS of the issue of storage duration, ISP implicitly concedes that SNF could be stored at the proposed ISP facility for the indefinite future.

(VII-6) Notable features of the proposed ISP facility would include:

(i) the absence at the facility site of a Dry Transfer System or equivalent capability to repackage SNF; and
(ii) the absence in the ISP Emergency Response Plan of preparations for "emissions mitigation" (i.e., reduction of emissions to the surrounding environment of radiation and/or radioactive material from SNF as a result of damage to SNF assemblies and/or SNF containers).

(VII-7) In the context of alternative options, the ISP Environmental Report discusses the no-action option.[47] It does not discuss the options listed in paragraph V-7, above.

---

[45] ISP, 2018c, Section 7.4.1.
[46] ISP, 2018c, Section 1.2.
[47] ISP, 2018c, Section 2.1.

(VII-8) The ISP Emergency Response Plan sets forth Protective Action Guides – in terms of levels of radiation dose – that ISP would use as guidance for emergency response.[48]

**VIII. Conclusions**

(VIII-1) **CONCLUSION #1**
(Regarding Adverse Impacts in the Situation Proposed by ISP)

Specified Situation: This conclusion applies to a situation in which the proposed ISP facility would operate in the manner described in the ISP Application and its supporting documents (i.e., Safety Analysis Report, Environmental Report, and Emergency Response Plan). Features of that situation would include:

(i) the absence at the facility site of a Dry Transfer System or equivalent capability to repackage SNF;
(ii) the absence in the ISP Emergency Response Plan of preparations for "emissions mitigation" (i.e., reduction of emissions to the surrounding environment of radiation and/or radioactive material from SNF as a result of damage to SNF assemblies and/or SNF containers); and
(iii) the potential for SNF to remain at the site for the indefinite future.

Adverse Impacts: In the above-specified situation, operation of the proposed ISP facility would be likely to create significant adverse impacts on:

(i) the general welfare, as stated in the Atomic Energy Act;
(ii) the common defense and security, as stated in the Atomic Energy Act; and/or
(iii) environments and human populations affected by the facility.

Likely events leading to impacts of that type, and the expected impacts of those events, would include:

***(a) Damage of SNF Assemblies and/or Containers Prior to Arrival at the Site***

Likely Events: It is likely that some SNF assemblies, and/or SNF containers, arriving at the site would be damaged prior to or during transportation to the site as a result of:

(i) accident;
(ii) attack; and/or
(iii) slow degradation.

[48] ISP, 2018d, Section 5.5.

Given the absence of repackaging capability at the site, and the absence in the ISP Emergency Response Plan of preparations for emissions mitigation, the affected SNF assemblies and/or SNF containers would remain at the site in a damaged condition, or would be transported elsewhere in a damaged condition.

Expected Impacts: The expected adverse impacts of the above-stated likely events would include:

(i) radiation exposure of workers and members of the public at dose levels exceeding permissible routine exposures, or at dose levels exceeding Protective Action Guides for emergency response;
(ii) radioactive contamination of the surrounding environment, on-site and/or off-site, at levels requiring remedial action; and/or
(iii) financial costs substantially exceeding the costs of routine operation of the ISP facility.

***(b) Damage of SNF Assemblies and/or Containers at the Site***

Likely Events: It is likely that some SNF assemblies, and/or SNF containers, would be damaged at the site as a result of:

(i) accident;
(ii) attack; and/or
(iii) slow degradation.

Likely modes of attack would include:

(i) initiation of a "cask fire" involving sustained burning in air of the zircaloy cladding of SNF, causing release from SNF to the atmosphere of radionuclides including cesium-137; and/or
(ii) initiation of a "non-fire release" involving release from SNF to the atmosphere of radionuclides but without the occurrence of a sustained zircaloy fire. (NOTE: A non-fire release could also arise from an accident or slow degradation.)

Given the absence of repackaging capability at the site, and the absence in the ISP Emergency Response Plan of preparations for emissions mitigation, the affected SNF assemblies and/or SNF containers would remain at the site in a damaged condition, or would be transported elsewhere in a damaged condition.

Expected Impacts: The expected adverse impacts of the above-stated likely events would include:

(i) radiation exposure of workers and members of the public at dose levels exceeding permissible routine exposures, or at dose levels exceeding Protective Action Guides for emergency response;

(ii) in the event of a cask fire, radioactive contamination of the surrounding environment at levels comparable to contamination levels in the vicinities of the Chernobyl reactor after its 1986 accident and the Fukushima reactors after their 2011 accident, thereby creating various adverse impacts on humans and their environment;
(iii) in the event of a non-fire release, radioactive contamination of the surrounding environment, on-site and/or off-site, at levels requiring remedial action; and/or
(iv) financial costs substantially exceeding the costs of routine operation of the ISP facility.

(VIII-2) **CONCLUSION #2**
(Regarding Adverse Impacts in a Situation of Neglect)

Specified Situation: This conclusion applies to a situation in which the proposed ISP facility would, after a period of operation in the manner described in the ISP Application and its supporting documents, experience a period of neglect. During the period of neglect, operational activity at or near the site would be severely degraded or absent. Such a period of neglect would be a likely outcome of creating the facility, for reasons including:

(i) the potential for SNF to remain at the site for the indefinite future; and or
(ii) the potential for ISP to become unwilling or unable to fulfill its obligations regarding site operations.

Adverse Impacts: In the above-specified situation, existence of the proposed ISP facility would be likely to create significant adverse impacts on:

(i) the general welfare, as stated in the Atomic Energy Act;
(ii) the common defense and security, as stated in the Atomic Energy Act; and/or
(iii) environments and human populations affected by the facility.

Likely events leading to impacts of that type, and the expected impacts of those events, would include:

***(a) Damage of SNF Assemblies and/or Containers at the Site***

Likely Events: It is likely that some SNF assemblies, and/or SNF containers, would be damaged at the site as a result of:

(i) accident;
(ii) attack; and/or
(iii) slow degradation.

The likelihoods of these types of event would differ from the likelihoods applicable in a situation where site operations would continue as postulated in the context of Conclusion #1, above. During the period of neglect, the likelihood of accident during a given time interval would decrease and the likelihood of attack would increase, if other factors remained equal. Both effects would be attributable to the degradation or absence of operational activity. Note that an attack could yield a cask fire or a non-fire release, whereas an attack, an accident, or slow degradation could yield a non-fire release.

Expected Impacts: The expected adverse impacts of the above-stated likely events would include:

(i) radiation exposure of workers and members of the public at dose levels exceeding permissible routine exposures, or at dose levels exceeding Protective Action Guides for emergency response;
(ii) in the event of a cask fire, radioactive contamination of the surrounding environment at levels comparable to contamination levels in the vicinities of the Chernobyl reactor after its 1986 accident and the Fukushima reactors after their 2011 accident, thereby creating various adverse impacts on humans and their environment;
(iii) in the event of a non-fire release, radioactive contamination of the surrounding environment, on-site and/or off-site, at levels requiring remedial action;
(iv) ongoing releases of radioactive material, and resulting adverse impacts on humans and the environment, comparable to the levels of releases and impacts set forth in the US Department of Energy's Yucca Mountain EIS in the context of No-Action Scenario 2; and/or
(v) financial costs substantially exceeding the costs of routine operation of the ISP facility.

***(b) Removal of SNF Assemblies and/or Components for Malevolent Purposes***

Likely Events: It is likely that some SNF assemblies, and/or components of SNF assemblies, would be removed from the site for malevolent purposes. Those purposes would include:

(i) construction of radiological weapons; and/or
(ii) extraction of plutonium for use in nuclear weapons.

The likelihood of removal for the purpose of extracting plutonium would increase over time, if other factors remained equal. That effect would be attributable to the decline over time of the "radiation barrier" that arises from radioactive decay in SNF.

Expected Impacts: The expected adverse impacts of the above-stated likely events would include:

(i) psychological, social, political, and economic stress arising from fear of the use of radiological weapons or nuclear weapons; and/or
(ii) adverse impacts arising from the use of radiological or nuclear weapons, in terms of human health, the environment, society, politics, and the economy.

(VIII-3) **CONCLUSION #3**
(Regarding Alternative Options with Lower Likelihoods or Magnitudes of Adverse Impacts)

The proposed ISP facility is one option for managing SNF. Other options are available. Some options could pose lower likelihoods and/or magnitudes of adverse impacts than would the proposed ISP facility. Alternative options in that category would include:

***(a) No Action***

In the context of the proposed ISP facility, the no-action option would be to abandon the proposal. Then, the potential for adverse impacts arising from operation of the proposed ISP facility would disappear. Adverse impacts could arise elsewhere, depending upon the options used to manage SNF.

Storage of SNF at high density in water-filled pools, which now occurs at nuclear power plants across the United States, is a dangerous practice that is likely to yield severe adverse impacts. There is no logical reason why implementation of the no-action option in the context of the proposed ISP facility should delay the ending of this practice.

***(b) Establishment of a Dry Transfer System or Equivalent Repackaging Capability***

A Dry Transfer System or equivalent capability to repackage spent fuel could be established at the site of the proposed ISP facility prior to receipt of any SNF at the site. This repackaging capability should be designed and licensed to handle damaged SNF, including SNF with ruptured and/or severely degraded cladding, and/or with severely degraded fuel pellets. Successful testing of this capability with actual damaged SNF should be a licensing precondition for receipt of SNF at the site.

Establishment of the above-described repackaging capability would reduce the likelihoods and/or magnitudes of adverse impacts arising from operation of the ISP facility. Relevant impacts would include those set forth in the context of Conclusion #1, above.

An additional benefit of this repackaging capability could be that SNF would be repackaged at the site as part of a coherent national strategy for storage, transport, and disposal of SNF.

***(c) Inclusion in the ISP Emergency Response Plan of Preparations for Emissions Mitigation***

The ISP Emergency Response Plan could be modified to include preparations for emissions mitigation (i.e., reduction of emissions to the surrounding environment of radiation and/or radioactive material from SNF as a result of damage to SNF assemblies and/or SNF containers). The emissions-mitigation measures would be temporary, and should be followed by repackaging of affected SNF.

Emissions-mitigation measures should be tested under representative conditions. The testing could occur at another location, such as a national laboratory. Inclusion in the ISP Emergency Response Plan of credible preparations to implement proven emissions-mitigation measures should be a licensing precondition for receipt of SNF at the site.

Inclusion of the above-described preparations in the ISP Emergency Response Plan would reduce the likelihoods and/or magnitudes of adverse impacts arising from operation of the ISP facility. Relevant impacts would include those set forth in the context of Conclusion #1, above.

***(d) Increased Robustness of SNF Storage***

The design of the proposed ISP facility could be modified so that SNF stored at the facility would be more robust against accident, attack, and/or removal of SNF assemblies or their components for malevolent purposes. For example, SNF arriving at the site could be repackaged into robust, thick-walled casks. Additionally or alternatively, SNF containers stored at the facility could be protected by external structures. For example, the ISP facility could follow the ISFSI design practice generally used in Germany, whereby SNF casks are located within comparatively robust buildings.

Modification of the design of the ISP facility in the above-described manner would reduce the likelihoods and/or magnitudes of adverse impacts arising from operation of the facility. Relevant impacts would include those set forth in the contexts of Conclusion #1 and Conclusion #2, above.

***(e) Federal Government Ownership of the Facility***

The business model underlying the ISP Application is that other entities would pay ISP for extended storage of SNF and eventual decommissioning of the ISP

facility, while those entities retain title to the SNF. In that context, the ISP Application says:[49]

> "The U.S., Department of Energy (DOE) or other holders of the title to SNF at commercial nuclear power facilities (SNF Title Holder(s)) will hold title to the SNF during transportation to and from and while in storage at the CISF."

In ISP's business model, the title holders would retain ultimate responsibility for managing the SNF, and for addressing adverse impacts arising during the period of control of the SNF by ISP. Despite retaining this ultimate responsibility, the title holders would not control the design or operation of the ISP facility. That control would reside with ISP, potentially for the indefinite future. Yet, experience shows that a private company such as ISP typically has a limited life and exhibits variable performance over time. Thus, this business model would create a substantial likelihood that operational activity at or near the site would become severely degraded or absent at some future time while SNF is present at the site. Moreover, in this model, ISP would have little incentive to design and operate the facility in a manner compatible with a coherent national strategy for storage, transport, and disposal of SNF.

An alternative business model could involve ownership, design, and control of the facility by the US federal government. Operation of the facility might be contracted to a private company, such as ISP, for a fixed period. That model would provide better alignment of control with responsibility, would reduce the likelihood that operational activity at or near the site would become severely degraded or absent in the future, and could facilitate the implementation of a coherent national strategy for storage, transport, and disposal of SNF.

Ownership, design, and control of the facility by the US federal government could imply that the government takes title to SNF stored at the facility. Transfer of title from the present title holders would require changes in federal policy and legislation. Such changes would raise issues that are not addressed here.

The ISP Environmental Report discusses the no-action option, but does not discuss the other alternative options set forth above.

## (III-4) **CONCLUSION #4**
(Regarding Definition and Assessment of Risk)

The concept of risk is used in the NRC licensing process for a proposed facility. This concept is used, for example, in determining if an adverse impact is significant, or if an alternative option should be adopted. NRC has set forth differing definitions of risk. In

[49] ISP, 2018a, Section 1.1.

the licensing process, however, NRC prefers an "arithmetic" definition in which risk is the arithmetic product of:

(i) a numerical indicator of harmful consequences (i.e., adverse impacts); and
(ii) a numerical indicator of the probability (i.e., likelihood) that those consequences will occur.[50]

The arithmetic definition of risk is flawed from at least three overlapping perspectives:

(i) numerical estimates of consequences and probability are typically incomplete and highly uncertain;
(ii) significant aspects of consequences and probability are not susceptible to numerical estimation; and
(iii) larger consequences can be qualitatively different than smaller consequences.

Moreover, devotees of the arithmetic definition typically argue that equal levels of "risk", as they define it, should be equally acceptable to citizens. Their argument may be given a scientific gloss, but is actually a statement laden with subjective values and interests. An informed citizen could reject their argument on reasonable grounds.

Accordingly, the arithmetic definition of risk should not be used in any NRC licensing process for the proposed ISP facility. Instead, risk should be assessed by compiling a set of qualitative and quantitative information about the likelihoods and characteristics of potential adverse impacts.

**********

I declare, under penalty of perjury, that the facts set forth in the foregoing narrative, and in the two appendices below, are true and correct to the best of my knowledge and belief, and that the opinions expressed therein are based on my best professional judgment.

Executed on 12 November 2018.

G. R. Thompson

Gordon R. Thompson

[50] Often, the arithmetic product is calculated for each of a range of scenarios, and these products are summed across the scenarios to yield an overall "risk".

**APPENDIX A: Tables**

*List of Tables*

Table III-1: Characteristics of BWR-Spent-Fuel Storage Canisters or Disposal Packages Proposed for Use at the Monticello or Skull Valley ISFSIs, or at Yucca Mountain

Table IV-1: Estimated Atmospheric Release of Radioactive Material and Downwind Inhalation Dose for Blowdown of the MPC in a Spent-Fuel-Storage Module

Table IV-2: Types of Atmospheric Release from a Spent-Fuel-Storage Module at an ISFSI as a Result of a Potential Attack

**Table III-1**
**Characteristics of BWR-Spent-Fuel Storage Canisters or Disposal Packages Proposed for Use at the Monticello or Skull Valley ISFSIs, or at Yucca Mountain**

| Category | Characteristics of Storage Canister or Disposal package | | |
|---|---|---|---|
| | NUHOMS 61BT storage canister (proposed for the Monticello ISFSI) | HI-STORM 100 MPC-68 storage canister (proposed for the Skull Valley ISFSI) | Proposed disposal package for emplacement in Yucca Mountain |
| Vendor | Transnuclear West | Holtec | Unknown |
| Capacity (number of BWR fuel assemblies) | 61 | 68 | 24 or 44 |
| Wall thickness | 0.5 in. (stainless steel) | 0.5 in. (stainless steel) | 2.0 in. (stainless steel) plus 0.8 in. outer layer (Alloy 22) |
| Length | 196.0 in. | 190.3 in. | 201.0 in. (for 24 assemblies) or 203.3 in. (for 44 assemblies) |
| Diameter | 67.2 in. | 68.4 in. | 51.9 in. (for 24 assemblies) or 65.9 in. (for 44 assemblies) |
| Neutron absorber material | Boral | Boral | Borated stainless steel |
| Fill gas | Helium | Helium | Helium |
| Presence of aluminum thermal shunts to transfer interior heat to wall of vessel ? | No | No | No for 24 assemblies, Yes for 44 assemblies |

**Notes:**
(a) NUHOMS data are from: Xcel Energy's Application to the Minnesota PUC for a Certificate of Need to Establish an ISFSI at the Monticello Generating Plant, 18 January 2005, Section 3.7; and Transnuclear West's FSAR for the Standardized NUHOMS system, Revision 6, non-proprietary version, October 2001.
(b) HI-STORM data are from Holtec's FSAR for the HI-STORM 100 system, Holtec Report HI-2002444, Revision 1.
(c) Characteristics of the Yucca Mountain package are from the Yucca Mountain Science and Engineering Report, DOE/RW-0539, May 2001, Section 3.
(d) This table reproduces Table V-4 of: Thompson, 2006.

**Table IV-1**
**Estimated Atmospheric Release of Radioactive Material and Downwind Inhalation Dose for Blowdown of the MPC in a Spent-Fuel-Storage Module**

| Indicator | | MPC Leakage Area | | |
|---|---|---|---|---|
| | | 4 sq. mm (equiv. dia. = 2.3 mm) | 100 sq. mm (equiv. dia. = 11 mm) | 1,000 sq. mm (equiv. dia. = 36 mm) |
| Fuel Release Fraction | Gases | 3.0E-01 | 3.0E-01 | 3.0E-01 |
| | Crud | 1.0E+00 | 1.0E+00 | 1.0E+00 |
| | Volatiles | 2.0E-04 | 2.0E-04 | 2.0E-04 |
| | Fines | 3.0E-05 | 3.0E-05 | 3.0E-05 |
| MPC Blowdown Fraction | | 9.0E-01 | 9.0E-01 | 9.0E-01 |
| MPC Escape Fraction | Gases | 1.0E+00 | 1.0E+00 | 1.0E+00 |
| | Crud | 7.0E-02 | 5.0E-01 | 8.0E-01 |
| | Volatiles | 4.0E-03 | 3.0E-01 | 6.0E-01 |
| | Fines | 7.0E-02 | 5.0E-01 | 8.0E-01 |
| Inhalation Dose (CEDE) to a Person at a Distance of 900 m | | 6.3 rem | 48 rem | 79 rem |

**Notes:**
(a) Estimates are from: Gordon Thompson, *Estimated Downwind Inhalation Dose for Blowdown of the MPC in a Spent Fuel Storage Module*, IRSS, June 2007.
(b) The assumed multi-purpose canister (MPC) contains 24 PWR spent fuel assemblies with a burnup of 40 MWt-days per kgU, aged 10 years after discharge.
(c) The following radioisotopes were considered: Gases (H-3, I-129, Kr-85); Crud (Co-60); Volatiles (Sr-90, Ru-106, Cs-134, Cs-137); Fines (Y-90 and 22 other isotopes).
(d) The calculation followed NRC guidance for calculating radiation dose from a design-basis accident, except that the MPC Escape Fraction was drawn from a study by Sandia National Laboratories that used the MELCOR code package.
(e) CEDE = committed effective dose equivalent. In this scenario, CEDE makes up most of the total dose (TEDE) and is a sufficient approximation to it.
(f) The overall fractional release of a radioisotope from fuel to atmosphere is the product of Fuel Release Fraction, MPC Blowdown Fraction, and MPC Escape Fraction.
(g) For a leakage area of 4 square mm, the overall fractional release is: Gases (0.27); Crud (0.063); Volatiles (7.2E-07); Fines (1.9E-06). Fines account for 95 percent of CEDE, and Crud accounts for 4 percent.
(h) This table reproduces Table 6-1 of: Thompson, 2009.

**Table IV-2**
**Types of Atmospheric Release from a Spent-Fuel-Storage Module at an ISFSI as a Result of a Potential Attack**

| Type of Event | Module Behavior | Relevant Instruments and Modes of Attack | Characteristics of Atmospheric Release |
|---|---|---|---|
| Type I: Vaporization | • Entire module is vaporized | • Module is within the fireball of a nuclear-weapon explosion | • Radioactive content of module is lofted into the atmosphere and amplifies fallout from nuc. explosion |
| Type II: Rupture and Dispersal (Large) | • MPC and overpack are broken open<br>• Fuel is dislodged from MPC and broken apart<br>• Some ignition of zircaloy fuel cladding may occur, without sustained combustion | • Aerial bombing<br>• Artillery, rockets, etc.<br>• Effects of blast etc. outside the fireball of a nuclear weapon explosion | • Solid pieces of various sizes are scattered in vicinity<br>• Gases and small particles form an aerial plume that travels downwind<br>• Some release of volatile species (esp. cesium-137) if incendiary effects occur |
| Type III: Rupture and Dispersal (Small) | • MPC and overpack are ruptured but retain basic shape<br>• Fuel is damaged but most rods retain basic shape<br>• No combustion inside MPC | • Vehicle bomb<br>• Impact by commercial aircraft<br>• Perforation by shaped charge | • Scattering and plume formation as for Type II event, but involving smaller amounts of material<br>• Little release of volatile species |
| Type IV: Rupture and Combustion | • MPC is ruptured, allowing air ingress and egress<br>• Zircaloy fuel cladding is ignited and combustion propagates within the MPC | • Missiles with tandem warheads<br>• Close-up use of shaped charges and incendiary devices<br>• Thermic lance<br>• Removal of overpack lid | • Scattering and plume formation as for Type III event<br>• Substantial release of volatile species, exceeding amounts for Type II release |

**Note:** This table reproduces Table 7-8 of: Thompson, 2009.

**APPENDIX B: Bibliography**

(Carlsen and Raap, 2012)
Brett W. Carlsen and Michaele Brady Raap, *Dry Transfer Systems for Used Nuclear Fuel, INL/EXT-12-26218* (Idaho Falls, Idaho: Idaho National Laboratory, May 2012).

(DOE, 2002)
US Department of Energy, *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250* (Washington, DC: DOE, February 2002).

(Hambley et al, 2016)
David Hambley and five other authors, "Lessons learned from a review of international approaches to spent fuel management", *EPJ Nuclear Sciences & Technologies*, Volume 2, published online 18 May 2016, DOI: 10.1051/epjn/2016019.

(ISP, 2018a)
Interim Storage Partners LLC, License Application, Docket No. 72-1050, Revision 2, 19 July 2018.

(ISP, 2018b)
Interim Storage Partners LLC, WCS Consolidated Interim Storage Facility System Safety Analysis Report (Public Version), Docket No. 72-1050, Revision 2, 19 July 2018.

(ISP, 2018c)
Interim Storage Partners LLC, WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050, Revision 2, 19 July 2018.

(ISP, 2018d)
Interim Storage Partners LLC submitted, as part of its license application of 19 July 2018, the following document: Waste Control Specialists LLC, Consolidated Emergency Response Plan, Revision of 15 March 2017.

(NRC, 2014)
US Nuclear Regulatory Commission, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, NUREG-2157* (Washington, DC: NRC, September 2014).

(NRC, 2013)
US Nuclear Regulatory Commission, *Nuclear Regulatory Legislation, NUREG-0980, Volume 1, Number 10* (Washington, DC: NRC, September 2013).

(Pretzsch and Maier, 2003)
Gunter Pretzsch and Ralph Maier, "German Approach To Estimate Potential Radiological Consequences Following A Sabotage Attack Against Nuclear Interim Storages", paper presented at the Eurosafe conference, Paris, 25-26 November 2003.

(Schneider et al, 2018)
Mycle Schneider and twelve other authors, *The World Nuclear Industry Status Report 2018* (Paris: Mycle Schneider Consulting Project, September 2018).

(Thompson, 2013)
Gordon R. Thompson, Declaration, "Comments on the US Nuclear Regulatory Commission's Waste Confidence Generic Environmental Impact Statement, Draft Report for Comment (September 2013)", 19 December 2013.
NOTE: This document is Exhibit # 1 of this declaration.

(Thompson, 2009)
Gordon R. Thompson, *Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 6 February 2009).
NOTE: This document is Exhibit # 5 of Thompson, 2013.

(Thompson, 2008)
Gordon R. Thompson, "The US Effort to Dispose of High-Level Radioactive Waste", *Energy and Environment*, Volume 19, Nos. 3+4, 2008, pp 391-412.
NOTE: This document is Exhibit # 8 of Thompson, 2013.

(Thompson, 2006)
Gordon R. Thompson, Prefiled Testimony before the Public Service Board, State of Vermont, in the Matter of the Petition of Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc., for a Certificate of Public Good, under 30 V.S.A. 248, to Construct a Dry-Fuel-Storage Facility at the Vermont Yankee Nuclear Power Station, 17 January 2006.

**INSTITUTE FOR RESOURCE AND SECURITY STUDIES**
**27 Ellsworth Avenue, Cambridge, Massachusetts 02139, USA**

Declaration of 19 December 2013
by Gordon R. Thompson:

Comments on the US Nuclear Regulatory Commission's
Waste Confidence Generic Environmental Impact Statement,
Draft Report for Comment (September 2013)

I, Gordon R. Thompson, declare as follows:

## I. Introduction

(I-1) I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. IRSS was founded in 1984 to conduct technical and policy analysis and public education, with the objective of promoting peace and international security, efficient use of natural resources, and protection of the environment. My professional qualifications are discussed in Section II, below.

(I-2) I have been retained by a group of environmental organizations to prepare this declaration.[1] This declaration provides comments invited by the US Nuclear Regulatory Commission (NRC).[2] NRC has invited comments on a September 2013 draft version of a generic environmental impact statement (GEIS) that addresses the subject of "waste confidence".[3] In the remainder of this declaration I refer to that document as the "draft GEIS". The stated objective of the draft GEIS is to:[4] "examine the potential environmental impacts that could occur as a result of the continued storage of spent

[1] These organizations include: Alliance to Halt Fermi 3, Beyond Nuclear, Blue Ridge Environmental Defense League, Center for a Sustainable Coast, Citizens Allied for Safe Energy, Citizens' Environmental Coalition, Don't Waste Michigan, Ecology Party of Florida, Friends of the Coast, Friends of the Earth, Georgia Women's Action for New Directions, Green States Solutions, Hudson River Sloop Clearwater, Missouri Coalition for the Environment, NC WARN, Nevada Nuclear Waste Task Force, New England Coalition, No Nukes Pennsylvania, Northwest Environmental Advocates, Nuclear Energy Information Service, Nuclear Information and Resource Service, Nuclear Watch South, Physicians for Social Responsibility, Public Citizen, Promoting Health and Sustainable Energy, Radiation and Public Health Project, Riverkeeper, SEED Coalition, San Clemente Green, San Luis Obispo Mothers for Peace, Sierra Club Nuclear Free Campaign, Snake River Alliance, Southern Alliance for Clean Energy, and Vista 360.
[2] NRC, 2013a.
[3] NRC, 2013b.
[4] NRC, 2013b, page iii.

nuclear fuel (spent fuel) at at-reactor and away-from-reactor sites until a repository is available."

(I-3) NRC states that it has prepared the draft GEIS to support a proposed rule.[5] The proposed rule is the most recent of a sequence of formal NRC findings, over several decades, about waste confidence. In this context, the term "waste" refers to spent nuclear fuel (SNF) or other forms of high-level radioactive waste (HLW) arising from the operation of commercial nuclear reactors.

(I-4) In a declaration dated 2 January 2013, I set forth 22 recommendations for the scope of the draft GEIS, together with information and analysis to support those recommendations.[6] Hereafter, I refer to that declaration as the "Thompson scoping declaration". It accompanies this declaration as Exhibit #1. In the present declaration, I incorporate by reference the information, analysis, and recommendations provided in the Thompson scoping declaration.

(I-5) This declaration addresses selected issues. Absence of discussion of an issue in this declaration does not imply that I view the issue as insignificant, or that I have no professional opinion on the manner in which the issue has been addressed in the draft GEIS.

(I-6) The issues discussed in this declaration are outlined in Section III, below. These issues all pertain to the concept of radiological risk, whose definition is discussed in Section IV, below. In this declaration the term "radiological risk" refers to the potential for harm to humans as a result of unplanned exposure to ionizing radiation. The consequences of this exposure could be direct or indirect. In the context of the draft GEIS, the set of direct and indirect consequences constitutes a set of environmental impacts.

(I-7) When spent fuel is discharged from a reactor of the type now used in the USA, it is initially stored under water in a pool adjacent to the reactor. The fuel assemblies are held upright in racks sitting on the floor of the pool. At each commercial reactor in the USA, the adjacent pool is now equipped with high-density, closed-frame racks. The nuclear industry began installing these racks in the 1970s, to replace the low-density, open-frame racks previously used. The high-density racks offered a comparatively cheap option for storing a growing nationwide inventory of spent fuel.

(I-8) At each commercial reactor in the USA, fuel takes the form of long, narrow tubes made of zirconium alloy (i.e., zircaloy), containing uranium oxide pellets. A group of these tubes makes up a fuel assembly. The zircaloy tubes are often referred to as fuel "cladding". Zircaloy has the property that at a comparatively high temperature (e.g.,

[5] NRC, 2013c.
[6] Thompson, 2013b.

about 900 °C) it can begin reacting exothermically (i.e., with production of heat) with either air or steam.

(I-9) Spent fuel generates internal heat from decay of radioactive isotopes. When the fuel is under water in a normally functioning pool, the decay heat enters the surrounding water, which is in turn cooled by pumping it through heat exchangers. However, if the water level were to fall below the top of the fuel, the fuel temperature would begin to rise. This temperature rise would be exacerbated by storage of spent fuel in high-density, closed-frame racks, as is now universally practiced in the USA. The fuel temperature could continue rising to the point at which an exothermic reaction of zircaloy with air or steam would begin. That reaction could then accelerate, in a runaway process. In this manner, loss of water from a pool could lead to a self-propagating exothermic reaction of zircaloy cladding with air or steam. That phenomenon is often referred to as a "pool fire". Conditions determining the onset and progression of a pool fire would include the timing of water loss and the level of decay heat production in the fuel. The level of decay heat production declines with increasing age of the fuel after discharge from a reactor.

(I-10) As part of its consideration of radiological risk, the draft GEIS considers the potential for a pool fire. Later in this declaration, I show that the draft GEIS is deficient in its examination of both the probability and the consequences of a pool fire. In examining these matters, the draft GEIS cites a number of studies that NRC has performed in the context of pool fires.

(I-11) In June 2013, NRC published a draft version of a pool-fire study that is not cited in the draft GEIS. That study is titled "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor".[7] Hereafter, I refer to that study as "NRC's draft consequence study". It accompanies this declaration as Exhibit #2. In a declaration dated 1 August 2013, I provided a critical review of NRC's draft consequence study, with recommendations for further NRC investigation in this area.[8] Hereafter, I refer to that declaration as the "Thompson draft consequence declaration". It accompanies this declaration as Exhibit #3. In the present declaration, I incorporate by reference the information, analysis, and recommendations provided in the Thompson draft consequence declaration. NRC's draft consequence study was re-published in final form in October 2013, with no substantial change.[9] Thus, my critical review of the draft study had no effect on the final study. I assume that the technical parts of the draft and final versions are identical. Thus, the Thompson draft consequence declaration applies equally to both.

---

[7] Barto et al, 2013a.
[8] Thompson, 2013a.
[9] The October 2013 version is: Barto et al, 2013b. It was published as an enclosure under the SECY memo: Satorius, 2013a. That memo stated: "None of the comments or responses [i.e., on the draft version of the study] has necessitated making substantial changes to the report." (See: Satorius, 2013a, page 3.)

(I-12) The draft GEIS assumes that spent fuel will be stored initially in pools and subsequently in dry casks. The potential for a pool fire has been mentioned above. There is also a potential for a "cask fire". Such an event could occur if a malevolent actor gains access to a dry cask containing spent fuel and attacks the cask in a manner that produces a self-propagating reaction between air and zircaloy fuel cladding. Later in this declaration, I address the probability and consequences of a cask fire.

(I-13) As mentioned in paragraph I-6, above, the issues discussed in this declaration all pertain to radiological risk. Accordingly, I focus my comments on the draft GEIS on selected portions of that document. Portions of the draft GEIS that I address include, but are not limited to:

- Section 4.18 – Environmental Impacts of Postulated Accidents
- Section 4.19 – Potential Acts of Sabotage or Terrorism
- Appendix F – Spent Fuel Pool Fires

(I-14) As mentioned in paragraph I-2, above, this declaration has been prepared on behalf of a group of environmental organizations. This declaration complements three other declarations – by Arjun Makhijani, David Lochbaum, and Mark Cooper – prepared on behalf of the same group of environmental organizations.

(I-15) This declaration has the following narrative sections:

I. Introduction
II. My Professional Qualifications
III. Issues Discussed in this Declaration
IV. Definition of Radiological Risk
V. Estimation of Radiological Risk
VI. Malevolent Acts and Radiological Risk
VII. The Future Risk Environment
VIII. Linkage of Pool Risk and Reactor Risk
IX. Risk Implications of Nuclear-Power Scenarios
X. Pool Fire: Probability and Consequences
XI. Cask Fire: Probability and Consequences
XII. Risk-Reducing Options
XIII. Conclusions

(I-16) In addition to the above-named narrative sections, this declaration has four appendices that are an integral part of the declaration. Appendix A contains tables and figures that support the narrative. Appendix B is a bibliography. Documents cited in the narrative or in Appendix A are listed in Appendix B unless otherwise identified. Appendix C is a list of exhibits that accompany this declaration. Each exhibit is a document that is listed in Appendix B. My curriculum vitae is provided in Appendix D.

**II. My Professional Qualifications**

(II-1) As stated in paragraph I-1, above, I am the executive director of the Institute for Resource and Security Studies. In addition, I am a senior research scientist at the George Perkins Marsh Institute, Clark University. My curriculum vitae is provided here in Appendix D.

(II-2) I received an undergraduate education in science and mechanical engineering at the University of New South Wales, in Australia, and practiced engineering in Australia in the electricity sector. Subsequently, I pursued graduate studies at Oxford University and received from that institution a Doctorate of Philosophy in mathematics in 1973, for analyses of plasma undergoing thermonuclear fusion. During my graduate studies I was associated with the fusion research program of the UK Atomic Energy Authority. My undergraduate and graduate work provided me with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering.

(II-3) My professional work involves technical and policy analysis in the fields of energy, environment, sustainable development, human security, and international security. Since 1977, a significant part of my work has consisted of analyses of the radiological risk posed by commercial and military nuclear facilities. These analyses have been sponsored by a variety of non-governmental organizations and local, state and national governments, predominantly in North America and Western Europe. Drawing upon these analyses, I have provided expert testimony in legal and regulatory proceedings, and have served on committees advising US government agencies.

(II-4) To a significant degree, my work has been accepted or adopted by relevant governmental agencies. During the period 1978-1979, for example, I served on an international review group commissioned by the government of Lower Saxony (a state in Germany) to evaluate a proposal for a nuclear fuel cycle center at Gorleben. I led the subgroup that examined radiological risk and identified alternative options with lower risk.[10] One of the risk issues that I personally identified and analyzed was the potential for a pool fire. In examining that potential, I identified partial loss of water from a pool as a more severe condition than total loss of water. I identified a variety of events that could cause loss of water from a pool, including aircraft crash, sabotage, neglect, and acts of war. Also, I identified and described alternative SNF storage options with lower risk; these lower-risk options included design features such as spatial separation, natural cooling, and underground vaults. The Lower Saxony government accepted my findings about the risk of a pool fire, and ruled in May 1979 that high-density pool storage of spent fuel was not an acceptable option at Gorleben.[11] That ruling accompanies this declaration as Exhibit #4. As a direct result of that ruling, policy throughout Germany

[10] Beyea et al, 1979.
[11] Albrecht, 1979.

has been to use dry storage in casks, rather than high-density pool storage, for away-from-reactor storage of SNF.

(II-5) Since 1979, I have been based in the USA. During the subsequent years, I have been involved in a number of NRC regulatory proceedings related to the radiological risk posed by storage of SNF. In that context I have prepared a number of declarations and expert reports. For example, in 2009 I prepared a report that critiqued proposed NRC findings on waste confidence.[12] That report accompanies this declaration as Exhibit #5. Also, I co-authored a 2003 journal article, on SNF radiological risk, that received considerable attention from relevant stakeholders.[13] That article accompanies this declaration as Exhibit #6. The findings in that article were generally confirmed by a subsequent report by the National Research Council.[14] That report accompanies this declaration as Exhibit #7. As a result of my cumulative experience, I am generally familiar with: (i) US practices for managing SNF; (ii) the radiological risk posed by those practices; (iii) NRC regulation of that risk; and (iv) alternative options for reducing that risk. Also, I am familiar with the US effort since the 1950s to implement final disposal of SNF and HLW, and have written a review article on that subject.[15] That article accompanies this declaration as Exhibit #8.

(II-6) I have performed a number of studies on the potential for commercial or military nuclear facilities to be attacked directly or to experience indirect effects of violent conflict. A substantial part of that work relates to the radiological risk posed by storage of SNF or HLW. For example, in 2005 I was commissioned by the UK government's Committee on Radioactive Waste Management (CORWM) to prepare a report on reasonably foreseeable security threats to options for long-term management of UK radioactive waste.[16] That report accompanies this declaration as Exhibit #9. The time horizon used in that report was, by CORWM's specification, 300 years.

(II-7) On behalf of the Nautilus Institute, I prepared a handbook that analysts in various countries could use to support their assessment of radiological risk arising from management of spent fuel.[17] That handbook accompanies this declaration as Exhibit #10.

**III. Issues Discussed in this Declaration**

(III-1) The primary purpose of this declaration is to provide comments on the draft GEIS, regarding selected issues. These issues all pertain to radiological risk, with a focus on the potential for a pool fire or a cask fire. The definition of radiological risk may appear to be an academic matter, but it has substantial practical implications. I discuss this matter in Section IV, below, explaining why I reject the definition employed in the

[12] Thompson, 2009.
[13] Alvarez et al, 2003.
[14] National Research Council, 2006.
[15] Thompson, 2008.
[16] Thompson, 2005.
[17] Thompson, 2013c.

draft GEIS. In addressing radiological risk in this declaration, I focus on the potential for an unplanned release of radioactive material, especially an atmospheric release. Within that focus, I consider two categories of initiating event for the release: (i) accidents; and (ii) attacks. Accidents would involve events such as equipment failure, human error, or natural forces (e.g., earthquake). Attacks would involve deliberate, malevolent acts or the collateral effects of such acts. Accidents and attacks have features in common. Therefore, they should be considered in parallel, which is the approach I take in this declaration.

(III-2) Analysts who examine the radiological risk associated with potential attacks affecting nuclear facilities have a double duty. First, they owe the public an accurate, general picture of the risk. Second, they should refrain from publishing information that could directly assist a potential attacker. This declaration is designed to meet both requirements. Also, this declaration does not purport to provide an assessment of radiological risk. Instead, it comments on the risk assessment provided in the draft GEIS. From that perspective this declaration is, I believe, accurate and reasonably complete. At the same time, this declaration does not provide information that could directly assist an attack on a particular nuclear facility. Accordingly, this declaration is appropriate for general distribution.

(III-3) After radiological risk is properly defined, one can identify quantitative and qualitative indicators that, taken together, describe the risk in a particular situation. Then, analysts can seek to estimate values for those indicators. The resulting set of values constitutes a risk assessment. Section V, below, discusses approaches that can be used to estimate the values of relevant indicators. In that discussion I describe the strengths and limitations of probabilistic risk assessment (PRA), which provides the basis for the draft GEIS's estimation of radiological risk.

(III-4) Section VI, below, provides some background discussion on the contribution of malevolent acts (i.e., attacks) to radiological risk. Section VII provides some background discussion on the "risk environment", a term that refers to the array of societal, technical, and natural factors that, taken together, have significant influence on the radiological risk posed by a particular facility. Those discussions inform this declaration's critique, in Sections X and XI and elsewhere, of risk assessment in the draft GEIS.

(III-5) The potential for a pool fire can be affected by the potential for a radioactive release from a nearby, operational reactor, and vice versa. In other words, the radiological risks associated with a pool and with a nearby reactor can be linked. Section VIII discusses the nature and significance of this linkage, and its neglect in the draft GEIS. The linkage is discussed further in Section X.

(III-6) The development of waste-related radiological risk over future decades would be affected by the nature and scale of activity in the country's nuclear-power sector during that period. Section IX discusses the risk implications of nuclear-power scenarios, and NRC's neglect of this issue in the draft GEIS.

(III-7) Section X provides a critical review of the assessment of pool-fire risk in the draft GEIS, in terms of probability and consequences. Section XI discusses the probability and consequences of a cask fire, and NRC's neglect of this threat in the draft GEIS.

(III-8) Section XII discusses options for reducing waste-related radiological risk, and NRC's neglect of these options in the draft GEIS.

(III-9) Conclusions are presented in Section XIII.

**IV. Definition of Radiological Risk**

(IV-1) In this declaration, I define the general term "risk" as the potential for an unplanned, undesired outcome. Risk, so defined, is an inevitable part of human existence. However, many aspects of risk can be managed. That is especially true when the risk arises from a technological project. In such a case, the first step in risk management is to understand, as deeply as possible, the risk arising from the project. The second step is to identify and characterize a range of options for reducing the risk. The remaining steps are to choose, implement, and follow up a set of risk-reducing options.

(IV-2) Table IV-1 shows some categories of risk that could be posed by a commercial nuclear facility. I define radiological risk as the potential for harm to humans as a result of unplanned exposure to ionizing radiation. The exposure could arise from unplanned release of radioactive material, or from line-of-sight exposure to unshielded radioactive material or a criticality event. In this declaration I focus on exposure arising from an unplanned release, especially an atmospheric release. That mode of exposure would typically dominate the radiological risk posed by storage of SNF or HLW, at least during the first few centuries of storage.

(IV-3) By defining radiological risk as "the potential for harm", I do not mean to imply that any single indicator can adequately describe this risk. To the contrary, assessment of radiological risk requires the compiling of a set of qualitative and quantitative information about the likelihood and characteristics of the unplanned exposure and resulting harm. The required information can be expressed as values of qualitative and quantitative indicators.

(IV-4) NRC has articulated several, inconsistent definitions of risk. The definition in the NRC Glossary is, on its face, similar to my definition. Other NRC definitions, discussed below, deviate from the NRC Glossary to the point where they become fundamentally flawed. The NRC Glossary defines risk as:[18]

[18] NRC website, http://www.nrc.gov/reading-rm/basic-ref/glossary/risk.html, accessed on 21 October 2013.

> "The combined answer to three questions that consider (1) what can go wrong, (2) how likely it is, and (3) what its consequences might be. These three questions allow the NRC to understand likely outcomes, sensitivities, areas of importance, system interactions, and areas of uncertainty, which can be used to identify risk-significant scenarios."

(IV-5) In the draft GEIS, the concept of risk is first introduced using a definition close to, but not identical with, the definition in NRC's Glossary. The Executive Summary of the draft GEIS says:[19]

> "NRC's concept of risk combines the *probability* of an accident with the *consequences of that accident.* In other words, the NRC examines the following questions:
>
> • What can go wrong?
> • How likely is it?
> • What would be the consequences?"

(IV-6) Later in the draft GEIS, the definition of risk deviates further from NRC's Glossary and becomes fundamentally flawed. In Section 4 of the draft GEIS, this later definition is embedded in an instructive paragraph. The paragraph is:[20]

> "The consequences of a severe (or beyond-design-basis) accident, if one occurs, could be significant and destabilizing. The impact determinations for these accidents, however, are made with consideration of the low probability of these events. The environmental impact determination with respect to severe accidents, therefore, is based on the **risk, which the NRC defines as the product of the probability and the consequences of an accident**. This means that a high-consequence low-probability event, like a severe accident, could still result in a small impact determination, if the risk is sufficiently low."

(IV-7) Through this deviation, NRC has ended up with a particular, limited definition of risk, as the arithmetic product of a numerical indicator of harmful consequences and a numerical indicator of the probability that those consequences will occur.[21] I refer to that definition hereafter as the "arithmetic" definition of risk. The arithmetic definition is flawed from several perspectives, as discussed below. It is, however, used extensively in the nuclear industry.

(IV-8) The above-quoted paragraph from the draft GEIS suggests a powerful motive for use of the arithmetic definition of risk. Consider the following situation. The consequences of a potential event could be severe; indeed, they could be "significant and

---

[19] NRC, 2013b, page xxx.
[20] NRC, 2013b, pages 4-68 and 4-69 (emphasis added).
[21] Often, the arithmetic product is calculated for each of a range of scenarios, and these products are summed across the scenarios to yield an overall "risk".

destabilizing", to use the words of the draft GEIS. Yet, if the event has, allegedly, a sufficiently low probability, then its "risk", arithmetically defined, would be very low. A devotee of the arithmetic definition could then argue that no action is required to mitigate the risk. In that way, the cost of mitigating actions would be avoided.

(IV-9) In the context of radiological risk in the commercial nuclear sector, the arithmetic definition of risk is flawed from at least four overlapping perspectives:

- First, numerical estimates of consequences and probability are typically incomplete and highly uncertain.
- Second, significant aspects of consequences and probability are not susceptible to numerical estimation.
- Third, larger consequences can be qualitatively different than smaller consequences.
- Fourth, devotees of the arithmetic definition typically argue that equal levels of "risk", as they define it, should be equally acceptable to citizens. Their argument may be given a scientific gloss, but is actually a statement laden with subjective values and interests. An informed citizen could reject their argument on reasonable grounds.

(IV-10) I address the first and second of these four perspectives in Section V, below, and elsewhere in this declaration. I address the third and fourth perspectives in the remainder of Section IV, and elsewhere in this declaration.

(IV-11) The third perspective is that larger consequences can be qualitatively different than smaller consequences. There is ample evidence to support this proposition. For example, analysts at the French government's Institut de Radioprotection et de Surete Nucleaire (IRSN) have found a qualitative difference between larger and smaller radiological consequences. The IRSN analysts estimated the costs (i.e., economic damage) that would arise from an accidental, atmospheric release of radioactive material from the Dampierre nuclear generating station in France. They considered two types of release – a "controlled" (smaller) and a "massive" (larger) release. A paper summarizing their findings was presented at the 2012 Eurosafe conference.[22] That paper accompanies this declaration as Exhibit #11.

(IV-12) The IRSN analysts concluded that the costs arising from a massive release would differ "profoundly" from the costs arising from a controlled release, in terms of both qualitative and quantitative factors. Indeed, they described the massive release as "an unmanageable European catastrophe". Their paper concluded with the statement: [23]

> "Safety decisions may also be informed by this picture, in particular if it is realized that the most severe cases actually carry huge stakes for the nation and

[22] Pascucci-Cahen and Patrick, 2012.
[23] Pascucci-Cahen and Patrick, 2012.

> therefore that their lower probability may not balance their catastrophic potential."

(IV-13) To illustrate the potential for qualitative difference between larger and smaller consequences, consider the IRSN description of a massive release as "an unmanageable European catastrophe". Underlying that description is the potential for major socio-political impacts that would, in Europe, have substantial trans-boundary dimensions. The European Union might not survive the political stress arising from this event.

(IV-14) There is strong evidence that the 1986 Chernobyl accident was a principal cause of the dissolution of the Soviet Union. Political unrest related to the accident was noted in a 1987 paper by the US Central Intelligence Agency. That paper accompanies this declaration as Exhibit #12. The paper's concluding statement was:[24]

> "As public dissatisfaction grows, the Chernobyl' accident may provide a focal point around which disgruntled citizens can organize, and Moscow may discover that Chernobyl' is a continuing irritant with a potential for social and ethnic tensions for years to come."

(IV-15) Public dissatisfaction did indeed grow, and the Warsaw Pact and the Soviet Union dissolved in 1991. Mikhail Gorbachev, the last head of state of the Soviet Union, confirmed in a 2006 essay that the Chernobyl accident was a principal cause of the Union's dissolution. That essay accompanies this declaration as Exhibit #13. Gorbachev's essay began with the statement:[25]

> "The nuclear meltdown at Chernobyl 20 years ago this month, even more than my launch of *perestroika*, was perhaps the real cause of the collapse of the Soviet Union five years later. Indeed, the Chernobyl catastrophe was an historic turning point: there was the era before the disaster, and there is the very different era that has followed."

(IV-16) The full array of consequences of a large, atmospheric release of radioactive material from a nuclear facility in the United States is difficult to predict. The nature and scale of those consequences would vary according to the characteristics of the release and other factors. It is clear, however, that there are unresolved socio-political tensions in this country. Thus, the consequences of a large release could include substantial political stress. It is unlikely that aggrieved citizens would be comforted if they learned that NRC had determined, at a prior time, that the release was a low-risk event.

(IV-17) As mentioned above, the arithmetic definition of risk is used extensively in the nuclear industry, despite its flaws. It is also used in other contexts. One manifestation of this definition is the "probability-threshold position" on risk. Supporters of that position

---

[24] CIA, 1987.
[25] Gorbachev, 2006.

argue that levels of risk below some numerical threshold can be ignored. That position means, in effect, that risks below the threshold are assigned a value of zero. The threshold might be, for example, an average probability of human fatality of $1x10^{-6}$ per annum. The probability-threshold position has been critiqued in a paper by the philosopher Kristin Shrader-Frechette.[26] That paper accompanies this declaration as Exhibit #14. Shrader-Frechette found that arguments for the probability-threshold position are fundamentally flawed.

(IV-18) Devotees of the arithmetic definition of risk often claim that their position is "scientific" and "rational". It is neither. The arithmetic definition is laden with subjective values and interests, and is prone to abuse. It is given a scientific gloss because it is expressed in numbers. However, the neatness of its numerical expression is achieved by ignoring significant factors that are not susceptible to numerical assessment. Ignoring such factors is the antithesis of a scientific approach. Moreover, the arithmetic definition pre-empts important ethical considerations, such as the tolerability of large consequences. Accordingly, the Thompson scoping declaration offered the following recommendation, which I continue to endorse:[27]

> "**Recommendation #21:** In considering radiological risk, the proposed EIS [i.e., the draft GEIS] should repudiate the arithmetic definition of risk."

**V. Estimation of Radiological Risk**

(V-1) For many societal hazards, such as automobile accidents, there is a rich body of data on actual incidents. In these cases, statistical methods can be used to predict probability. Also, in cases where the consequences are well defined, as is true for most automobile accidents, statistics can be used to predict consequences.

(V-2) The hazard of interest in this declaration is an unplanned release of radioactive material from a commercial nuclear facility. More specifically, the unplanned release contemplated here would be substantially larger than the authorized, routine release from a facility over a period of a year or so. There is, fortunately, a limited body of experience with unplanned releases of this nature. Thus, statistics cannot be used to predict probability or consequences.

(V-3) In the absence of reliable statistics, other approaches to radiological risk assessment must be taken. Three approaches are discussed here:

- Probabilistic risk assessment
- Direct experience
- Insurers' judgment

[26] Shrader-Frechette, 1985.
[27] Thompson, 2013b, Sections IX and X.

(V-4) The great majority of experience with radiological risk assessment for commercial nuclear facilities is for reactors. Thus, I provide here a discussion of reactor risk assessment. This discussion shows the strengths and limitations of PRA, which provides the basis for estimation of radiological risk in the draft GEIS. Moreover, spent-fuel-pool risk is strongly linked with reactor risk, as shown in Section VIII, below.

(V-5) Figures V-1 through V-3 show PRA findings for two commercial reactors – a pressurized-water reactor (PWR) at the Surry site, and a boiling-water reactor (BWR) at the Peach Bottom site. Figures V-1 and V-2 show the estimated probability of an accident involving substantial damage to the reactor core. Such damage would involve melting of some or all of the fuel in the core. The probability is expressed as core damage frequency (CDF) per reactor-year (RY). Figure V-3 shows the estimated conditional probability (i.e., probability given core damage) of various types of containment failure. A failure of containment would lead to a release of radioactive material to the atmosphere. The earlier the failure, the larger the release, other factors being equal.

(V-6) The findings shown in Figures V-1 through V-3 are from NRC's NUREG-1150 study.[28] That study was the high point of PRA practice worldwide. The study was well funded, involved many experts, was conducted in an open and transparent manner, was done at Level 3 (i.e., with estimation of offsite consequences), considered internal and external initiating events, explicitly propagated uncertainty through its chain of analysis, was subjected to peer review, and left behind a large body of published documentation. While there are deficiencies in the NUREG-1150 findings, these could be corrected by fresh analysis and the use of new information. The process of correction is possible because the NUREG-1150 study was conducted openly and left a documentary record.

(V-7) PRA practice in the USA has degenerated since the NUREG-1150 study. Now, PRAs or similar studies are conducted mostly by the nuclear industry, with limited transparency. NRC formerly sponsored independent reviews of industry PRAs, but no longer does so. Recent NRC work on PRA has not attained the scope, quality of review, and other aspects of NUREG-1150 that are mentioned in paragraph V-6.

(V-8) The first reactor PRA was the NRC's Reactor Safety Study (RSS).[29] NRC set up a group of experts, chaired by the physicist Harold Lewis, to review the RSS. Their report accompanies this declaration as Exhibit #15. In their report, the review group succinctly described the challenge of developing a credible PRA as follows:[30]

> "RSS was faced with the problem of estimating the probability of occurrence of an extremely rare event – core melt – in a system of great complexity, a nuclear power reactor. Since the event has never occurred in a commercial reactor, there

[28] NRC, 1990.
[29] NRC, 1975.
[30] Lewis et al, 1978, page 6.

> are no direct experimental data on which to base an estimate. The only datum that exists is the observation that there have been no core melts [as of 1978] in several hundred reactor-years of light water power reactor operation, and this fact provides at best an upper bound on the probability to be estimated. Therefore, it is necessary to resort to a theoretical calculation of the probability. But since the system is so complex, a complete and precise theoretical calculation is impossibly difficult. It is consequently necessary to invoke simplified models, estimates, engineering opinion, and in the last resort, subjective judgments."

(V-9) The preparation of a "complete and precise theoretical calculation" of core damage frequency remains "impossibly difficult" today, just as it was when Lewis and his colleagues wrote in 1978. This difficulty is intrinsic to the complexity of a reactor and the large number of potential failure modes. The difficulty is compounded when PRA analysts move from estimation of CDF (Level 1) to estimation of radioactive release (Level 2) and to estimation of offsite consequences (Level 3). At Level 2 there are many phenomenological uncertainties and variabilities. At Level 3 there is great variation in a variety of factors, such as atmospheric characteristics, and basic difficulties in characterizing indirect consequences. Thus, the radiological risk posed by a reactor is much more uncertain than other technological risks that are readily susceptible to actuarial analysis (e.g., automobile accidents).

(V-10) The complexity of a reactor is not the only reason why PRA findings are uncertain. Another reason is that a PRA examines an idealized system. The idealized system is properly designed, properly built, properly operated, and composed of independent components that typically fail randomly. PRA analysts have recognized that component failures may not always be independent. In response, they have developed analytic techniques to account for "common mode" failures that are attributable to influences (e.g., an earthquake, or a maintenance error) that can simultaneously affect more than one component. Although these techniques are useful, they leave some significant threats unaddressed.

(V-11) Three exemplary threats show how the idealized system examined in a PRA can be an incomplete representation of reality. First, a PRA cannot account for gross errors in design, construction, or operation. Second, it cannot account for malevolent acts. Third, it cannot account for deficiencies in institutional culture and practice. Each threat is significant. All three threats can lead to common mode failures. PRA's inability to account for malevolent acts is notable because a malevolent human intellect can identify weak points in a system, and can exploit destructive forces that are latent in the system.

(V-12) Reactor core-melt accidents have occurred at the Three Mile Island (TMI) site in 1979, the Chernobyl site in 1986, and the Fukushima #1 site in 2011. In each instance, retrospective investigations identified dominant risk factors that were non-quantifiable and could not have been accounted for in a PRA. These factors reflected, in differing ways, substantial deficiencies in institutional culture and practice. The three instances are discussed in the following three paragraphs.

(V-13) A commission, chaired by John Kemeny, was established by US President Carter to investigate the TMI accident. The commission's report accompanies this declaration as Exhibit #16. The commission concluded that systemic deficiencies in human behavior and organization were the dominant causes of the accident. To illustrate, their report included the statement:[31]

> "We are convinced that if the only problems were equipment problems, this Presidential Commission would never have been created. The equipment was sufficiently good that, except for human failures, the major accident at Three Mile Island would have been a minor incident. But, wherever we looked, we found problems with the human beings who operate the plant, with the management that runs the key organization, and with the agency that is charged with assuring the safety of nuclear power plants."

(V-14) Two Harvard University physicists, one of whom had previously worked in a reactor physics group in the USSR, published a paper in 1992 that examined the Chernobyl accident. Their paper accompanies this declaration as Exhibit #17. The abstract of their paper stated:[32]

> "The Chernobyl accident was the inevitable outcome of a combination of bad design, bad management and bad communication practices in the Soviet nuclear industry. We review the causes of the accident, its impact on Soviet society, and its effects on the health of the population in the surrounding areas. It appears that the secrecy that was endemic in the USSR has had profound negative effects on both technological safety and public health."

(V-15) The National Diet (i.e., parliament) of Japan established an independent commission to investigate the Fukushima accident. The executive summary of their report accompanies this declaration as Exhibit #18. The commission's principal conclusion was:[33]

> "The TEPCO Fukushima Nuclear Power Plant accident was the result of collusion between the government, the regulators and TEPCO, and the lack of governance by said parties. They effectively betrayed the nation's right to be safe from nuclear accidents. Therefore, we conclude that the accident was clearly "manmade". We believe that the root causes were the organizational and regulatory systems that supported faulty rationales for decisions and actions, rather than issues related to the competency of any specific individual."

---

[31] Kemeny et al, 1979, page 8.
[32] Shlyakhter and Wilson, 1992.
[33] Diet, 2012, page 16.

(V-16) The combined experience of these three incidents strongly suggests that a non-quantifiable factor, which cannot be accounted for in a PRA, will be a major or dominant risk factor underlying the next core melt at a commercial nuclear reactor. Thus, reliance on PRA to estimate the probability of the next core melt would be neither reasonable nor prudent.

(V-17) One might expect that responsible authorities would learn from these three incidents, and ensure that hitherto neglected risk factors are considered in future assessments of radiological risk. However, a paper by the sociologist John Downer shows that entrenched institutional cultures in the nuclear industry can suppress learning and promote the continuation of favored narratives. Downer's paper accompanies this declaration as Exhibit #19. The paper's conclusion begins with the statement:[34]

> "The disaster-punctuated history of nuclear power ought to speak for itself about the limitations of risk assessments, but our narratives obfuscate that history by rationalizing it away. For experience can only "show" if we are willing to "see," and the lessons of Fukushima, like those of the accidents that preceded it, will always be opaque to us if our narratives consistently interpret it as exceptional. So it is that even as the dramas of Fukushima linger, and in some ways intensify, the Ideal of Mechanical Objectivity survives with its misleading impression that expert calculations can objectively and precisely reveal the "truth" of nuclear risks. This has critical policy implications."

(V-18) Another approach to assessing radiological risk is to examine direct experience. In the case of a reactor, the most relevant experience consists of incidents in which a reactor core suffered severe damage. The next most relevant experience consists of incidents in which the core could have suffered severe damage if the incident had continued to develop. NRC categorizes incidents of the second type as accident sequence precursors (ASPs).

(V-19) Testimony to the US Senate by Thomas Cochran, soon after the Fukushima accident, listed twelve incidents involving severe damage to fuel in the core of a power reactor.[35] Cochran's testimony accompanies this declaration as Exhibit #20. His list of incidents excludes similar incidents at non-power reactors. For example, it excludes the core fire and radioactive release experienced in 1957 by a reactor at the Windscale site in the UK. That reactor was used to produce plutonium and other materials for nuclear weapons.

(V-20) Of the twelve core-damage incidents at power reactors, five have both: (i) occurred at a Generation II commercial reactor; and (ii) involved substantial fuel melting. These five incidents were at TMI Unit 2 (a PWR) in 1979, Chernobyl Unit 4 (an RBMK) in 1986, and Fukushima #1 Units 1 through 3 (BWRs) in 2011. These incidents occurred

[34] Downer, 2013, page 17.
[35] Cochran, 2011.

in a worldwide fleet of commercial reactors. About 430 reactors are currently operable, although none of Japan's 50 nominally operable reactors is actually operating at present. Currently-operating reactors and previous reactors in the worldwide fleet had accrued 14,760 RY of operating experience as of February 2012.[36] Thus, about 15,500 RY of experience will be accrued through 2013.

(V-21) These five core-melt incidents provide a data set that is comparatively sparse and therefore does not provide a statistical basis for a high-confidence estimate of CDF. Nevertheless, this data set does provide a reality check for PRA estimates of CDF. From this data set – five core-melt incidents over a worldwide experience base of about 15,500 RY – one observes a CDF of $3.2 \times 10^{-4}$ per RY (1 event per 3,100 RY). This value can be regarded as a "simple" estimate of CDF.

(V-22) A PRA analyst employed by NRC, Raymond Gallucci, has written a paper that develops CDF estimates based on direct experience.[37] Gallucci's paper accompanies this declaration as Exhibit #21. The paper considers both reactor core-melt and ASP experience, leading to a "simple" CDF estimate of $6.0 \times 10^{-4}$ per RY (1 event per 1,700 RY). The paper does not adopt that estimate. Instead, it makes some analytic assumptions, and ultimately concludes that CDF, worldwide and in the USA, is in the range $0.7 \times 10^{-4}$ to $4.0 \times 10^{-4}$ per RY (between 1 event per 14,300 RY and 1 event per 2,500 RY). I question the assumptions underlying this downward adjustment of the "simple" CDF estimate. However, Gallucci's analysis deserves careful consideration in view of his professional expertise. On another note, Gallucci ends his paper by expressing his personal willingness to tolerate a CDF of the level that he has identified. On that matter, his opinion has no more weight than the opinion of any citizen.

(V-23) As shown in the preceding paragraphs, direct experience suggests a CDF as high as $6.0 \times 10^{-4}$ per RY. The lowest value in the range suggested by Gallucci is $0.7 \times 10^{-4}$ per RY. It is instructive to compare these numbers with the CDF estimates shown in Figures V-1 and V-2. The only CDF estimates in those figures that approach direct-experience levels are the upper-bound (95$^{th}$ percentile) levels of earthquake-caused CDF using Livermore seismic estimates. Thus, direct experience indicates that NUREG-1150 substantially under-estimated CDF. This finding does not mean that NUREG-1150 was a bad study. On the contrary, as stated above, NUREG-1150 was the high point of PRA practice. My finding simply confirms that PRA cannot account for all of the factors that determine the probability component of radiological risk.

(V-24) CDF estimates are typically presented as the number of incidents per RY. These estimates could also be presented as the cumulative number of incidents across a fleet of reactors, during a calendar year or some other time interval. At present, there are 100

---

[36] See: World Nuclear Association (WNA) website, http://www.world-nuclear.org/. Data on cumulative reactor-years worldwide were obtained from the WNA website on 17 February 2012. The WNA website no longer provides such data.
[37] Gallucci, 2012.

licensed commercial reactors in the USA. Thus, a CDF of $3.2x10^{-4}$ per RY would be equivalent to a nationwide core-damage probability of $3.2x10^{-2}$ per calendar year (i.e., 3.2 percent per year). If that probability were sustained over decades, the occurrence of one or more core-damage incidents would become almost certain.

(V-25) Estimating the probability of core damage is just one step in assessing the radiological risk posed by a commercial reactor. Another step is to estimate the potential release of radioactive material to the environment. Figure V-3 illustrates a part of that step – estimating the conditional probability of failure of containment, given core damage. Additional steps include estimation of the movement of radioactive material in the environment, and estimation of the resulting consequences. As mentioned above, assessment of radiological risk involves the compiling of a set of qualitative and quantitative information about both probability and consequences.

(V-26) Direct experience provides some evidence regarding the release of radioactive material, its movement in the environment, and its impacts. Table V-1 shows estimated amounts of the radioactive isotope Cs-137 that were released to the atmosphere during the Chernobyl and Fukushima accidents. Figure V-4 shows the distribution of Cs-134 and Cs-137 isotopes deposited on Japan after being released to the atmosphere during the Fukushima accident. Table V-2 shows an estimate, by the US Department of Energy, of radiation dose commitment from the Chernobyl release.

(V-27) A paper by Sornette et al reveals the limitations of PRA findings by comparing them with lessons from direct experience.[38] That paper accompanies this declaration as Exhibit #22. The paper considers monetized losses from nuclear-facility incidents, using two sources of information. One source is a reactor PRA. The other source is a compilation of data on actual incidents at nuclear facilities. Figure V-5 of this declaration reproduces a figure from Sornette et al. That figure shows that the PRA substantially under-estimates the probability of a monetized loss. The under-estimation grows as losses become larger. In other words, the PRA findings show a thin-tail probability distribution, whereas the empirical data show a fat-tail distribution.

(V-28) Two approaches to radiological risk assessment are discussed above – PRA, and direct experience. A third approach is to examine the judgment of nuclear-facility insurers. Such an examination is set forth in Tables V-3 and V-4. Table V-3 shows insurance premiums for the Darlington nuclear generating station in Canada, to cover liability for bodily injury or property damage at offsite locations. Table V-4 calculates an "implied probability of event", which represents the insurers' assessment of the probability of a claim up to the liability limit, arising from an accident at Darlington.[39] (Events caused by malevolent acts are not considered in Table V-4.) If, for example, the liability limit is $1 billion, the implied probability of a claim up to that limit ranges from $6.4x10^{-4}$ to $1.0x10^{-3}$ per RY.

[38] Sornette et al, 2013.
[39] A claim up to the liability limit means that monetized impact exceeds the liability limit.

(V-29) The calculations presented in Table V-4 show that, in the judgment of the Canadian nuclear insurers, the probability distribution of the monetized impact of an accident at Darlington is close to the distribution shown by the "Empirical Records" curve in Figure V-5. Evidently, the insurers are not persuaded by PRA findings, which show much lower probabilities. In 2012, Ontario Power Generation, the owner/operator of the Darlington station, published the findings of a PRA it conducted for the station.[40] Those findings accompany this declaration as Exhibit #23. Findings of a previous PRA for Darlington were published in 1987.[41] The 2012 PRA estimated the probability of a large, atmospheric release as $9.5 \times 10^{-6}$ per RY, while the 1987 PRA estimated that probability as $8.2 \times 10^{-7}$ per RY. The Canadian nuclear insurers have access to these PRA studies, but choose to set premiums at much higher levels than the PRAs would imply.

(V-30) At this point in Section V, I have shown that reactor PRAs typically yield estimates of probability (i.e., the probability of accident outcomes) that are substantially lower than is implied by direct experience and insurers' judgment. This finding carries over to PRAs for non-reactor facilities, because it arises from limitations in the art of PRA itself. Those limitations are significant for the draft GEIS, because the draft GEIS relies upon PRA findings for estimation of radiological risk.

(V-31) In 1989 I was a co-author of a critical review of the state of the art of PRA.[42] The findings of that review remain generally valid today. One of the review's conclusions, with some reframing and updating to match the context of this declaration, provides a useful way to summarize the role of PRA in radiological risk assessment. The reframed and updated conclusion, which refers to a commercial reactor or to various other types of nuclear facility, is:

Actual probability of event = (PRA finding)x(Reality factor #1) + (Reality factor #2)

Where the variables in this equation are as follows:

- "Actual probability of event" refers to the real-world numerical probability of an outcome such as: reactor core damage; release of a specified amount of radioactive material; contamination of a specified area of land above a specified dose threshold; or accrual of a specified collective dose to people offsite.
- "PRA finding" refers to a PRA estimate of the probability of the outcome in question – this could be a mean, median, or other representation of a probability distribution.
- "Reality factor #1" is a number, typically greater than 1, that represents influences that are within the paradigm of PRA but are not properly accounted for in contemporary PRAs – these influences include: complexity; inadequate data; and deficiencies in institutional culture and practice.

[40] OPG, 2012.
[41] Ontario Hydro, 1987.
[42] Hirsch et al, 1989.

- "Reality factor #2" is a number that represents influences outside the paradigm of PRA – these influences include: gross errors in design, construction, or operation; and malevolent acts.

And the following observations apply:

- Experience suggests that Reality factor #1 for severe accidents may have a value that exceeds 1 by several orders of magnitude (i.e., factors of 10).
- Reality factor #2 has two numerical components: (i) a retrospective component that can be determined empirically based on the occurrence of events; and (ii) a prospective component that will remain unknown for the foreseeable future.
- Both Reality factors may vary significantly in response to variations in the future risk environment, as discussed in Section VII, below.
- This version of the equation is applicable when the values of "PRA finding" and "Actual probability of event" are both less than 1. At higher values, the term "probability" would be replaced by the term "frequency".

(V-32) The two Reality factors cannot be fully estimated by PRA techniques, although they may have components that can be estimated in that way. In cases where there is a record of direct experience – such as the occurrence of reactor core damage or the occurrence of ASPs – one can infer a range of values for the Reality factors, drawing upon PRA findings. If there is no record of direct experience of a hypothesized event, PRA findings can provide a kernel of information that can be adjusted by Reality factors that are judged appropriate to the situation. Thus, PRA findings can be valuable items of information. They are, however, only a guide to the assessment of probability, and are not definitive statements of that probability.

**VI. Malevolent Acts and Radiological Risk**

(VI-1) The draft GEIS makes assertions about the environmental impacts of malevolent acts affecting stored spent fuel. Later in Section VI, I identify those assertions. Then, in Sections X and XI, below, I critically review those assertions in the contexts of pool fires and cask fires. I begin Section VI by providing some background information about malevolent acts.

(VI-2) In the context of this declaration, it is noteworthy that NRC explicitly considered the impacts of malevolent acts in its 1979 GEIS on Handling and Storage of Spent Light Water Power Reactor Fuel, which was designated NUREG-0575.[43] Potential malevolent acts were described in Appendix J of that GEIS. Appendix J accompanies this declaration as Exhibit #24. NRC stated its rationale for considering malevolent acts as follows:[44]

[43] NRC, 1979.
[44] NRC, 1979, Appendix J, pages J-2 and J-3.

> "The NRC staff is unable to determine the quantitative likelihood of a hypothetical malevolent act being successfully performed by an adversary group. Instead, a group of selected reference events have been assumed to occur in order to establish a range of potential effects that might be caused by deliberate acts. The consequences corresponding to these reference events were calculated on a per-fuel-element basis, thus allowing the results to be extrapolated to possibly include massive destructive acts and thereby develop an upper bound on estimates of potential consequences, regardless of the plausibility of the attempted acts."

(VI-3) To implement that rationale in NUREG-0575, NRC considered four types of "sabotage" event at a spent-fuel pool. Table VI-1 summarizes NRC's description of these types of event. One sees from Table VI-1 that NRC envisioned an attack by up to 83 adversaries. The attackers could hold the control room for about one half hour. They could use explosive charges to breach the walls of the pool building or the floor of the pool itself.

(VI-4) NUREG-0575 did not consider the environmental impact of pool fires. It dismissed the potential for a pool fire with the brief statement:[45]

> "Assuming that the spent fuel stored at an independent spent fuel storage installation is at least one year old, calculations have been performed to show that loss of water should not result in fuel failure due to high temperatures if proper rack design is employed".

(VI-5) The citation for the "calculations" mentioned in that statement was to a report prepared by Sandia Laboratories for NRC, under the designation NUREG/CR-0649.[46] That report accompanies this declaration as Exhibit #25. Careful examination of NUREG/CR-0649 shows that it did not support the interpretation placed upon it by NUREG-0575. In fact, NUREG/CR-0649 showed that partial loss of water from a spent-fuel pool could lead to a pool fire.[47] The significance of partial loss of water is discussed further in Section X, below.

(VI-6) Thus, the authors of NUREG-0575 did not properly understand the potential for a pool fire. Accordingly, they failed to understand that the malevolent acts they postulated in Appendix J could, with slight adjustment, readily initiate a pool fire, as discussed in Section X, below. Nevertheless, NRC did postulate this set of malevolent acts in its 1979 GEIS. To my knowledge, NRC has never repudiated its postulation of these acts.

(VI-7) Since the 1970s, I have written numerous reports, declarations, and other documents that address malevolent acts as potential contributors to the radiological risk posed by reactors, spent-fuel-storage facilities, and other nuclear facilities. Documents in

---

[45] NRC, 1979, page 4-21.
[46] Benjamin et al, 1979.
[47] See, for example, the "blocked inlets" curve in Figure 26 (at page 77) of: Benjamin et al, 1979.

this category that are mentioned up to this point in this declaration include: (i) a January 2013 declaration[48] (Exhibit #1); (ii) an August 2013 declaration[49] (Exhibit #3); (iii) a February 2009 report[50] (Exhibit #5); (iv) a November 2005 report[51] (Exhibit #9); and (v) a January 2013 handbook[52] (Exhibit #10). Here, I introduce two additional documents I have written that address malevolent acts at nuclear facilities. One document is a November 2007 report that discusses continued operation of the Indian Point nuclear power plants.[53] That report accompanies this declaration as Exhibit #26. The second document is a January 2003 report that discusses threats to spent fuel as a neglected issue of homeland security.[54] That report accompanies this declaration as Exhibit #27. Each of the documents listed in this paragraph cites numerous documents prepared by diverse authors.

(VI-8) An August 2012 report prepared at the Congressional Research Service provides a succinct overview of policy, law, and regulation in the United States regarding the threat of malevolent acts at nuclear facilities.[55] That report accompanies this declaration as Exhibit #28. A February 2012 report on the future of nuclear power in the United States, by authors including former NRC chair John Ahearne, contains an instructive chapter on the threat of malevolent acts.[56] That report accompanies this declaration as Exhibit #29. Also instructive is a 2007 journal article by staff of the US Environmental Protection Agency, on the sabotage vulnerability of nuclear power plants.[57] That article accompanies this declaration as Exhibit #30. Computer models have been developed to help assess the vulnerability of nuclear facilities to malevolent acts, as discussed in a 2006 journal article by Morris et al.[58] That article accompanies this declaration as Exhibit #31.

(VI-9) For convenience, this declaration includes some tables and figures that appear in one or more of the documents listed in paragraph VI-7, above. I refer here to Tables VI-2 through VI-5, and Figures VI-1 through VI-4. These tables and figures provide clear evidence that reactors and spent-fuel-storage facilities are vulnerable to attack, including attack by non-State actors. I could explain this evidence in detail, but choose not to provide that explanation in a document that is intended for general distribution.

---

[48] Thompson, 2013b.
[49] Thompson, 2013a.
[50] Thompson, 2009.
[51] Thompson, 2005.
[52] Thompson, 2013c.
[53] Thompson, 2007.
[54] Thompson, 2003.
[55] Holt and Andrews, 2012.
[56] Ahearne et al, 2012.
[57] Honnellio and Rydell, 2007.
[58] Morris et al, 2006.

(VI-10) The documents listed in paragraphs VI-7 and VI-8, the numerous citations within those documents, and the tables and figures identified in paragraph VI-9, provide a thoroughly documented basis for the following conclusions:

1. A reactor, spent-fuel-storage facility, or other nuclear facility in the United States could be attacked by a State or by a non-State actor.
2. A non-State actor could acquire the capability to execute an attack that releases to the environment a large amount of radioactive material from a reactor core or from stored spent fuel.
3. Storage of spent fuel at high density in a pool adjacent to an operating reactor is advantageous to an attacker, because this arrangement would help the attacker to obtain a large, radioactive release from the reactor and the pool.
4. The amount of radioactive material that would be released by an attack could exceed the amount that would be released by an accident.
5. NRC requires licensees to implement only a "light" defense of a nuclear facility, namely a defense that is designed to resist attacks within the lower end of the spectrum of severity of potential attacks.
6. NRC does not require any defense against attack from the air, although a non-State actor could execute such an attack.
7. Licensees routinely lobby NRC to reduce the scale of threat against which licensees are required to mount a defense.
8. Measures deployed by licensees to mitigate the effects of potential accidents would be ineffective in many scenarios of potential attack.
9. The probability of a successful attack cannot be estimated by statistical methods or by analytic arts such as probabilistic risk assessment.
10. In light of human history, observation of the contemporary world, and consideration of possible societal trends, a prudent decision maker would conclude that a successful attack on a reactor or spent-fuel-storage facility in the United States over the coming decades is as likely to occur as are major national challenges that are planned for, such as severe natural disasters or engagement in wars.
11. Options are available to reduce radiological risk arising from potential attacks.
12. The attack-related risk of storing spent fuel could be dramatically reduced by re-equipping spent-fuel pools with low-density, open-frame racks, and by otherwise storing spent fuel in protected dry casks.
13. Requiring licensees to implement options that substantially reduce the attack-related risk at nuclear facilities would enhance protective deterrence as a national strategy, with substantial benefits.

(VI-11) The draft GEIS addresses the potential for malevolent acts in its Section 4.19, titled Potential Acts of Sabotage or Terrorism. The Executive Summary of the draft GEIS addresses this potential in its Section ES.13.1.19, also titled Potential Acts of Sabotage or Terrorism. In its Section 4.19, the draft GEIS has separate sub-sections that address attacks on spent-fuel pools, and attacks on independent spent fuel storage

installations (ISFSIs). The draft GEIS summarizes its findings on the potential for malevolent acts as follows:[59]

> "The NRC finds that even though the environmental consequences of a successful attack on a spent fuel pool beyond the licensed life for operation of a reactor are large, the very low probability of a successful attack ensures that the environmental risk is SMALL. Similarly, for an operational ISFSI during continued storage, the NRC finds that both the probability and consequences of a successful attack are low, and therefore, the environmental risk is SMALL. Therefore, the storage of spent fuel during continued storage will not constitute an unreasonable risk to the public health and safety from acts of radiological sabotage, theft, or diversion of special nuclear material. The environmental impacts of terrorism are an area of particular controversy."

(VI-12) In addressing an attack on a spent-fuel pool, this statement in the draft GEIS acknowledges that the consequences of an attack could be "large". In Section X, below, I provide further evidence about the meaning of that term. Then, the statement asserts that the probability of a successful attack is "very low". Elsewhere, the draft GEIS says that this probability is "numerically indeterminable".[60] I agree with the latter statement, but do not agree that the probability is very low. As summarized in paragraph VI-10, above, there is an extensive, thoroughly documented body of evidence showing that a successful attack on a reactor or pool is as likely to occur as are major national challenges that are planned for, such as severe natural disasters or engagement in wars.

(VI-13) The draft GEIS notes that, after loss of cooling at a pool, some days would pass before water boiled away to the point where fuel would be exposed. For a pool containing PWR fuel, the draft GEIS cites boil-away times exceeding 4 to 11 days, depending upon the age of the fuel. The draft GEIS asserts that such a time period would allow the implementation of mitigating actions that would prevent a pool fire.[61] In Section VIII, below, I show that NRC has neglected to consider pool-reactor risk linkage that could hinder or preclude mitigating actions. Pool-reactor risk linkage could preclude mitigating actions during either an accident or an attack. Also, a malevolent actor could preclude mitigating actions directly, and/or could cause a loss of water by mechanisms other than boil-away. I address these matters in Section X, below.

(VI-14) The draft GEIS asserts that additional security measures implemented after the 11 September 2001 attacks reduced the probability of a pool fire.[62] Presumably, the draft GEIS is referring to attack-induced pool fires. However, even with the additional security measures, NRC requires licensees to implement only a light defense of a nuclear

---

[59] NRC, 2013b, Executive Summary, page xiiv. A briefer statement to the same general effect appears at: NRC, 2013b, pp 4-89 to 4-90.
[60] NRC, 2013b, page 4-85.
[61] NRC, 2013b, Appendix F, page F-11.
[62] NRC, 2013b, Appendix F, page F-11.

facility. The conclusions that I set forth in paragraph VI-10, above, take account of that defense.

(VI-15) As discussed in paragraphs VI-11 and VI-12, above, the draft GEIS identifies "large" but vaguely specified consequences of an attack-induced pool fire, and "very low" but numerically indeterminable probability. The draft GEIS proceeds to multiply these indicators together in some unspecified manner, concluding that the risk of an attack on a pool is "SMALL". In effect, the draft GEIS uses the "arithmetic" definition of risk that I discuss in Section IV, above. That definition is fundamentally flawed for the reasons I set forth in Section IV. In this instance, application of the arithmetic definition is additionally flawed because the indicators that are multiplied together are nebulous.

(VI-16) In addressing an attack on an ISFSI, the statement in the draft GEIS that is quoted in paragraph VI-11 asserts that both the probability and consequences of a successful attack are "low". I discuss this probability and these consequences in Section XI, below. That discussion addresses, among other matters, the role of protective deterrence. The statement quoted in paragraph VI-11 goes on to assert that the risk of a successful attack on an ISFSI is "SMALL". That assertion reflects use of the arithmetic definition of risk. As stated in paragraph VI-15, above, that definition is fundamentally flawed, and its application in the draft GEIS is additionally flawed because the indicators that are multiplied together are nebulous.

**VII. The Future Risk Environment**

(VII-1) The draft GEIS examines storage of spent fuel over three timeframes.[63] The "short-term storage" timeframe is for 60 years beyond licensed life for reactor operations. The "long-term storage" timeframe is for 100 years beyond the short-term timeframe. The "indefinite storage" timeframe extends into the indefinite future.

(VII-2) Assessing radiological risk over such long timeframes poses a daunting challenge to risk assessors. A competent risk assessor would immediately acknowledge that the risk environment could change substantially during the short- and long-term timeframes, and even more so during the indefinite timeframe. In this declaration, the term "risk environment" refers to the array of societal, technical, and natural factors that, taken together, have significant influence on risk. Over a period of decades and centuries, these factors, and their interactions with each other, could change substantially. Moreover, the risk environment could change non-uniformly across the United States.

(VII-3) Section V of the Thompson scoping declaration discussed the future risk environment. That discussion culminated in my recommendation:[64]

[63] NRC, 2013b, page 1-12.
[64] Thompson, 2013b, Section V and Section X.

> "**Recommendation #7:** Risk assessment in the proposed EIS should be supported by a set of indicators that express the dynamic aspects of the potential risk environment across the time period and suite of scenarios considered in the EIS."

(VII-4) A report from Argonne National Laboratory examines the challenge of safeguarding spent fuel during very long-term storage (VLTS), which it defines as above-ground, interim, dry storage for a period of more than 50 years.[65] That report accompanies this declaration as Exhibit #32. The challenges identified in the report arise partly from potential changes in the risk environment. Thus, the report illustrates the significance of a potentially changing risk environment for the assessment of radiological risk. The report makes the following statement:[66]

> "Safeguarding a VLTS facility with nuclear material for 50, 100, or 200 years will present many challenges. First of all, the integrity of the fuel or cask may deteriorate. The radioactive signature of the fuel will also change. As the fuel cools, it may become more attractive for diversion. Even though the State has the means to handle very radioactive spent fuel, cooler spent fuel will still be more attractive to divert because it is easier to handle and reprocess. Keeping data on the facility for that long may also be a challenge. If the past 50 years are any indication of the future, it is difficult to predict what the safeguards challenges and needs will be in just the next 50 years."

(VII-5) The draft GEIS does consider one aspect of potential change in the risk environment over coming decades. In its Section 4.18, it discusses the influence of climate change on design-basis accidents or severe accidents at spent-fuel pools or at dry cask storage facilities (i.e., ISFSIs). It acknowledges various potential outcomes of climate change, such as increased intensity and frequency of severe weather events, sea level rise, increased storm surges, shoreline retreat, and inland flooding. It assumes, however, that mitigating actions could prevent significant increase in radiological risk as a result of climate change, that NRC will continue to exist and will require the necessary mitigating actions, and that licensees will be willing and able to implement these actions.

(VII-6) Section 1.8.3 of the draft GEIS, titled Analysis Assumptions, sets forth a highly optimistic view of the future conditions that will affect stored spent fuel. It assumes that institutional controls will remain operative into the indefinite future, arguing that this assumption "avoids unreasonable speculation regarding what might happen in the future regarding Federal actions to provide for the safe storage of spent fuel".[67] It further assumes that each ISFSI will be replaced on a 100-year cycle, into the indefinite future.

---

[65] Kollar et al, 2013.
[66] Kollar et al, 2013, page 6.
[67] NRC, 2013b, page 1-14.

(VII-7) For the reasons set forth in Section V of the Thompson scoping declaration, the highly optimistic assumptions used in the draft GEIS are neither reasonable nor prudent. Moreover, assuming static conditions is speculative in the extreme, and shows a profound ignorance of human history. Given the long timeframes envisioned in the draft GEIS, the only reasonable approach is to consider a broad range of scenarios. Section VI of the Thompson scoping declaration discussed this approach. That discussion yielded three recommendations, each of which is pertinent to radiological risk, as follows:[68]

> "**Recommendation #8:** The scenarios considered in the proposed EIS should cover a range of potential outcomes regarding the role of nuclear power, including: (i) shrinkage in the number of operating reactors, with potential shutdown of all reactors by the middle of the 21st century; (ii) expansion in the number of operating reactors; and (iii) introduction of new technology."
>
> "**Recommendation #9:** The scenarios considered in the proposed EIS should cover future societies exhibiting a range of variation in prosperity, technological capability, and the quality of governance."
>
> "**Recommendation #10:** The scenarios considered in the proposed EIS should cover a range of potential future outcomes regarding the propensity for violent conflict, and should cover situations in which stored SNF or HLW would experience attacks involving States or non-State actors."

(VII-8) The draft GEIS does not implement any of my Recommendations #7 through #10. Instead, the draft GEIS takes the unreasonable, imprudent, and highly speculative position that the risk environment will remain unchanged into the indefinite future.

**VIII. Linkage of Pool Risk and Reactor Risk**

(VIII-1) The radiological risk posed by a spent-fuel pool is significantly increased if that pool is located near an operational reactor, and vice versa. This linkage of pool risk and reactor risk is discussed below. Before embarking on that discussion, however, I explain why this linkage is significant in the context of the draft GEIS.

(VIII-2) The hazard posed by a nuclear fuel assembly begins at the moment when the assembly first undergoes nuclear fission, which occurs inside a reactor. That moment would be the logical starting point for any GEIS that addresses spent fuel. A less logical, but perhaps plausible, starting point would be the moment when the fuel assembly is discharged from a reactor and placed in a nearby pool. The draft GEIS uses a much later and entirely illogical starting point. The draft GEIS considers the environmental impacts of storing spent fuel during a period that begins when the reactor that discharged the fuel is no longer licensed for operation.

[68] Thompson, 2013b, Section VI and Section X.

(VIII-3) By adopting this later starting point, the draft GEIS excludes from consideration a set of significant environmental impacts that arise in earlier phases of the life of a fuel assembly. That exclusion is illogical. It deserves examination from a legal perspective, but that examination is outside the scope of this declaration.

(VIII-4) For the remainder of this declaration, I adopt the starting point used in the draft GEIS. That adoption does not mean that I endorse this starting point. Discussion in the following paragraphs shows that, even if one adopts the starting point used in the draft GEIS, linkage of pool risk and reactor risk is a significant factor in the radiological risk of storing spent fuel.

(VIII-5) Let us consider spent fuel that has been discharged from a reactor that is no longer operational, and that is currently in the pool into which it was discharged. Let us designate the US inventory of this spent fuel, at any given time, as "draft GEIS fuel in pools" (DGFIP). It turns out, as shown below, that a significant fraction of DGFIP could be located near operational reactors. This finding could hold for a significant period even if nuclear power continues to decline as a US energy source. The same finding could hold for a much longer period if nuclear power revives as a US energy source. Both outcomes for nuclear power are encompassed by the draft GEIS. Later in this declaration, I discuss the implications of nuclear-power scenarios for the radiological risk of storing spent fuel. That discussion is in Section IX, below.

(VIII-6) Currently, 100 commercial reactors are licensed to operate in the United States, at 62 sites. At 35 of these sites, there are multiple (i.e., two or three) licensed reactors.[69] During future decades, all of the currently licensed reactors will shut down permanently. However, there is no NRC requirement or expectation that all of the reactors at a particular site will permanently shut down at the same moment. Thus, there could be, and probably will be, significant periods when a significant fraction of DGFIP is located near operational reactors. Moreover, there are 9 sites where two reactors share a single pool, and 8 other sites where the pools serving two adjacent reactors are connected by a transfer canal.[70] At these 17 sites, any fuel in a pool is intimately associated with two adjacent reactors.

(VIII-7) If nuclear power revives as a US energy source, where might a new fleet of reactors be constructed? This question has been addressed by nuclear industry consultant Karl Fleming in a paper supporting his presentation to NRC commissioners in July 2011. That paper accompanies this declaration as Exhibit #33. The paper states:[71]

> "It is likely that most if not all of the next fleet of new reactors will be built on one or more of the existing licensed reactor sites in view of the additional costs

[69] NRC, 2013d. There are 25 sites with multiple PWRs, and 10 sites with multiple BWRs. There are 13 sites with one PWR, and 14 sites with one BWR.
[70] Satorius, 2013b, Enclosure 1, Table 72.
[71] Fleming, 2011.

> and effort that will be required to approve new sites."

(VIII-8) Thus, if nuclear power revives, a significant fraction of DGFIP could be located near new operational reactors, for a period of many years. That finding, combined with my finding in paragraph VIII-6 for the case of continued decline of nuclear power, shows that a significant fraction of DGFIP could be located near operational reactors for a significant period, regardless of future trends in US nuclear power.

(VIII-9) At this point, I have established that pool storage of spent fuel, as considered in the draft GEIS, could occur, and probably will occur, at locations near operational reactors. It follows that the draft GEIS should have carefully considered the potential linkage of pool risk and reactor risk.

(VIII-10) PRA practice has neglected linkage of risk among multiple reactors at a site. That neglect is summarized in Karl Fleming's paper, discussed above. The paper says:[72]

> "Our current state of knowledge about the risks from accidents is derived from PRAs. For the most part PRAs on multi-unit sites have been performed on individual reactors separately. In fact, some multi-unit sites have performed a PRA only for one of the sited reactors, arguing that symmetry considerations justify a single reactor PRA. In order to meet expectations for PRA quality, as defined in the various PRA standards, such PRAs must address certain multi-unit dependencies in the modeling of risks that involve damage to a single reactor. The capability to use equipment from one reactor to back up failures on another is typically considered, however the probability that resources are consumed by concurrent reactor accidents is almost always ignored."

(VIII-11) In a 2013 journal article, Schroer and Modarres proffer an event classification schema for applying PRA to multiple reactors at a site.[73] That article accompanies this declaration as Exhibit #34. At the time of publication, co-author Suzanne Schroer was a member of the NRC staff. The article says:[74]

> "Currently, multi-unit nuclear power plant PRAs consider the risk from each unit separately and do not consider combination events between the units. To gain an accurate view of the site's risk profile, the CDF for the site rather than the unit must be considered. This paper has presented a classification system that utilizes existing single-unit PRAs and combines them into a multi- unit PRA. Six main commonality classes that can cause multiple units to be dependent have been presented: initiating events, shared connections, identical components, proximity dependencies, human dependencies, and organizational dependencies. A seventh

[72] Fleming, 2011.
[73] Schroer and Modarres, 2013.
[74] Schroer and Modarres, 2013, page 49.

class, independent events, was only marginally discussed because it does not address dependencies between the units."

(VIII-12) From the two preceding paragraphs and the documents cited therein, one sees that linkage of risk among multiple reactors at a site has been long neglected, but is beginning to receive some attention from NRC and licensees. Linkage of pool risk and reactor risk at a site has been similarly neglected, but has not been properly addressed by NRC or licensees.

(VIII-13) Although NRC has not properly addressed the linkage of pool risk and reactor risk, NRC has taken a small, initial step in that direction. This step was taken in a pool-fire study that NRC published in 2013. As discussed in paragraph I-11, above, NRC published a draft version of the pool-fire study in June 2013.[75] The study was re-published in final form in October 2013, with no substantial change.[76] The October 2013 version, with its cover memo, accompanies this declaration as Exhibit #35. Hereafter, I refer to it as "NRC's consequence study". I assume that the technical parts of the June 2013 and October 2013 version are identical. Thus, the Thompson draft consequence declaration applies equally to both.

(VIII-14) NRC's consequence study took a small step toward addressing the linkage of pool risk and reactor risk in the sense that it identified aspects of that linkage. It did not proceed to analyze those aspects. The identification occurred under the rubric, Multi-Unit Considerations, via the following statement:[77]

"Observations Regarding a Concurrent Reactor Event:

There are four broad interplays that can be defined between the SFP [spent fuel pool] and the reactor:

1. an initiating event that directly affects both the reactor and the SFP
2. a reactor accident that prevents accessibility to the SFP for a prolonged period of time (e.g., due to high radiation fields), leading to a SFP accident
3. a reactor accident that includes ex-containment energetic events (e.g., a hydrogen combustion event) or other ex-containment interplays (e.g., steaming through the drywell head that affects refuel floor combustible gas mixtures) and creates a hazard to the SFP (e.g., by causing debris to fall in to the pool) or otherwise changes the SFP event progression
4. an SFP accident that prevents accessibility to key reactor systems and components for a prolonged period of time or which creates a hazard for

[75] Barto et al, 2013a.
[76] The October 2013 version is: Barto et al, 2013b. It was published as an enclosure under the SECY memo: Satorius, 2013a. That memo stated: "None of the comments or responses [i.e., on the draft version of the study] has necessitated making substantial changes to the report." (See: Satorius, 2013a, page 3.)
[77] Barto et al, 2013b, Section 2.2, pp 28-29.

> equipment used to cool the reactor (e.g., the flooding of low elevations of the reactor building due to a leak in the pool or excessive condensation from continuous boiling of SFP water), leading to a reactor accident
>
> For each of these interplays, large seismic events and severe weather SBO [station blackout] events are logically the most relevant initiators, as they are the type of initiators that are most likely to initiate an accident at the reactor and SFP, while simultaneously hampering further accessibility to key areas, key systems and components, and key resources. To the extent practicable, this study has attempted to qualitatively account for some of these effects. For example, when the reactor and SFP are hydraulically connected (during refueling), the decay heat and water volumes from both sources are considered. The study also explores these effects on mitigation (Section 8), and addresses some aspects of the uncertainty associated with this treatment (Section 9). However, explicitly modeling multiunit effects was not a focus of this study, because of the existing limitations with the available computational tools. An ongoing project described in SECY-11-0089 will attempt to more rigorously address these effects in the framework of a multiunit Level 3 PRA for Vogtle Electric Generating Plant Units 1 and 2."

(VIII-15) The four "interplays" described in this statement are far from the final word about linkage of pool risk and reactor risk, but they would provide a useful starting point for technical analysis on that linkage. These interplays could occur in situations where pool storage of spent fuel, as considered in the draft GEIS, occurs at a location near an operational reactor. Thus, the draft GEIS should have carefully considered the implications of these interplays for the environmental impacts of storing spent fuel in pools. Unfortunately, the draft GEIS failed to consider those implications.

(VIII-16) The second half of the statement quoted in paragraph VIII-14 shows clearly that NRC's consequence study does not provide credible technical analysis of the pool-reactor interplays that it identifies. Instead, it says that another project "will attempt" to address these interplays at some future date. Until that work is done properly, NRC will not be able to complete an adequate GEIS on the environmental impacts of storing spent fuel.

(VIII-17) The 2011 Fukushima accident illustrated the potential for risk linkages among facilities at a nuclear site. Figure VIII-1 shows how that potential was manifested at Unit 4. The Unit 4 reactor building suffered a violent explosion of hydrogen that reportedly originated from reactor core damage at Unit 3.[78] That hydrogen explosion, and other influences at the site, hindered mitigating actions at Unit 4. Those actions were needed to keep the Unit 4 spent-fuel pool in a safe state, because normal systems that provide cooling and makeup to the pool were disabled by the earthquake and tsunami that

[78] The reactor core of Unit 4 had been removed and placed in the adjacent pool prior to the accident.

afflicted the site. Eventually, water makeup was provided to the pool by the concrete-pumping truck that appears in Figure VIII-1. That truck was brought to the site after several other methods of providing water makeup had failed.

(VIII-18) Figure VIII-2 illustrates how intimately a spent-fuel pool can be associated with the reactor it serves. Moreover – as discussed in paragraph VIII-6, above – at 17 sites in the United States, any fuel in a pool is intimately associated with two adjacent reactors. In other instances, the association between a pool and a different, nearby reactor may not be quite so intimate. Nevertheless, physical proximity, sharing of buildings, and/or sharing of support systems could establish a strong linkage of pool risk and reactor risk. One concern is that a release of radioactive material from a reactor could create a radiation field that precludes personnel access needed to keep a nearby spent-fuel pool in a safe state. Lack of that access could lead to a pool fire.

(VIII-19) One potential manifestation of risk linkage among facilities at a nuclear site would be the occurrence of a cascading sequence of incidents. To illustrate, consider the potential impact of a large aircraft on a reactor. That event could be an accident or a malevolent act. The successful use of a large aircraft as an instrument of attack is, of course, not theoretical. It occurred in the United States three times on 11 September 2001.

(VIII-20) Morris et al describe the use of the VISAC code to analyze the impact of a large aircraft on the containment of a reactor.[79] They note that the hard parts of the aircraft – notably, the jet engine rotors – might not fully penetrate the containment. They consider, however, the entry of a small fraction (apparently, 1 percent) of the aircraft's jet fuel into the annular space between the inner and outer walls of the containment. Perusal of Figure VIII-2 shows analogous spaces in that reactor design. Vaporization and ignition of the jet fuel in this confined space would, with high conditional probability, lead to a violent fuel-air explosion. Morris et al describe VISAC analyses that show, in all cases, significant damage to the containment from this explosion, with holes in both the inner and outer walls. They go on to say:[80]

> "While the damage is significant, subsequent events are most likely responsible for most of the radioactive release predicted. It is unlikely that the staff inside the control room adjacent to the containment building will survive the smoke and toxic fumes resulting from the fire, even if they managed to survive the direct consequences of the crash of the airplane. In view of the fire engulfing the containment building and adjacent structures, it seems unlikely that the separately located auxiliary control room could be reached by the staff members originally located in the main control room. Therefore, even if those in the control room should be unaffected by the air fuel explosion, the additional fire hazard outdoors will prohibit the surviving operators from shutting down the plant in a controlled

[79] Morris et al, 2006.
[80] Morris et al, 2006, page 206.

manner from the auxiliary control room."

(VIII-21) The potential events that Morris et al describe can be viewed as stages in a cascading sequence of incidents. First, the aircraft strikes the containment. Second, some jet fuel enters a confined space. Third, a fuel-air explosion breaches the containment and causes other damage. At some point during stages 1-3, or subsequently, the control room, the auxiliary control room, and their personnel are rendered non-functional. Fourth, radioactive material is released from the reactor to the interior of the containment, or directly to the external environment. Fifth, radioactive material passes from the interior of the containment to the external environment. Sixth, the cascade could proceed to one or more pool fires, as discussed in the following paragraph.

(VIII-22) The spent-fuel pool that serves the afflicted reactor, and the cooling and water makeup systems that serve that pool, could be damaged by the aircraft impact or by the fuel-air explosion. That damage could be sufficient to initiate a zircaloy fire in the pool. A nearby spent-fuel pool, built to serve another reactor, could suffer similar damage, resulting in a zircaloy fire in that pool. Deposition of radioactive material released from the afflicted reactor would create an intense radiation field around the reactor. The radiation field could extend in all directions, because the fire accompanying this disaster would create intense turbulence in the local atmosphere. The radiation field could preclude personnel access for days or weeks, thereby precluding mitigating actions that might prevent the initiation of zircaloy fires in the affected pools. In that situation, a nearby pool that was not affected directly by the aircraft impact could boil dry, leading to a fire in that pool.

(VIII-23) NRC has never, to my knowledge, published a credible technical analysis of a cascading sequence of incidents of this type. Nor, to my knowledge, has NRC ever publicly stated that it has performed such analysis in secret. Until such analysis is done, and done properly, NRC will not be able to complete an adequate GEIS on the environmental impacts of storing spent fuel.

**IX. Risk Implications of Nuclear-Power Scenarios**

(IX-1) Section 1.8.6 of the draft GEIS, titled Issues Eliminated from Review in this GEIS, contains the statement:[81]

> "The NRC is evaluating the continued storage of commercial spent fuel in this draft GEIS. Thus, certain topics are not addressed because they are not within the scope of this review. These topics include:
>
> • noncommercial spent fuel (e.g., defense waste)
> • commercial high level waste generated from reprocessing
> • greater-than-class-C LLW
> • advanced reactors (e.g., high-temperature and gas-cooled reactors)

[81] NRC, 2013b, pages 1-23 and 1-24.

- foreign spent fuel
- nonpower reactor spent fuel (e.g., test and research reactors)
- need for nuclear power
- reprocessing of commercial spent fuel"

(IX-2) By excluding from consideration the "need for nuclear power", the draft GEIS cripples its ability to assess the environmental impacts of storing spent fuel. Nowhere in the draft GEIS is this grave deficiency corrected. The draft GEIS does not set forth any scenario for the future use of nuclear power or, more specifically, for the future creation of spent fuel. Thus, in the draft GEIS, the timeframe for creation of spent fuel spans an unknown but potentially vast range, as does the quantity of spent fuel created in that timeframe.

(IX-3) At the lower end of its range, the timeframe for creation of spent fuel will end when the last of the currently licensed reactors ceases to operate. However, since the draft GEIS sets no upper limit on the time period that it considers, the creation of spent fuel could continue ad infinitum. Thus, the upper end of the range of timeframes is undefined.

(IX-4) At the lower end of its range, the quantity of spent fuel that is created will be the quantity that is discharged from the currently licensed reactors. However, since the draft GEIS says nothing about the future use of nuclear power, it sets no upper limit to the quantity of spent fuel that will be created. Consider a simple, illustrative example. Suppose that nuclear power soon revives in the United States, leading to a tenfold increase in annual creation of spent fuel by the mid-21st century. Further suppose that this rate of creation continues for a few centuries. At the end of that period, the cumulative quantity of spent fuel that has been created would far exceed the quantity that is discharged from the currently licensed reactors.

(IX-5) If the total quantity of spent fuel that is created were at the lower end of its range, the radiological risk posed by storing this fuel would be bounded. As the inventory of fuel aged, its radiological risk would decline, other factors being equal. Moreover, the inventory would gradually move from pools to ISFSIs, which would reduce its risk. In principle, one could assess the cumulative radiological risk of storing spent fuel, from the present until the moment when the last fuel assembly in the inventory is emplaced in a repository.

(IX-6) If, however, the total quantity of spent fuel that is created is unbounded, then the radiological risk posed by storing this fuel would be similarly unbounded.[82] The draft GEIS allows for this outcome. Thus, the draft GEIS has denied itself the ability to assess the long-term radiological risk of storing spent fuel. One cannot assess a quantity that is unbounded.

[82] This statement holds at any given time, and cumulatively.

(IX-7) In Sections VI and VII of the Thompson scoping declaration, I set forth a number of recommendations for the use of scenarios.[83] These recommendations could have helped the framers of the draft GEIS to avoid the self-crippling of the draft GEIS that I have described in the preceding paragraphs. The framers ignored my recommendations. Those recommendations would, in principle, have allowed the draft GEIS to bound the radiological risk of storing spent fuel. Moreover, those recommendations would have allowed the draft GEIS to compare the risk posed by different scenarios and different options for managing spent fuel.

**X. Pool Fire: Probability and Consequences**

(X-1) The draft GEIS concedes that a pool fire could occur. More precisely, it concedes that zircaloy combustion could occur in a spent-fuel pool following loss of water from the pool. Here, in Section X, I address five aspects of the draft GEIS's consideration of pool fires, with an emphasis on the probability and consequences of a pool fire. The draft GEIS's consideration of pool fires is deficient in regard to each aspect. As a result, the draft GEIS makes an incorrect determination of the environmental impact of pool fires. The five aspects are:

- Documents cited in the draft GEIS
- NRC's understanding of relevant phenomena
- Probability of a pool fire
- Consequences of a pool fire
- Determination of radiological risk and environmental impact

*Documents cited in the draft GEIS*

(X-2) The draft GEIS provides technical discussions of pool fires in its Sections 4.18 and 4.19 and Appendix F. To support those discussions, the draft GEIS cites a number of documents. However, some relevant documents are not cited. In paragraphs X-3 through X-6, below, I discuss three examples of documents whose omission from the citations in the draft GEIS is significant.

(X-3) In paragraph VI-2, above, I note that NRC explicitly considered the impacts of malevolent acts in its 1979 GEIS on Handling and Storage of Spent Light Water Power Reactor Fuel, which was designated NUREG-0575.[84] Potential malevolent acts were described in Appendix J of that document. NUREG-0575 is not cited in Sections 4.18 and 4.19 and Appendix F of the draft GEIS. That omission is significant because the malevolent acts postulated in Appendix J of NUREG-0575 could, with slight adjustment, readily initiate a pool fire. I discuss that matter below.

[83] Thompson, 2013b, Sections VI, VII, and X.
[84] NRC, 1979.

(X-4) In paragraph VIII-13, above, and elsewhere in this declaration, I discuss NRC's consequence study.[85] That study, published in draft form in June 2013 and final form in October 2013, is NRC's most recent technical analysis of pool fires. Yet, that study is not cited in Sections 4.18 and 4.19 and Appendix F of the draft GEIS, which was published in September 2013. That omission is significant from several perspectives. For example, as discussed in paragraphs VIII-14 through VIII-16, above, NRC's consequence study identified an important issue that has not been considered in the draft GEIS. That issue is the linkage of pool risk and reactor risk.

(X-5) The NRC staff incorporated the findings of NRC's consequence study into a staff recommendation regarding the expedited transfer of spent fuel from pools to dry storage. The staff recommended against expedited transfer in a November 2013 document that I refer to hereafter, following NRC practice, as the "Tier 3 analysis".[86] That document accompanies this declaration as Exhibit #36. The Tier 3 analysis describes its connection to the draft GEIS as follows:[87]

> "Within this Tier 3 analysis, the staff has considered the agency's activities on the waste confidence generic environmental impact statement (GEIS) and rulemaking, and it has ensured that the availability of these documents and interactions with stakeholders are coordinated to facilitate the public's involvement in these activities. Although this Tier 3 analysis was not specifically referenced in the draft GEIS, those who prepared the draft GEIS were aware of the conclusions in this Tier 3 analysis, and the staff has coordinated this activity with the relevant sections of the draft GEIS. To facilitate the public's ability to provide input, a draft of the October 2013 SFP study was released for public review and comment on July 1, 2013. Additionally, the draft evaluation of this Tier 3 issue was released to the public on September 26, 2013, well before the draft GEIS public comment period ends on December 20, 2013."

(X-6) Omission of the Tier 3 analysis from the citations in the draft GEIS is significant because the Tier 3 analysis sets forth an NRC staff position on the radiological risk of pool fires. The draft GEIS does not address that position. Yet, according to the statement quoted in the preceding paragraph, the preparers of the draft GEIS were aware of the conclusions in the Tier 3 analysis, and the two documents were "coordinated" in some manner. Thus, the Tier 3 analysis had a substantial but undocumented influence on the draft GEIS.[88] The lack of documentation of this influence handicaps those who seek to comment on the draft GEIS.

---

[85] Barto et al, 2013b.
[86] Satorius, 2013b.
[87] Satorius, 2013b, page 9.
[88] One illustration of a likely influence is the draft GEIS's assertion that air cooling of spent fuel would prevent a pool fire at a point much earlier following fuel offload from a reactor than was considered in the study NUREG-1738. (See: NRC, 2013b, Appendix F, page F-11.) The Tier 3 analysis and NRC's consequence study represent NRC's most recent analysis of pool-fire issues such as the role of air cooling, but are not cited in the draft GEIS.

*NRC's understanding of relevant phenomena*

(X-7) I now turn to addressing NRC's understanding of phenomena relevant to a pool fire. I show that NRC's understanding of these phenomena is deficient, and that the NRC staff seeks to close off further inquiry that could correct the deficiencies. The first phenomenon that I address is the connection between: (i) the presence of residual water in the lower part of a pool that has experienced water loss; and (ii) the initiation of zircaloy combustion. NRC failed to understand this connection for more than two decades, and that misunderstanding continues to influence NRC's current analysis on pool fires.

(X-8) As discussed in paragraph I-7, above, the pool serving each commercial reactor in the USA is now equipped with high-density, closed-frame racks. The nuclear industry began installing these racks in the 1970s, to replace the low-density, open-frame racks previously used. The high-density racks offered a comparatively cheap option for storing a growing nationwide inventory of spent fuel. Figure X-1 shows the configurations of the two types of rack.

(X-9) If water were lost from a pool equipped with high-density racks, the racks would inhibit heat transfer from the exposed fuel. Thus, spent fuel in the pool would increase in temperature, potentially leading to ignition and sustained combustion of zircaloy cladding in air or steam. To a technically trained observer, it should be obvious that ignition could be more likely if residual water were present in the pool, other factors being equal. Residual water would block the flow of air from below, thus reducing heat transfer from the exposed portion of the fuel. Figure X-2 illustrates this phenomenon. As a result, spent fuel with a comparatively high age after discharge from a reactor could burn if residual water were present. The initial phase of "burning" would, in this case, be a steam-zircaloy reaction.

(X-10) As discussed in paragraph VI-4, above, NUREG-0575 dismissed the potential for a pool fire, arguing that spent fuel aged more than one year would not burn if water were lost from a pool.[89] NUREG-0575 was published by NRC in 1979. NRC held a similar position in 1989, when it published the pool-fire study NUREG-1353.[90] That study accompanies this declaration as Exhibit #37. NUREG-1353 stated:[91]

> "A typical spent fuel storage pool with high density storage racks can hold roughly five times the fuel in the core. However, since reloads typically discharge one third of the core, much of the spent fuel stored in the pool will have had considerable decay time. This reduces the radioactive inventory somewhat. More importantly, **after roughly three years of storage, spent fuel can be air-**

[89] NRC, 1979, page 4-21.
[90] Throm, 1989.
[91] Throm, 1989, page 1-1 (emphasis added).

> **cooled**. The spent fuel need not be submerged to prevent melting, although submersion is still desirable for shielding and to reduce airborne activity."

(X-11) Thus, from 1979 to 1989, NRC failed to understand the significance of residual water for zircaloy ignition. NRC's belief that comparatively old fuel would not ignite derived from NRC's mistaken assumption that the worst case of water loss from a pool would be total, instantaneous drainage. This erroneous belief continued into 1999 and 2000, while NRC was preparing a pool-fire study that was eventually published, in February 2001, as NUREG-1738.[92] That study accompanies this declaration as Exhibit #38. Preliminary versions of NUREG-1738 were published by NRC in June 1999 and February 2000.

(X-12) In 1999 and 2000, I was a technical adviser and expert witness for Orange County, North Carolina, supporting the County's intervention in a license proceeding before NRC's Atomic Safety and Licensing Board. The proceeding addressed a proposed expansion of spent-fuel storage capacity at the Shearon Harris nuclear power plant. In a March 2000 filing in that proceeding, the NRC staff disputed my position that comparatively old fuel could ignite if water were lost from a pool. That filing accompanies this declaration as Exhibit #39. In its filing, the NRC staff stated:[93]

> "However, although Dr. Thompson states that for "scenarios which involve partial uncovery of fuel, the reaction could affect fuel aged 10 or more years," he offers no authority to support this conclusion. **Dr. Thompson's is the only opinion of which the Staff is aware that holds that fuel five years or more out of the reactor is susceptible to zircaloy fire/exothermic reaction**. *See, e.g.,* NUREG/CR-0649, Spent Fuel Heatup Following Loss of Water During Storage, at 85-87 (1979) (Exhibit B)."

(X-13) Later in 2000, NRC corrected its erroneous belief, held since 1979, that comparatively old fuel could not ignite in the event of water loss. The Thompson draft consequence declaration describes the circumstances in which NRC made this correction.[94] In brief, NRC made the correction because its representatives were required, for the first time in decades, to justify their technical position in a public setting in which they could be challenged. The correction was acknowledged in NUREG-1738, which stated:[95]

> "The analyses in Appendix 1A determined that the amount of time available (after complete fuel uncovery) before a zirconium fire depends on various factors, including decay heat rate, fuel burnup, fuel storage configuration, building ventilation rates and air flow paths, and fuel cladding oxidation rates. While the

---

[92] Collins and Hubbard, 2001.
[93] NRC, 2000, page 21 (emphasis added).
[94] Thompson, 2013a, paragraphs III-12 to III-13 and III-23 to III-24.
[95] Collins and Hubbard, 2001, pages 2-1 and 2-2 (emphasis added).

> February 2000 study indicated that for the cases analyzed a required decay time of 5 years would preclude a zirconium fire, **the revised analyses show that it is not feasible, without numerous constraints, to define a generic decay heat level (and therefore decay time) beyond which a zirconium fire is not physically possible**. Heat removal is very sensitive to these constraints, and two of these constraints, fuel assembly geometry and spent fuel pool rack configuration, are plant specific. Both are also subject to unpredictable changes as a result of the severe seismic, cask drop, and possibly other dynamic events which could rapidly drain the pool. Therefore, since the decay heat source remains nonnegligible for many years and since configurations that ensure sufficient air flow for cooling cannot be assured, a zirconium fire cannot be precluded, although the likelihood may be reduced by accident management measures."

(X-14) Paragraphs X-7 through X-13, above, yield a significant finding. They show that NRC failed to understand a comparatively simple technical issue for more than two decades. NRC's misunderstanding persisted for this long period because its staff were shielded from public challenge and did not engage in the open discourse that is essential to scientific inquiry. With some limited exceptions, that situation has continued until the present.

(X-15) Before publishing NUREG-1738 in February 2001, NRC had published several studies related to pool fires. These studies, like NUREG-1353, contained erroneous statements about the potential for ignition of comparatively old fuel. They also contained other substantial deficiencies.[96] For example, NUREG-1353 did not consider storage of BWR spent fuel in high-density racks, even though such storage has been common practice for many years.[97] Yet, NRC has neither retracted nor repudiated NUREG-1353, despite its clear obsolescence. Indeed, the draft GEIS cites NUREG-1353 as a major source of information on the probability and consequences of a pool fire.[98]

(X-16) The potential for a pool fire became clear in 1979. From the beginning, the means of addressing this threat was also clear. The radiological risk of a pool fire could be dramatically reduced by abandoning the use of high-density racks in pools, and reverting to low-density, open-frame racks.[99] Figure X-1 shows the two types of rack. Since 1979, numerous parties have intervened in license proceedings and pursued other avenues, seeking to persuade NRC to order the elimination of high-density racks. A corollary of that action would be the transfer of a substantial portion of the US inventory of spent fuel from pools to dry casks. NRC has consistently and vigorously opposed the elimination of high-density racks.

---

[96] Thompson, 2009, Section 5.
[97] Throm, 1989, pages 4-9 and 4-10.
[98] NRC, 2013b, Table F-1 (page F-4).
[99] In the case of BWR spent fuel, removal of channel boxes from the fuel could also be appropriate.

(X-17) Now, in its Tier 3 analysis, the NRC staff seeks to close off any further inquiry into the risk of a pool fire. The staff recommends:[100]

> "The staff's assessment concludes that the expedited transfer of spent fuel to dry cask storage would provide only a minor or limited safety benefit, and that its expected implementation costs would not be warranted. Therefore, the staff recommends that no further generic assessments be pursued related to possible regulatory actions to require the expedited transfer of spent fuel to dry cask storage and that this Tier 3 Japan lessons-learned activity be closed."

(X-18) The Tier 3 analysis relies heavily upon NRC's consequence study.[101] I provided a critical review of that study in the Thompson draft consequence declaration.[102] I concluded that NRC's consequence study is fundamentally and irredeemably flawed, and recommended:[103]

> "(VIII-7) NRC's Draft Consequence Study should be scrapped.
> (VIII-8) In addressing the pool-fire issue, NRC should focus its initial attention exclusively on establishing a solid technical understanding of phenomena directly related to a potential pool fire. To do this, NRC would start with a clean slate and use the best available modeling capability backed up by experiment. This modeling and experimental work would be done according to scientific principles. Further recommendations regarding such work are provided in Section IV, above."

(X-19) I recommend additional investigation of pool-fire phenomena because, more than three decades after the potential for a pool fire was recognized, NRC has not yet established a solid technical understanding of relevant phenomena. Thus, the NRC staff's recommendation to cease investigation of pool-fire issues is imprudent. Apparently, the NRC staff believes that acquisition of a solid understanding of pool-fire phenomena is unnecessary. The staff has not articulated a clear position on this matter. Such a position has, however, been articulated by Dr. Dana Powers, a member of NRC's Advisory Committee on Reactor Safeguards (ACRS), in a written commentary on the Thompson draft consequence declaration.[104] That commentary, with associated documents, accompanies this declaration as Exhibit #40. Dr. Powers' commentary includes the statement:[105]

> "Much of Section IV of Dr. Thompson's report is devoted to outlining an extensive study of accident phenomenology for spent fuel events. The intent seems to be to establish a very comprehensive understanding to a scientific

[100] Satorius, 2013b, page 10.
[101] Barto et al, 2013b.
[102] Thompson, 2013a.
[103] Thompson, 2013a, Section VIII.
[104] Armijo, 2013, Enclosure 3.
[105] Armijo, 2013, Enclosure 3, page 4 (emphasis added).

> certainty in this phenomenology. Dr. Thompson does not make it clear why this should be done if, in fact, it can be shown that partial drain events are easily remediated with high confidence and that complete drain events are highly improbable. Nor does he provide a ranking of the use of resources for the purposes of studying spent fuel pools in preference to other safety issues. On the basis of results presented to ACRS thus far, it would appear that a systems engineering evaluation would suggest **the best use of available resources would be to assure that mitigation of partial drain events was assured and that complete drain events were highly improbable. This would obviate the need for a detailed understanding of accident phenomenology**. Should a decision be made to conduct confirmatory research, examination of the Dr. Thompson's list of topics might be useful starting point in the identification of possible avenues of investigation."

(X-20) Dr. Powers' statement is instructive. He and I view the pool-fire problem from opposite perspectives. His confidence regarding the efficacy of mitigating measures, and the validity of probability estimates, is such that he sees no need for a thorough understanding of relevant phenomena. In my judgment, however, there is compelling evidence that: (i) mitigation of loss of water from a pool could not be assured in many potential situations; and (ii) complete or partial loss of water from a pool has a significant probability. Moreover, the consequences of a pool fire could be severe. Accordingly, given present knowledge of pool-fire phenomena, prudence dictates a high-priority action – the rapid elimination of high-density racks from all pools. A thorough investigation of pool-fire phenomena, conducted in parallel with that action, might yield knowledge that somewhat reduces the urgency and scope of the action, thus reducing its cost. I recommend such an investigation.

(X-21) Later in Section X, I discuss the compelling evidence mentioned in the preceding paragraph. Here, I close my discussion of pool-fire phenomena by briefly discussing the influence of two factors on zircaloy ignition and combustion. The two factors are: (i) accumulation of zirconium hydrides in the cladding of high-burnup fuel; and (ii) the ballooning and burst of fuel cladding at temperatures above the normal operating level.

(X-22) In April 2000, the Chairman of ACRS wrote a letter to the Chairman of NRC, discussing some pool-fire phenomena.[106] That letter accompanies this declaration as Exhibit #41. The letter discussed a number of phenomenological issues that had not been properly considered by NRC. I focus here on one of those issues. That issue is the influence of zirconium hydrides on the ignition of exposed spent fuel. As part of its discussion of that issue, the ACRS letter said:[107]

> "We also have difficulties with the analysis performed to determine the time at which the risk of zirconium fires becomes negligible. In previous interactions

[106] Powers, 2000.
[107] Powers, 2000, page 3 (emphasis added).

> with the staff on this study, we indicated that there were issues associated with the formation of zirconium-hydride precipitates in the cladding of fuel especially when that fuel has been taken to high burnups. Many metal hydrides are spontaneously combustible in air. Spontaneous combustion of zirconium-hydrides would render moot the issue of "ignition" temperature that is the focus of the staff analysis of air interactions with exposed cladding. **The staff has neglected the issue of hydrides** and suggested that uncertainties in the critical decay heat times and the critical temperatures can be found by sensitivity analyses. Sensitivity analyses with models lacking essential physics and chemistry would be of little use in determining the real uncertainties."

(X-23) Given the trend of driving nuclear fuel to ever-higher burnups, one could reasonably expect that NRC would seriously address the concern expressed by ACRS. The ACRS letter did stimulate the preparation of an NRC internal memorandum.[108] That memorandum, with its attached draft report, accompanies this declaration as Exhibit #42. The memorandum and its attached draft report discussed factors that could influence the ignition of zircaloy when exposed to air or steam. Those factors included the presence of hydrides. They also included the ballooning and burst of fuel cladding, a matter I return to below. The draft report attached to the memorandum contained the statement:[109]

> "It would be necessary to **conduct actual ignition tests on either spent fuel or pre-oxidized and hydrided cladding** to generate experimental data to understand these various effects and to determine unambiguously the potential for autoignition. For lack of such experimental data, the potential for autoignition after ballooning and burst cannot be ruled out at this time."

(X-24) Ignition tests on actual spent fuel would be problematic because the fuel's large inventory of radioactive material would have to be shielded and contained. NRC did sponsor ignition tests on pre-oxidized cladding, as described in the report NUREG/CR-6846, published in 2004.[110] That report accompanies this declaration as Exhibit #43. At the time of publication of NUREG/CR-6846, NRC had not sponsored tests on hydrided cladding. Those tests were promised at some future time, as follows:[111]

> "The effect of pre-existing hydrides, formed on the cladding surface during in-reactor operation and relevant, in particular, for high burnup operation, is being investigated under a follow-on program at the Argonne National Laboratory. This latter study will be reported separately."

(X-25) NRC's consequence study was published in 2013. In that study, the theoretical model used to represent zircaloy ignition and combustion is drawn directly from

---

[108] Eltawila, 2001.
[109] Eltawila, 2001, attached draft report by Chung and Basu, page 9 (emphasis added).
[110] Natesan and Soppet, 2004.
[111] Natesan and Soppet, 2004, Foreword (by Farouk Eltawila), page xvii.

NUREG/CR-6846. The model reflects the ignition tests on pre-oxidized cladding that are mentioned in the preceding paragraph. The study notes that this model shows accelerated combustion compared with previous models, and that this effect is confirmed by experiment.[112] Thus, the tests on pre-oxidized cladding that are described in NUREG/CR-6846 were a useful step toward simulating the ignition and combustion of actual spent fuel. Moreover, this step revealed that combustion would be more vigorous than previously expected. Yet, NRC's consequence study does not mention the effects of hydrides on cladding ignition and combustion, despite ACRS's highlighting of this issue in 2000 and NRC's promise in 2004 to sponsor appropriate tests. Thus, it seems that a key aspect of the ignition and combustion behavior of actual spent fuel, arising from the presence of hydrides, has been ignored by NRC. Moreover, accumulation of hydrides increases with burnup, and there is a trend of driving nuclear fuel to ever-higher burnups.

(X-26) As discussed in paragraph X-23, above, factors that could influence the ignition of zircaloy include the ballooning and burst of fuel cladding. It is well known that cladding can balloon (i.e., swell) and ultimately burst at temperatures substantially above the normal operating temperature. During the ballooning phase, the cross-sectional area for axial fluid flow through a fuel assembly could be reduced, thereby reducing heat transfer from the fuel. At the time of burst, unoxidized cladding would be exposed to air or steam, which could promote zircaloy ignition. The MELCOR code used in NRC's consequence study lacks a capability to model the ballooning and burst of fuel cladding.[113] MELCOR has been "benchmarked" against tests involving the ignition of electrically heated structures simulating fuel assemblies, as described in the report NUREG/CR-7143.[114] That report accompanies this declaration as Exhibit #44. Apparently, the tests did not involve ballooning and burst of cladding, perhaps because the simulated fuel rods were not sealed. Thus, neither MELCOR nor these tests provides any information about the implications of cladding ballooning and burst for zircaloy ignition. NRC's consequence study alludes to secret studies that address this matter, but provides no citation.[115]

(X-27) An April 2003 accident at the Paks-2 nuclear power plant in Hungary shows how overheated nuclear fuel will balloon and then burst. The accident and a subsequent simulation are described in a 2007 conference paper that accompanies this declaration as Exhibit #45.[116] The accident occurred while fuel was undergoing chemical cleaning inside a tank submerged in the plant's spent-fuel pool. Cooling water was supplied to the tank by a pump submerged in the pool. On this occasion, the water flow was inadequate, reportedly due to design defects and operating deficiencies. As a result, a steam bubble formed in the tank and fuel temperature began to rise. The zircaloy fuel cladding experienced extensive ballooning, followed by cladding burst and zirconium-steam

[112] Barto et al, 2013b, pages 93 and 94.
[113] Barto et al, 2013b, Table 3, page 26.
[114] Lindgren and Durbin, 2013.
[115] Barto et al, 2013b, Table 3 (page 26).
[116] Windberg and Hozer, 2007.

combustion. This accident did not lead to a substantial release of radioactive material to the atmosphere, because it occurred inside a closed tank submerged in a pool. Nevertheless, this accident provides real-world evidence of the significance of phenomena such as cladding ballooning and burst. Regrettably, NRC's consequence study has not accounted for all relevant phenomena.

(X-28) Paragraphs X-7 through X-27, above, address various aspects of phenomena relevant to a pool fire. The Thompson draft consequence declaration contains a further critique of NRC's consideration of such phenomena.[117] Taken together, those sources support the following findings:

- NRC failed to understand a comparatively simple technical issue for more than two decades, because its staff were shielded from public challenge and did not engage in the open discourse that is essential to scientific inquiry.
- With limited exceptions, NRC staff remain shielded from public challenge and scientific discourse.
- NRC's latest analysis of pool fires (i.e., NRC's consequence study) ignores a number of technical issues that are significant to a determination of pool-fire risk.
- The NRC staff proposes to close off further inquiry into pool-fire risk.
- Apparently, the NRC staff believes that the acquisition of a thorough understanding of pool-fire phenomena is unnecessary because the probability of unmitigated partial or total loss of water from a pool is, in their view, negligible.

(X-29) NRC's deficient understanding of pool-fire phenomena is significant for the draft GEIS's determination of the environmental impact of pool fires, because that determination relies heavily on the judgment of NRC staff, especially in the context of malevolent acts. In many instances that reliance is undocumented or poorly documented.

*Probability of a pool fire*

(X-30) I now turn to discussing the probability of a pool fire. In this discussion I generally use the term "frequency" instead of "probability", because in some situations this indicator could have a value exceeding 1. A pool fire could be caused by an accident or a malevolent act. In the context of accidents, I have always been concerned about potential situations in which a radioactive release occurs at a reactor near to a pool. Given such a situation, the radiation field created by the reactor release, and other influences, could preclude mitigating actions needed to keep the pool in a safe state. In the context of malevolent acts, an analogous situation could arise. Additionally, a malevolent actor could preclude pool-related mitigating actions in ways that did not rely on obtaining a radioactive release from a nearby reactor.

(X-31) The draft GEIS relies upon the findings of PRA-type studies for its estimation of the frequency of accident-induced pool fires. Drawing upon such studies, the draft GEIS asserts that the frequency of a pool fire, caused by an accident, is in the range $5.8 \times 10^{-7}$ to

[117] Thompson, 2013a.

$2.4x10^{-6}$ per year.[118] Although not explicitly stated as such, this assertion refers to a frequency per pool-year. A pool-year is analogous to the concept of a reactor-year, which is introduced in paragraph V-5, above. Note that a frequency of $2.4x10^{-6}$ per pool-year, which is low, would become a much higher value if accumulated across many pools over many years. I address that matter below.

(X-32) The discussion in Section V, above, regarding the limitations of PRA, suggests that the actual frequency of a pool fire may be substantially higher than is asserted in the draft GEIS. Here, I focus on an issue that reinforces that suggestion. That issue is the linkage of pool risk and reactor risk. As discussed in Section VIII, above, NRC has never done a credible analysis of this linkage. Moreover, there is persuasive evidence, including the Fukushima accident, that a reactor accident could be part of a cascading sequence of incidents that preclude mitigating actions needed to maintain nearby pools in a safe state. Finally, as discussed in Section VIII, pool storage of spent fuel, as considered in the draft GEIS, will probably occur at locations near operational reactors.

(X-33) As discussed in paragraph V-21, above, direct experience of reactor accidents suggests that the frequency of accident-induced severe core damage may be in the vicinity of $3.2x10^{-4}$ per reactor-year. Let us now consider the conditional probability of a pool fire, given severe core damage at a nearby reactor. Experience suggests that this conditional probability is less than 1, because there have been 5 core melts and 0 pool fires at commercial facilities. Given the present state of knowledge, selecting a value of 0.1 for this conditional probability is prudent. Thus, a reasonable estimate for the frequency of an accident-induced pool fire, associated with an accident at a nearby reactor, is $0.1x3.2x10^{-4} = 3.2x10^{-5}$ per pool-year.[119] That value is 13 times higher than the pool-fire frequency (i.e., $2.4x10^{-6}$ per pool-year) at the upper end of the range asserted by the draft GEIS, and 55 times higher than the frequency (i.e., $5.8x10^{-7}$ per pool-year) at the lower end of the range.

(X-34) The discussion in the three preceding paragraphs can be structured in terms of the equation that is set forth in paragraph V-31, above. In that context, "PRA finding" is the pool-fire frequency asserted by the draft GEIS. The present state of knowledge suggests that "Reality factor #1" has a value of about one order of magnitude (i.e., factor of 10) at the upper end of the draft GEIS's frequency range. That value reflects the fact that the PRA-type analyses cited in the draft GEIS did not account for linkage of pool risk and reactor risk.

(X-35) As discussed in paragraph VI-11, above, the draft GEIS asserts that the probability of an attack-induced pool fire is "very low". In Section VI, however, I present evidence to the contrary. In my judgment, a prudent decision maker would

---

[118] NRC, 2013b, Appendix F, Table F-1 (page F-4). Also see: Collins and Hubbard, 2001, Table 3.1 (page 3-9).
[119] Here, I make the simplifying assumption that each reactor has a risk linkage with one nearby pool other than its own pool, and vice versa.

conclude from this evidence that a successful attack on a reactor or spent-fuel-storage facility in the United States over the coming decades is as likely to occur as are major national challenges that are planned for, such as severe natural disasters or engagement in wars.

(X-36) Here, I expand slightly upon the discussion in Section VI, while being careful to not disclose information that would assist a potential attacker. First, consider a potential situation in which a malevolent actor creates a cascading sequence of incidents that includes a radioactive release from a reactor. Given such a situation, the radiation field created by the reactor release, and other influences, could preclude mitigating actions needed to keep nearby pools in a safe state.

(X-37) In paragraphs VIII-19 through VIII-22, above, I draw from analysis by Morris et al to discuss a potential situation in which a large aircraft strikes a reactor. That event could be a malevolent act. I show that the aircraft impact could be part of a cascading sequence of incidents that includes a pool fire. Since the attacks of 11 September 2001 in New York and Washington, acquisition of a large aircraft by a malevolent actor has become more difficult. Also, precise aiming of a large aircraft at low altitude is difficult. However, a malevolent actor has other options. That actor might, for example, employ a comparatively small aircraft equipped with explosive devices.

(X-38) Now, consider a situation in which a malevolent actor has direct access to a pool. NUREG-0575 postulated such a situation, as discussed in paragraphs VI-2 through VI-6, above. The malevolent acts postulated in NUREG-0575 are summarized in Table VI-1. In the Mode 4 case, adversaries are assumed to temporarily take command of a spent-fuel pool while deploying an explosive device that could breach the floor of the pool. In that situation, as a slight adjustment of the Mode 4 case, the adversaries could use the explosive device to breach a wall of the pool, causing rapid drainage of water. The adversaries could ensure that some residual water is present. The exposed portion of the fuel would begin to heat up. Without prompt implementation of mitigating actions, a pool fire could follow. The adversaries could, in various ways, hinder or preclude mitigating actions.

(X-39) NRC proffers two, mutually inconsistent narratives about the threat of an attack on a spent-fuel pool. In one narrative, the pools are safe and secure, and no further action is needed to reduce the risk of a pool fire. In the other narrative, information about the potential for a pool fire must remain secret, because that information could be useful to an adversary.[120] Both narratives cannot be true. Apparently, NRC recognizes that the pools are vulnerable to attack, but believes that hiding that vulnerability under a veil of secrecy will eliminate the potential for attack. That belief is imprudent. Non-State

[120] NRC's consequence study mentions "security assessments" that were completed in 2006-2008, and further states that the results of these studies are not publicly available because they contain "sensitive information that could be useful to an adversary". (See: Barto et al, 2013b, page 14.)

adversaries of the United States have repeatedly demonstrated a level of technical knowledge such that they could readily understand the mechanisms underlying a pool fire, without recourse to NRC's secret studies. Thus, NRC's secrecy does not provide protection. Instead, it denies US citizens a full accounting of the risk of a pool fire.

*Consequences of a pool fire*

(X-40) I now turn to discussing the consequences of a pool fire. The draft GEIS provides two types of quantitative estimate of the consequences of a pool fire. One type is the value of an outcome per event (i.e., per pool fire). The second type is the frequency-weighted value of the outcome, which is calculated by multiplying the value per event by the supposed frequency of the event. The supposed frequency is expressed on a per-pool-year basis. The draft GEIS takes the position that the frequency-weighted value is the appropriate indicator of an environmental impact. I reject that position, as discussed below. Here, I discuss consequences on a per-event basis.

(X-41) The draft GEIS sets forth the following estimates of quantitative outcomes of a pool fire, on a per-event basis, in its Table F-1:[121]

- Collective radiation dose ranging from 47,000 person-Sv to 260,000 person-Sv across the population living within 50 miles, with no accounting of collective dose at greater distances.
- Latent fatalities (i.e., deaths occurring months or years after the event) ranging from 20,000 to 27,000, across the population residing at distances up to 500 miles.
- Onsite and offsite economic damage ranging from $56 billion to $58 billion (in 2010 dollars).

(X-42) NRC's consequence study, which is not cited in the draft GEIS, provides some quantitative estimates of pool-fire consequences.[122] These estimates do not appear in the draft GEIS. I discuss these estimates because they help to show that the draft GEIS substantially under-estimates the potential consequences of a pool fire. These estimates are specific to a potential fire at the Peach Bottom site in Pennsylvania. The particular estimates shown below are for an atmospheric release containing 330 PBq (i.e., 8.8 MCi) of the radioactive isotope Cs-137. That is a minor fraction of the inventory available for release. There are two operational reactors at the Peach Bottom site. Each reactor has its own spent-fuel pool, and each pool now contains about 2,180 PBq (i.e., 59 MCi) of Cs-137.[123] The quantity (i.e., mass) of fuel in each pool is equivalent to 5 reactor cores. For

[121] NRC, 2013b, Table F-1 (page F-4).
[122] The pool fire considered in NRC's consequence study would begin in recently-discharged fuel. In this declaration, I consider older spent fuel that falls under the ambit of the draft GEIS. However, the consequences that I discuss would be determined primarily by the magnitude of release of comparatively long-lived radio-isotopes, principally Cs-137. Thus, the consequences predicted by NRC's consequence study are applicable to the situation that I consider.
[123] Satorius, 2013b, Enclosure 1, Table 72 (page 133).

a postulated release of 330 PBq of Cs-137, NRC's consequence study predicts the following average outcomes of a pool fire, on a per-event basis:[124]

- Collective radiation dose of 350,000 person-Sv across a population living within an unspecified distance.
- Land area interdicted (i.e., rendered unfit for habitation) of 24,300 square km (i.e., 9,400 square miles).[125]
- Long-term displacement of 4.1 million people.[126]

(X-43) The numbers shown in paragraphs X-41 and X-42 begin to show the scale of the national disaster that could arise from a pool fire. Long-term displacement of 4.1 million people, which is an average case and not a worst case, would be a disaster of historic magnitude.[127] As discussed in paragraph IV-16, above, this event would cause substantial political stress and other adverse consequences. The social, political, and economic consequences would be diverse and difficult to predict, but would undoubtedly be severe. Moreover, the estimates described in paragraph X-42 assume a release of only 7% of the inventory of Cs-137 in the two pools at the Peach Bottom site. A larger release could occur.

(X-44) The estimate of economic damage that is set forth in the draft GEIS, and is shown in paragraph X-41, above, is much lower than other, more credible, estimates. Here, I discuss two estimates of this kind. One estimate is set forth in a 2004 journal article by Beyea et al.[128] That article accompanies this declaration as Exhibit #46. The second estimate is set forth in a 2007 report by the French government agency IRSN.[129] That report accompanies this declaration as Exhibit #47. A related paper by IRSN analysts is discussed in paragraphs IV-11 through IV-13, above.

(X-45) Beyea et al considered two potential, atmospheric releases. One release would consist of 130 PBq (i.e., 3.5 MCi) of Cs-137, and the other release would consist of 1,300 PBq (i.e., 35 MCi) of Cs-137. These releases represent two possible outcomes of a pool fire. The larger release would represent 60% of the Cs-137 inventory now in each of the two pools at the Peach Bottom site. Beyea et al estimated offsite economic damage for the two releases, at each of five nuclear-power-plant sites. For the 130 PBq release, the estimated offsite economic damage, averaged across the five sites, was $91 billion. For

---

[124] Barto et al, 2013b, Table 33 (page 162).
[125] The relationship between the estimated average area of interdicted land and distance is as follows: 1,200 square miles within a 50-mile distance; 3,100 square miles within a 100-mile distance; and 9,400 square miles within a 500-mile distance. (See: Barto et al, 2013b, Table 35.)
[126] The relationship between the estimated average number of displaced people and distance is as follows: 780,000 people within a 50-mile distance; 2.0 million people within a 100-mile distance; and 4.1 million people within a 500-mile distance. (See: Barto et al, 2013b, Table 36.)
[127] For a given atmospheric release, the estimated number of displaced people varies with wind direction, atmospheric stability, precipitation, and other factors. NRC's consequence study presents an average case.
[128] Beyea et al, 2004.
[129] IRSN, 2007.

the 1,300 PBq release, the estimated offsite economic damage, averaged across the five sites, was $385 billion.[130] Both values are substantially higher than the economic-damage estimate of $56 billion to $58 billion, covering both onsite and offsite damage, that is set forth in the draft GEIS. Yet, Beyea et al did not consider a full range of contributors to offsite economic damage. Nor did they consider onsite economic damage.

(X-46) A more comprehensive set of contributors to economic damage was considered by IRSN. Their findings are set forth in Table X-1, drawing from IRSN's 2007 report. That report was secret when first prepared, but was leaked to the press in early 2013 and, soon thereafter, was published by IRSN. The report considered an atmospheric release from a reactor at the Dampierre site in France. Economic damage was attributed primarily to the presence of 100 PBq of Cs-137 in the release. Thus, IRSN's findings are applicable to a pool fire. This pool fire would not be a worst-case event. A release of 100 PBq of Cs-137 would represent only 5% of the Cs-137 inventory now in each of the two pools at the Peach Bottom site.

(X-47) The cost (i.e., economic damage) estimates shown in Table X-1 are in Euro. Here, I use a currency conversion of US$1.40 per Euro. With that conversion, Table X-1 shows that IRSN's base-case estimate of economic damage from a release of 100 PBq of Cs-137 in France is $1,060 billion (760 billion Euro). The low-case estimate is $410 billion (290 billion Euro), and the high-case estimate is $8,060 billion (5,760 billion Euro). For comparison, the GDP of the United States in 2012 was $15,700 billion.[131]

(X-48) A cost study of the type done by IRSN would yield different results if done for a US nuclear site. There is no reason to expect, however, that the estimated economic damage would be substantially lower in the US case. The damage could be higher. Thus, IRSN's 2007 analysis provides, until a better estimate becomes available, a reasonable default estimate of economic damage from a pool fire in the United States that would release 100 PBq (2.7 MCi) of Cs-137. I am not aware of any other analysis that considers all of the cost contributors that are considered in the IRSN analysis. The draft GEIS's estimation of economic damage, as shown in paragraph X-41, is derived from analysis that is substantially inferior to the IRSN analysis.

(X-49) The economic damage estimated by IRSN would be only part of the consequences of a pool fire. The accompanying social and political consequences would be diverse and difficult to predict, but would undoubtedly be severe. Thus, a pool fire could be a national disaster of historic dimensions. That is why IRSN analysts, whose work is described in paragraphs IV-11 through IV-13, above, said in their 2012 paper that a massive release of radioactive material would be "an unmanageable European catastrophe".[132] In their 2012 paper, these analysts did not disclose the magnitude of a

---

[130] Beyea et al, 2004, Table 3 (page 131).
[131] World Bank website, "GDP (current US$)", accessed on 13 December 2013 at: http://data.worldbank.org/indicator/NY.GDP.MKTP.CD
[132] Pascucci-Cahen and Patrick, 2012.

"massive" release. I assume that this release would contain no more than 100 PBq of Cs-137, the amount considered in IRSN's 2007 report. That report was secret when the IRSN analysts presented their 2012 paper.

(X-50) Japan's experience with fallout from the 2011 Fukushima accident is instructive. The pattern of radioactive fallout across Japan is complex, as shown in Figure V-4. That fallout contained about 6 PBq of Cs-137, as shown in Table V-1. This amount of Cs-137 is comparatively small in the context of a potential release from a pool fire. Yet, the impacts of the Fukushima fallout on Japan are diverse and significant. For example, it is reported that 160,000 people were displaced from land contaminated by the Fukushima accident, and about one-third of this population remains in temporary housing. There is considerable uncertainty about the number of people who may be able to return to their homes.[133] Also, all of Japan's nuclear power plants remain shut down, due to public concern about their operation.

*Determination of radiological risk and environmental impact*

(X-51) I now turn to the final subject I address in Section X, namely the determination of radiological risk and environmental impact. As discussed in Section IV, above, NRC employs what I describe as an "arithmetic" definition of risk. That definition is fundamentally flawed for the reasons I set forth in Section IV.

(X-52) The flawed nature of the arithmetic definition of risk is clearly evident in the draft GEIS, NRC's consequence study, and the NRC staff's Tier 3 analysis. Each of those documents uses frequency-weighted consequences, as discussed in paragraph X-40, above, as a measure of environmental impact. In that manner, disastrous consequences of a potential pool fire, such as the long-term displacement of 4.1 million people, are made to appear small by multiplying the consequences by a supposedly low frequency.

(X-53) Also, NRC focuses on each facility in isolation. That focus is evident in NRC's discussion of frequency in terms of occurrence per reactor-year or per pool-year. For some, limited, technical purposes, this single-facility focus is appropriate. It is, however, inappropriate when considering the risk experienced by a citizen. The United States currently has 100 operational, commercial reactors, roughly the same number of spent-fuel pools, and various other nuclear facilities.[134] A citizen is exposed to the radiological risk associated with a number of facilities. This point is illustrated by NRC's finding, as discussed in paragraph X-42, above, that a pool fire at the Peach Bottom site could lead to the long-term displacement of 4.1 million people. About 800,000 of those people would have resided within 50 miles of the site, while about 1.2 million would have resided between 50 and 100 miles from the site, and about 2.1 million would have resided

[133] Knight and Slodkowski, 2013.
[134] An operational reactor is a reactor that is normally in operation except when shut down for refueling, maintenance, or repair.

between 100 and 500 miles from the site.[135] Clearly, this event would have long-range consequences, extending far beyond the vicinity of the afflicted site. A citizen at a given location could be vulnerable to impacts of this nature originating at any of a number of sites.[136]

(X-54) Moreover, if such an event occurred, citizens would experience significant consequences even if they did not suffer from substantial, immediate injury such as displacement from their homes. The economic, social, and political consequences of this event would be felt by everyone residing in the United States, and by many people outside its borders. This pool fire would be a national disaster with international implications.

(X-55) Thus, in considering the probability of a pool fire, an appropriate indicator would be the frequency of the event occurring anywhere in the United States during a specified time period. Given the existence of operational reactors in Canada and Mexico, the geographic perimeter might logically be extended to North America. For the purposes of this declaration, however, I set that option aside because it would be legally and politically difficult to implement.

(X-56) What would be the appropriate time period for a determination of frequency? Given that a pool fire could be a national disaster of historic dimensions, a reasonable time period would be a century. If that time period were employed in the context of the United States as a geographic unit, then the frequency of a pool fire would be expressed in terms of the number of occurrences per century, where the occurrence could be at any location within the United States. This concept of frequency would be compatible with the particular characteristics of pool-fire risk. Hereafter, I refer to this concept as "cumulative frequency". Note, as discussed previously, that this indicator could have a value greater than 1.

(X-57) There are now 100 operational reactors in the United States. As discussed in Section IX, above, the draft GEIS allows for the continuation of this situation indefinitely. Thus, for the purpose of illustrating pool-fire risk, it is reasonable to consider a scenario in which 100 reactors are operational throughout a period of 100 years. In this scenario, each reactor has a risk linkage with one nearby pool other than its own pool, and vice versa. Each of these nearby pools is assumed to fall under the ambit of the draft GEIS because the reactor that it served is no longer licensed for operation. I assume that each nearby pool is equipped with high-density racks, and that the risk posed by each reactor-pool linkage is uniform across the fleet and constant over time. This "status quo" scenario is entirely compatible with the draft GEIS.

---

[135] Barto et al, 2013b, Table 36 (page 169).

[136] The flexRISK project in Austria developed a computer-model capability to assess the radiological risk, at any location in Europe, that arises from operation of all nuclear facilities across Europe. That capability could be applied to the United States. An overview of the flexRISK project was accessed on 14 December 2013 from: http://flexrisk.boku.ac.at/en/index.html

(X-58) For this illustrative scenario, the cumulative frequency of a pool fire can be determined by simple extrapolation of current estimates of pool-fire frequency, which are expressed on a per-pool-year basis. Consider first the frequency estimate of $2.4 \times 10^{-6}$ per pool-year that is set forth in the draft GEIS in the context of an accident-induced pool fire, as discussed in paragraph X-31, above. In that case, the cumulative frequency would be $100 \times 100 \times 2.4 \times 10^{-6} = 0.024$ events per century. Now, consider the revised frequency estimate of $3.2 \times 10^{-5}$ per pool-year that is set forth in paragraph X-33. This revised estimate accounts for linkage of pool risk and reactor risk, still in the context of an accident-induced pool fire. In this case, the cumulative frequency would be $100 \times 100 \times 3.2 \times 10^{-5} = 0.32$ events per century.

(X-59) At this point in Section X, I am ready to evaluate the draft GEIS's assessment of the environmental impact of pool fires. I provide this evaluation in paragraph X-60, addressing accident-induced pool fires, and in paragraph X-61, addressing attack-induced pool fires. In both cases, I find that the draft GEIS's assessment of environmental impact is incorrect. Paragraphs X-60 and X-61 provide my evaluation and its underlying rationale.

(X-60) The draft GEIS asserts that the environmental impact of accident-induced pool fires is SMALL.[137] However, as shown above, the draft GEIS indicates that the cumulative frequency of such fires could be 0.024 events per century. Also, NRC's consequence study shows that the consequences of a pool fire could be severe, with outcomes such as the long-term displacement of 4.1 million people. IRSN's analysis shows that outcomes could include economic damage measured in trillions of dollars. Therefore, the environmental impact of accident-induced pool fires is not SMALL. Instead, it is LARGE. This finding does not account for linkage of pool risk and reactor risk. If that linkage is accounted for, as is appropriate, the cumulative frequency of accident-induced pool fires could be 0.32 events per century. In that case, it is even more evident that the environmental impact of accident-induced pool fires is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of accident-induced pool fires. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition.

(X-61) The draft GEIS further asserts that the environmental impact of attack-induced pool fires is SMALL.[138] However, from the discussions in Section VI and paragraphs X-35 through X-39, above, it is clear that the cumulative frequency of attack-induced pool fires could be substantial. Also, NRC's consequence study shows that the consequences of a pool fire could be severe, with outcomes such as the long-term displacement of 4.1 million people. IRSN's analysis shows that outcomes could include economic damage measured in trillions of dollars. Therefore, the environmental impact of attack-induced

[137] NRC, 2013b, Table 4-2 (page 4-91).
[138] NRC, 2013b, Table 4-2 (page 4-91).

pool fires is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of attack-induced pool fires. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition. Moreover, application of the arithmetic definition is additionally flawed in this instance because the indicators that are multiplied together are nebulous.

**XI. Cask Fire: Probability and Consequences**

(XI-1) The draft GEIS assumes that spent fuel will be stored initially in pools and subsequently in dry casks. A group of dry casks will constitute an ISFSI. During cask storage there is a potential for a "cask fire". That event could occur if a malevolent actor gains access to a dry cask containing spent fuel and attacks the cask in a manner that produces a self-propagating reaction between air and zircaloy fuel cladding, leading to a substantial atmospheric release of radio-isotopes including Cs-137. An accident could conceivably cause a cask fire at a storage facility, but I do not consider that possibility here. The draft GEIS does not consider the occurrence of a cask fire caused by either accident or attack.

(XI-2) In the Thompson scoping declaration, I outlined the potential for an attack-induced cask fire.[139] I first discussed a potential precursor to a cask fire – a reasonably foreseeable attack that would penetrate a cask, damage fuel inside the cask, and cause a release of radioactive material to the atmosphere. The feasibility of such an attack has been demonstrated in tests whose findings have been openly published. In my judgment, an attacker could, with a few additional steps, readily initiate a cask fire. NRC has not conceded that an attacker could take these additional steps and initiate a cask fire.

(XI-3) The difference between my position and that of NRC could be resolved by commissioning an independent "Red Team" of persons who have relevant experience in practice and research. That team could conduct tests at a national laboratory or military base, to determine how readily a cask fire could be initiated. The tests could involve the use of tracer materials, thereby contributing to estimation of the radioactive release that could result from a cask fire. The general findings of the tests should be published, but some details of the tests may not be appropriate for publication. Until such tests are done, NRC will not be able to complete an adequate GEIS on the environmental impacts of storing spent fuel.

(XI-4) The probability and impacts of an attack-induced cask fire are interrelated. Also, the relationship between probability and impacts is influenced by the extent to which casks are protected from attack. Moreover, the difference between the risk of attack-induced pool fires and the risk of attack-induced cask fires is a significant issue in the context of national security. The concept of protective deterrence provides a useful perspective on that difference. These matters are discussed below.

[139] Thompson, 2013b, paragraphs VII-15 through VII-16 and VIII-14 through VIII-18.

(XI-5) The effort needed to successfully attack an ISFSI and produce a cask fire could be roughly the same as the effort needed to successfully attack a spent-fuel pool and produce a pool fire. Let us examine the implications of that finding during a future period when pools and ISFSIs coexist. As discussed in paragraph VI-10 and elsewhere in this declaration, there is persuasive evidence that an attack-induced pool fire is as likely to occur as are major national challenges that are planned for, such as severe natural disasters or engagement in wars. An identical statement could be made about a cask fire, if two provisos were satisfied. The first proviso is that attackers would be able to achieve roughly the same outcomes by attacking a pool or an ISFSI. If that proviso were not satisfied, and the attack on the ISFSI would achieve a lower outcome, the attackers would have a reduced incentive to attack the ISFSI. The second proviso is that the casks sit on concrete pads in the open air without additional protection, which is current practice. If that proviso were not satisfied, and additional protection was provided, the attackers would have to expend greater effort to achieve the same outcome, which would reduce their incentive to attack.

(XI-6) These provisos show how probability and impacts are interrelated. If the expected outcome of an attack on an ISFSI would be smaller than the outcome of an attack on a pool, other factors being equal, then a malevolent actor would be less likely to attack the ISFSI. The probability of the attack would decrease even further if the casks in the ISFSI were provided with additional protection against attack. Thus, either decreasing the expected outcome of an attack, or increasing the effort required to achieve a given outcome, would decrease the probability of attack. In the context of national security, that effect is encompassed within the concept of protective deterrence. Implementation of that concept could benefit the nation. Accordingly, the Thompson scoping declaration made the following recommendation:[140]

> "**Recommendation #22:** In assessing the overall impacts of storing SNF or HLW, the proposed EIS [i.e., the draft GEIS] should consider the implications of alternative storage options for a national strategy of protective deterrence."

(XI-7) Table XI-1 shows how the United States could benefit from policies that ensured that critical infrastructure is designed to be robust and inherently safer. The benefits could include, for example, a reduction in the federal government's perceived need to conduct surveillance of the domestic population. That matter is a subject of current debate. Designing critical infrastructure to be robust and inherently safer would be part of a national strategy of protective deterrence.

(XI-8) Nuclear facilities – including reactors, pools, and ISFSIs using dry casks – are components of critical infrastructure. In the context of storing spent fuel, a dry cask is more robust and inherently safer than is a pool equipped with high-density racks. A dry cask in an ISFSI with enhanced protection would be even more robust and inherently

[140] Thompson, 2013b, Section IX and Section X.

safer. Thus, the aspects of radiological risk that I discuss in this declaration are significant for national security, and could be productively addressed within the context of protective deterrence. The draft GEIS is oblivious to this matter, and does not respond to my recommendation as quoted in paragraph XI-6, above. More generally, NRC appears oblivious to its potential ability to benefit the nation by implementing principles of protective deterrence.

(XI-9) The first step in assessing potential consequences of an attack-induced cask fire is to determine the inventory of radioactive material that is in the cask and available for release. Here, I focus on the radio-isotope Cs-137. I consider, as an illustrative example, a cask holding 32 PWR fuel assemblies. With reasonable assumptions, one can readily calculate that the cask contains 67 PBq (i.e., 1.8 MCi) of Cs-137.[141]

(XI-10) A successful attack on an ISFSI, in which attackers expended an effort roughly the same as the effort needed to successfully attack a spent-fuel pool and cause a pool fire, could cause a cask fire in one or perhaps two casks. For illustration, let us assume that two casks would experience a fire and the fractional release of Cs-137 to the atmosphere would be 50%. In that case, the total atmospheric release from two typical casks holding 32 PWR fuel assemblies per cask would contain 67 PBq of Cs-137. That would be a substantial release, with a magnitude between the Fukushima release (36 PBq) and the Chernobyl release (85 PBq), as shown in Table V-1.

(XI-11) Section X, above, discusses the consequences of atmospheric releases of various amounts of Cs-137. For example, as discussed in paragraph X-42, release of 330 PBq of Cs-137 could lead to severe consequences including long-term displacement of 4.1 million people. Also, as discussed in paragraphs X-46 through X-48, release of 100 PBq of Cs-137 could create economic damage of about $1 trillion in the "base" case and $8 trillion in the "high" case. In addition, there would be severe consequences of a social and political nature.

(XI-12) Thus, it is clear that a release of 67 PBq of Cs-137 during a cask-fire incident could lead to severe consequences. Yet, a pool fire could lead to a much larger release, with correspondingly greater consequences. For example, as noted in paragraph X-42, each of the two pools at the Peach Bottom site now contains about 2,180 PBq of Cs-137. The fractional release of Cs-137 during a pool fire could be substantial, potentially exceeding 50%. At Peach Bottom, where two pools are in close proximity, an attack on one pool could ultimately lead to fires in both pools. Thus, a pool-fire release exceeding 2,000 PBq of Cs-137 is entirely credible.

---

[141] Assumptions in the calculation are: (i) there are 32 PWR spent fuel assemblies in the cask; (ii) each fuel assembly has a mass of 0.45 Mg HM; (iii) the fuel has a burnup of 50 GWt-days per Mg HM; (iv) the fuel is aged 10 years after discharge from a reactor; and (v) 1 GWt-day of fission energy yields $1.17 \times 10^{14}$ Bq of Cs-137.

(XI-13) The effort needed to successfully attack an ISFSI and produce an atmospheric release of 67 PBq of Cs-137 could be roughly the same as the effort needed to successfully attack a spent-fuel pool and produce a pool fire. However, the pool-fire release could be much larger than 67 PBq of Cs-137. As discussed above, at Peach Bottom a pool-fire release could exceed 2,000 PBq of Cs-137. Informed attackers would be aware of this discrepancy in potential outcomes. Accordingly, they would tend to target a pool rather than an ISFSI, other factors being equal. If the ISFSI were provided with enhanced protection, the comparative attractiveness of the ISFSI as a target would be even lower. Section XII, below, discusses some options for providing ISFSIs with enhanced protection.

(XI-14) At present, pools and ISFSIs coexist in the United States. Thus, given the comparative attractiveness of pools and ISFSIs as targets, a successful attack on a pool is currently more likely than a successful attack on an ISFSI. However, the draft GEIS contemplates a future in which there would be ISFSIs and no pools. That situation could continue into the indefinite future. Diminution of radioactive decay heat in spent fuel over time would be irrelevant to the creation of a cask fire. The risk environment could become more adverse over time. For example, security measures at ISFSIs could degrade over time. Also, an increased propensity for violent conflict could find expression through attacks on ISFSIs. Thus, the frequency of successful attacks on ISFSIs could be much greater in the future than it is today.

(XI-15) The findings set forth in Section XI, up to this point, support three conclusions about the environmental impact of attacks on ISFSIs. Here, I use the creation of one or more cask fires as an indicator of the success of an attack on an ISFSI.

(XI-16) The first conclusion is as follows. As discussed in paragraph VI-11, above, the draft GEIS asserts that the environmental impact of attacks on ISFSIs is SMALL. However, the cumulative frequency of successful attacks on ISFSIs could be substantial. Also, the consequences of a successful attack could be severe. Therefore, the environmental impact of attacks on ISFSIs is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of attacks on ISFSIs. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition. Moreover, application of the arithmetic definition is additionally flawed in this instance because the indicators that are multiplied together are nebulous.

(XI-17) The second conclusion is as follows. While pools and ISFSIs coexist, as is true today, the cumulative frequency of successful attacks on pools is likely to exceed the cumulative frequency of successful attacks on ISFSIs. However, the draft GEIS contemplates a future in which there would be ISFSIs and no pools. In that case, the cumulative frequency of successful attacks on ISFSIs could be comparable to the currently-applicable cumulative frequency of successful attacks on pools, if there were no change in the risk environment. Whether or not pools coexist with ISFSIs in the future,

the risk environment could become more adverse, leading to an increase in the cumulative frequency of successful attacks on ISFSIs.

(XI-18) The third conclusion is as follows. The cumulative frequency of successful attacks on ISFSIs, now and in the future, could be decreased by providing ISFSIs with enhanced protection against attack.

**XII. Risk-Reducing Options**

(XII-1) There are numerous options for reducing the radiological risk arising from management of spent fuel and other radioactive waste produced by the nuclear fuel cycle. The draft GEIS does not discuss any options of this type. Here, I provide a brief discussion of a few options. This discussion does not purport to be comprehensive.

(XII-2) Table XII-1 outlines some options for reducing the risk of a pool fire at a nuclear power plant. This table was prepared in the context of a spent-fuel pool that serves an operational reactor. A similar table could be prepared for a pool that no longer serves an operational reactor.

(XII-3) The most effective option in Table XII-1 is to re-equip the pool with low-density, open-frame racks. In the case of BWR fuel, a corollary action could be the removal of channel boxes from the fuel. When nuclear power plants in the present US fleet first entered service, their spent-fuel pools were equipped with low-density, open-frame racks. The margin of safety provided by this configuration was lost when the nuclear industry adopted high-density racks as a way to minimize short-term costs.

(XII-4) Over a period of decades, pursuit of short-term cost minimization has increased the radiological risk of nuclear power production in various respects. This pursuit influenced the design of the nuclear power plants that participated in the Fukushima accident of 2011. Other manifestations of this pursuit include reactor power uprates, use of higher-burnup fuel, shorter refueling periods, and use of high-density racks in spent-fuel pools.

(XII-5) Section XI, above, discusses some of the implications of providing enhanced protection of ISFSIs. In the United States, a typical ISFSI consists of dry casks sitting on a concrete pad in the open air. Other countries provide greater protection.

(XII-6) Sweden has taken an interesting approach to ISFSI design. The Swedes have built the Clab facility, in which spent-fuel pools are located in underground caverns excavated in rock. The Clab facility has been described in a brochure published by SKB, the company that manages Sweden's radioactive waste.[142] That brochure accompanies this declaration as Exhibit #48. One sees from the brochure that the ceiling of each cavern is 32 m below the surface. The intervening rock is granite.

[142] SKB, 2006.

(XII-7) The Clab facility will probably not be replicated in the United States. It represents a comparatively expensive approach to managing spent fuel. Also, although Clab is not designed as a repository, there might be political pressure to employ such a facility as a repository if repeated efforts to build a repository were to fail. For that reason, I recommend that interim storage of spent fuel be done at the surface, to reduce the likelihood that an interim storage facility could become a repository by default.

(XII-8) The German approach to ISFSI design is to store spent fuel in dry casks that are, with one exception, located within buildings at the surface.[143] The design of these buildings is described in a conference paper by Thomauske.[144] That paper accompanies this declaration as Exhibit #49. Two basic designs are used. One design is by STEAG, and the other by WTI. Cross-sectional drawings in Thomauske's paper suggest that the STEAG design would be more robust against attack. That observation is confirmed by analyses showing that the STEAG design would be more robust against impact by a large aircraft.

(XII-9) Holtec is a US-based vendor of dry casks used for storing spent fuel at ISFSIs. The Holtec design approach is modular. Fuel is sealed inside a multi-purpose canister (MPC) that is designed to be placed inside overpacks of various types. Holtec has developed an overpack, known as the HI-STORM 100U, that would be more robust against attack than present overpacks. A standard MPC would be placed, in a vertical-axis position, inside the 100U overpack. The 100U overpack would be sunk below ground except for its lid. Holtec has described the robustness of the 100U system as follows:[145]

> "Release of radioactivity from the HI-STORM 100U by any mechanical means (crashing aircraft, missile, etc.) is virtually impossible. The only access path into the cavity for a missile is vertically downward, which is guarded by an arched, concrete-fortified steel lid weighing in excess of 10 tons. The lid design, at present configured to easily thwart a crashing aircraft, can be further buttressed to withstand more severe battlefield weapons, if required in the future for homeland security considerations. The lid is engineered to be conveniently replaceable by a later model, if the potency of threat is deemed to escalate to levels that are considered non-credible today."

(XII-10) Paragraphs XII-6 through XII-9 show that options are available for providing enhanced protection of ISFSIs. Use of such options at ISFSIs across the United States would support a national strategy of protective deterrence.

---

[143] The exception is the Neckarwestheim ISFSI, which consists of two concrete-lined tunnels in the wall of a quarry.
[144] Thomauske, 2003.
[145] Holtec, 2007. A current description of the 100U system was accessed on 15 December 2013 from: http://www.holtecinternational.com/productsandservices/wasteandfuelmanagement/hi-storm/

**XIII. Conclusions**

(XIII-1) I provide conclusions in two categories. The first category is "reference conclusions". These are set forth at some length, linked consecutively to the portions of this declaration from which they were derived. The second category is "summary conclusions". These are expressed concisely, and are arranged to support a coherent argument.

(XIII-2) The reference conclusions, and the body of this declaration, represent my definitive findings. The summary conclusions may be less exact.

(XIII-3) My reference conclusions are set forth below. The heading for each conclusion shows the portion of this declaration from which the conclusion was principally derived. These conclusions are:

<u>Reference Conclusion #1 (derived from Section IV)</u>

The draft GEIS defines radiological risk as the numerical product of the probability and the consequences of an event, and further argues that a high-consequence, low-probability event, such as a severe accident, could be determined to have a small environmental impact if the risk is sufficiently low. In the context of the draft GEIS, that definition of radiological risk, and the associated determination of environmental impact, are fundamentally flawed from at least four overlapping perspectives:

- First, numerical estimates of consequences and probability are typically incomplete and highly uncertain.
- Second, significant aspects of consequences and probability are not susceptible to numerical estimation.
- Third, larger consequences can be qualitatively different than smaller consequences.
- Fourth, devotees of this definition of risk typically argue, as does the draft GEIS, that equal levels of "risk", as they define it, should be equally acceptable to citizens. That argument may be given a scientific gloss, but is actually a statement laden with subjective values and interests. An informed citizen could reject the argument on reasonable grounds.

<u>Reference Conclusion #2 (derived from Section V)</u>

The draft GEIS relies on PRA-type studies for its estimation of radiological risk. Studies of this type can provide useful information about radiological risk, for certain purposes. However, these studies cannot provide a credible estimate of the probability of a radiological event such as a pool fire. The relationship between a PRA finding and reality can be represented as follows:

Actual probability of event = (PRA finding)x(Reality factor #1) + (Reality factor #2)

Where the variables in this equation are as follows:

- "Actual probability of event" refers to the real-world numerical probability of an outcome such as: fuel damage; release of a specified amount of radioactive material; contamination of a specified area of land above a specified dose threshold; or accrual of a specified collective dose to people offsite.
- "PRA finding" refers to a PRA estimate of the probability of the outcome in question – this could be a mean, median, or other representation of a probability distribution.
- "Reality factor #1" is a number, typically greater than 1, that represents influences that are within the paradigm of PRA but are not properly accounted for in contemporary PRAs – these influences include: complexity; inadequate data; and deficiencies in institutional culture and practice.
- "Reality factor #2" is a number that represents influences outside the paradigm of PRA – these influences include: gross errors in design, construction, or operation; and malevolent acts.

And the following observations apply:

- Experience suggests that Reality factor #1 for severe accidents may have a value that exceeds 1 by several orders of magnitude (i.e., factors of 10).
- Reality factor #2 has two numerical components: (i) a retrospective component that can be determined empirically based on the occurrence of events; and (ii) a prospective component that will remain unknown for the foreseeable future.
- Both Reality factors may vary significantly in response to variations in the future risk environment.
- This version of the equation is applicable when the values of "PRA finding" and "Actual probability of event" are both less than 1. At higher values, the term "probability" would be replaced by the term "frequency".

<u>Reference Conclusion #3 (derived from Section VI)</u>

In light of human history, observation of the contemporary world, and consideration of possible societal trends, a prudent decision maker would conclude that a successful attack on a reactor or spent-fuel-storage facility in the United States over the coming decades is as likely to occur as are major national challenges that are planned for, such as severe natural disasters or engagement in wars.

<u>Reference Conclusion #4 (derived from Section VII)</u>

The draft GEIS sets forth a highly optimistic view of the future conditions that will affect stored spent fuel. It assumes that institutional controls will remain operative into the indefinite future, arguing that this assumption "avoids unreasonable speculation regarding

what might happen in the future". This assumption, like other optimistic assumptions in the draft GEIS, is neither reasonable nor prudent. Moreover, assuming static conditions is speculative in the extreme, and shows a profound ignorance of human history. Given the long timeframes envisioned in the draft GEIS, the only reasonable approach is to consider a broad range of scenarios. Those scenarios would encompass substantial changes in the risk environment over time. The changes could be non-uniform across the United States.

Reference Conclusion #5 (derived from Section VIII)

Pool storage of spent fuel, as considered in the draft GEIS, could occur, and probably will occur, at locations near operational reactors. Accordingly, the draft GEIS should have carefully considered the potential linkage of radiological risk among pools and operational reactors at each site. The draft GEIS has not considered this matter.

Reference Conclusion #6 (derived from Section VIII)

Risk linkages among spent-fuel pools and operational reactors at a site could be manifested in a cascading sequence of incidents that preclude mitigating actions needed to maintain pools in a safe state. Mitigating actions could be precluded by, for example, a radiation field arising from the release of radioactive material. NRC has never, to my knowledge, published a credible technical analysis of a cascading sequence of incidents of this type, or publicly stated that it has performed such analysis in secret. Until such analysis is done properly, NRC will not be able to complete an adequate GEIS on the environmental impacts of storing spent fuel.

Reference Conclusion #7 (derived from Section IX)

The draft GEIS does not set forth any scenario for the future use of nuclear power or, more specifically, for the future creation of spent fuel. Thus, in the draft GEIS, the timeframe for creation of spent fuel spans an unknown but potentially vast range, as does the quantity of spent fuel created in that timeframe. Accordingly, the radiological risk posed by storing spent fuel is unbounded. In this manner, the draft GEIS has denied itself the ability to assess the long-term radiological risk of storing spent fuel. One cannot assess a quantity that is unbounded. This grave deficiency could have been avoided by judicious use of scenarios. A scenario-based approach could, in principle, have allowed the draft GEIS to bound the radiological risk of storing spent fuel. Moreover, such an approach could have allowed the draft GEIS to compare the risk posed by different scenarios and different options for managing spent fuel.

Reference Conclusion #8 (derived from Section X)

The draft GEIS fails to cite a number of documents that are relevant to its findings about the risk of pool fires. Moreover, some recently published documents in this category had a substantial but undocumented influence on the draft GEIS. The lack of documentation

of this influence handicaps those who seek to comment on the draft GEIS. Documents not cited in the draft GEIS that are particularly significant include:

- Appendix J of NUREG-0575.[146]
- NRC's consequence study. [147]
- The NRC staff's Tier 3 analysis.[148]

Reference Conclusion #9 (derived from Section X)

The draft GEIS reflects NRC's present understanding of phenomena relevant to a pool fire. That understanding is deficient from the following perspectives:

- NRC failed to understand a comparatively simple technical issue for more than two decades, because its staff were shielded from public challenge and did not engage in the open discourse that is essential to scientific inquiry.
- With limited exceptions, NRC staff remain shielded from public challenge and scientific discourse.
- NRC's latest analysis of pool fires (i.e., NRC's consequence study) ignores a number of technical issues that are significant to a determination of pool-fire risk.
- The NRC staff proposes to close off further inquiry into pool-fire risk.
- Apparently, the NRC staff believes that the acquisition of a thorough understanding of pool-fire phenomena is unnecessary because the probability of unmitigated partial or total loss of water from a pool is negligible.

Reference Conclusion #10 (derived from Section X)

The draft GEIS significantly under-estimates the probability of an accident-induced pool fire, in part because it does not consider the linkage of pool risk and reactor risk. The present state of knowledge suggests that the under-estimate is by at least one order of magnitude (i.e., factor of 10).

Reference Conclusion #11 (derived from Section X)

The draft GEIS significantly under-estimates the probability of an attack-induced pool fire. That probability cannot be determined quantitatively. My qualitative assessment is provided in Conclusion #3, above.

Reference Conclusion #12 (derived from Section X)

The draft GEIS substantially under-estimates the consequences of a pool fire. Those consequences could include the long-term displacement of millions of people, economic damage measured in trillions of dollars, and adverse social and political outcomes. A pool fire yielding these consequences would be a national disaster of historic dimensions.

---

[146] NRC, 1979.
[147] Barto et al, 2013b.
[148] Satorius, 2013b.

Reference Conclusion #13 (derived from Section X)

The draft GEIS considers the risk of a pool fire in terms of the probability of its occurrence at a particular pool within a 1-year timeframe. That approach to risk assessment does not account for the potential magnitude and scope of the consequences of a pool fire. Instead, the radiological risk of a pool fire should be considered in terms of the cumulative frequency of its occurrence, over a period of a century, at any location within the United States.

Reference Conclusion #14 (derived from Section X)

The draft GEIS asserts that the environmental impact of accident-induced pool fires is SMALL. However, the cumulative frequency of such fires is substantial, and the consequences of a pool fire could be severe. Therefore, the environmental impact of accident-induced pool fires is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of accident-induced pool fires. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition.

Reference Conclusion #15 (derived from Section X)

The draft GEIS asserts that the environmental impact of attack-induced pool fires is SMALL. However, the cumulative frequency of such fires is substantial, and the consequences of a pool fire could be severe. Therefore, the environmental impact of accident-induced pool fires is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of attack-induced pool fires. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition. Moreover, application of the arithmetic definition is additionally flawed in this instance because the indicators that are multiplied together are nebulous.

Reference Conclusion #16 (derived from Section XI)

The draft GEIS asserts that the environmental impact of attacks on ISFSIs is SMALL. However, the cumulative frequency of successful attacks on ISFSIs could be substantial. Also, the consequences of a successful attack could be severe. Therefore, the environmental impact of attacks on ISFSIs is not SMALL. Instead, it is LARGE. Thus, the draft GEIS substantially under-estimates the environmental impact of attacks on ISFSIs. Also, the draft GEIS ignores the possibility that the risk environment will become more adverse in the future. In addition, the draft GEIS uses a flawed definition of risk – the arithmetic definition. Moreover, application of the arithmetic definition is additionally flawed in this instance because the indicators that are multiplied together are nebulous.

Reference Conclusion #17 (derived from Section XI)

While pools and ISFSIs coexist, as is true today, the cumulative frequency of successful attacks on pools is likely to exceed the cumulative frequency of successful attacks on ISFSIs. However, the draft GEIS contemplates a future in which there would be ISFSIs and no pools. In that case, the cumulative frequency of successful attacks on ISFSIs could be comparable to the currently-applicable cumulative frequency of successful attacks on pools, if there were no change in the risk environment. Whether or not pools coexist with ISFSIs in the future, the risk environment could become more adverse, leading to an increase in the cumulative frequency of successful attacks on ISFSIs.

Reference Conclusion #18 (derived from Section XI)

The cumulative frequency of successful attacks on ISFSIs, now and in the future, could be decreased by providing ISFSIs with enhanced protection against attack.

Reference Conclusion #19 (derived from Section XII)

The draft GEIS does not consider options for reducing the radiological risk arising from management of spent fuel. However, numerous options of this kind are available. For example, options are available for providing enhanced protection of ISFSIs. Use of such options at ISFSIs across the United States would support a national strategy of protective deterrence.

(XIII-4) My summary conclusions are set forth below. They are:

Summary Conclusions

1. The draft GEIS asserts that the environmental impact of accident-induced or attack-induced pool fires is SMALL in both cases. That assertion is incorrect. The environmental impact is LARGE in both cases.
2. The draft GEIS asserts that the environmental impact of attacks on ISFSIs is SMALL. That assertion is incorrect. The environmental impact is LARGE.
3. The draft GEIS's assertions regarding the environmental impacts of pool fires and attacks on ISFSIs are incorrect because the draft GEIS: (i) employs an inappropriate definition of radiological risk; (ii) inappropriately assesses radiological risk on a single-facility basis over a one-year period; and (iii) under-estimates the probability and consequences of radiological incidents at pools and ISFSIs.
4. An appropriate definition of radiological risk would: (i) account for qualitative factors affecting probability and consequences; (ii) recognize qualitative differences between small and large consequences; and (iii) repudiate the idea that large consequences are tolerable if their supposed probability is low.

5. An appropriate assessment of radiological risk at pools and ISFSIs would examine cumulative risk across all US facilities over a period of a century, and would account for potential changes in the risk environment.
6. The draft GEIS under-estimates the probability and consequences of radiological incidents at pools and ISFSIs because: (i) NRC has not conducted the comprehensive empirical and analytic inquiry needed to thoroughly understand probability and consequences in this context; (ii) NRC staff are shielded from public challenge and scientific discourse; and (iii) NRC inappropriately assumes that the risk environment will remain static.
7. The NRC staff proposes to close off further inquiry into the probability and consequences of radiological incidents at pools.
8. NRC has ignored my recommendation to conduct further inquiry into the probability and consequences of cask fires.
9. Options are available to reduce the probability and consequences of radiological incidents at pools and ISFSIs, with collateral benefits to the nation via enhancement of protective deterrence, but these options are ignored in the draft GEIS.

**********

I declare, under penalty of perjury, that the facts set forth in the foregoing narrative, and in the four appendices below, are true and correct to the best of my knowledge and belief, and that the opinions expressed therein are based on my best professional judgment.

Executed on 19 December 2013.

G. R. Thompson

Gordon R. Thompson

**APPENDIX A: Tables and Figures**

*List of Tables*

Table IV-1: Some Categories of Risk Posed by a Commercial Nuclear Facility: Author's Definitions

Table V-1: Amounts of Cesium-137 Related to the Chernobyl and Fukushima #1 Accidents

Table V-2: Estimated Human Dose Commitment from the Chernobyl Release of Radioactive Material to Atmosphere in 1986

Table V-3: Insurance Premiums Paid by Ontario Power Generation (OPG) for Nuclear Liability and Terrorism Coverage of the Darlington Station, 2005-2012

Table V-4: Accident-Probability Implications of Insurance Premiums Paid by OPG for Coverage Associated with Operation of the Darlington Station

Table VI-1: Potential Sabotage Events at a Spent-Fuel Storage Pool, as Postulated in NRC's August 1979 GEIS on Handling and Storage of Spent LWR Fuel

Table VI-2: Potential Types of Attack on a Reactor or Spent-Fuel Storage Facility, Leading to Atmospheric Release of Radioactive Material

Table VI-3: Some Potential Modes and Instruments of Attack on a Nuclear Power Plant

Table VI-4: The Shaped Charge as a Potential Instrument of Attack

Table VI-5: Performance of US Army Shaped Charges, M3 and M2A3

Table X-1: IRSN Estimates of Costs Arising from a "Massive" Atmospheric Release of Radioactive Material from a French 900 MWe PWR

Table XI-1: Selected Approaches to Protecting Critical Infrastructure in the USA From Attack by Non-State Actors, and Some Strengths and Weaknesses of these Approaches

Table XII-1: Selected Options to Reduce the Risk of a Pool Fire at a PWR or BWR Plant

*List of Figures*

Figure V-1: Core Damage Frequency for Accidents at a Surry PWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150

Figure V-2: Core Damage Frequency for Accidents at a Peach Bottom BWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150

Figure V-3: Conditional Probability of Containment Failure Following a Core-Damage Accident at a Surry PWR or Peach Bottom BWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150

Figure V-4: Contamination of Land in Japan by Radioactive Cesium Released to Atmosphere During the Fukushima #1 Accident of 2011

Figure V-5: Probability Distribution of Monetized Losses from Nuclear-Facility Incidents: Sornette et al's Comparison of Empirical Data with PRA Estimates

Figure VI-1: Schematic View of a Generic Shaped-Charge Warhead

Figure VI-2: MISTEL System for Aircraft Delivery of a Shaped Charge, World War II

Figure VI-3: January 2008 Test of a Raytheon Shaped Charge, Intended as the Penetration (Precursor) Stage of a Tandem Warhead System

Figure VI-4: Aftermath of a Small-Aircraft Suicide Attack on an Office Building in Austin, Texas, February 2010

Figure VIII-1: Unit 4 at the Fukushima #1 Site During the 2011 Accident

Figure VIII-2: Schematic View of a BWR Reactor with a Mark I Containment, as Used at the Fukushima #1 Site and Elsewhere

Figure X-1: PWR Spent Fuel Storage Racks: Low-Density and High-Density Designs

Figure X-2: An Argonne Analyst's Illustration of the Effect of Residual Water on Heat Transfer from Spent Fuel in a Partially Drained Pool Equipped with High-Density Racks

**Table IV-1**
**Some Categories of Risk Posed by a Commercial Nuclear Facility: Author's Definitions**

| Category | Definition | Mechanisms |
|---|---|---|
| Radiological risk | Potential for harm to humans as a result of unplanned exposure to ionizing radiation | Exposure arising from:<br>• Release of radioactive material via air or water pathways, or<br>• Line-of-sight exposure to unshielded radioactive material or a criticality event |
| Proliferation risk | Potential for diversion of fissile material or radioactive material to weapons use | Diversion by:<br>• Non-State actors who defeat safeguards procedures and devices, or<br>• The host State |
| Program risk | Potential for facility function to diverge substantially from original design objectives | Functional divergence due to:<br>• Failure of facility to enter service or operate as specified, or<br>• Policy or regulatory shift that alters design objectives or facility operation, or<br>• Changed economic and societal conditions, or<br>• Conventional accident or attack affecting the facility |

**Notes:**
(a) In this declaration, the general term "risk" is defined as the potential for an unplanned, undesired outcome. There are various categories of risk, including the three categories in this table.
(b) In the case of radiological risk, the events leading to unplanned exposure to radiation could be accidents or attacks.
(c) The term "proliferation risk" is often used to refer to the potential for diversion of fissile material, for use in nuclear weapons. Here, the term also covers the potential for diversion of radioactive material, for use in radiological weapons.

**Table V-1**
**Amounts of Cesium-137 Related to the Chernobyl and Fukushima #1 Accidents**

| Category | Amount of Cesium-137 (PBq) |
|---|---|
| Chernobyl release to atmosphere (1986) | 85 |
| Fukushima #1 release to atmosphere (2011) | 36 |
| Deposition on Japan due to the Fukushima #1 atmospheric release | 6.4 |
| Pre-release inventory in reactor cores of Fukushima #1, Units 1-3 (total for 3 cores) | 940 |
| Pre-release inventory in spent-fuel pools of Fukushima #1, Units 1-4 (total for 4 pools) | 2,200 |

**Notes**:
(a) This table shows estimated amounts of Cesium-137 from: Stohl et al, 2011. The estimates for release from Fukushima #1 and deposition on Japan may change as new information becomes available.
(b) Stohl et al, 2011, provide the following data and estimates for Fukushima #1, Units 1-4, just prior to the March 2011 accident:

| Indicator | Unit 1 | Unit 2 | Unit 3 | Unit 4 |
|---|---|---|---|---|
| Number of fuel assemblies in reactor core | 400 | 548 | 548 | 0 |
| Number of fuel assemblies in reactor spent-fuel pool | 392 | 615 | 566 | 1,535 |
| Cesium-137 inventory in reactor core (Bq) | 2.40E+17 | 3.49E+17 | 3.49E+17 | 0 |
| Cesium-137 inventory in reactor pool (Bq) | 2.21E+17 | 4.49E+17 | 3.96E+17 | 1.11E+18 |

(The core capacity of Unit 4 was 548 assemblies. The core of Unit 3 contained some MOX fuel assemblies at the time of the accident.)
(c) Assuming a total Cesium-137 release to atmosphere of 36 PBq, originating entirely from the reactor cores of Units 1, 2, and 3, which contained 940 PBq, the overall release fraction to atmosphere for Cesium-137 was 36/940 = 0.038 = 3.8 percent.

**Table V-2**
**Estimated Human Dose Commitment from the Chernobyl Release of Radioactive Material to Atmosphere in 1986**

| Region | 50-Year Collective Dose Commitment (person-Gy) | 50-Year Average Individual Dose Commitment (mGy) |
|---|---|---|
| USSR (European) | 4.7E+05 | 6.1E+00 |
| USSR (Asian) | 1.1E+05 | Not available |
| Europe (non-USSR) | 5.8E+05 | 1.2E+00 |
| Asia (non-USSR) | 2.7E+04 | 1.4E-02 |
| USA | 1.1E+03 | 4.6E-03 |
| **Northern Hemisphere Total** | 1.2E+06 | Not available |

**Notes:**
(a) These estimated doses are whole-body doses, from: DOE, 1987, Table 5.16, "preferred estimate".
(b) Most of the dose is attributable to Cesium-137 (see: DOE, 1987, page x).
(c) Estimates for non-USSR countries show that, on average, about 50% of the collective dose is attributable to external exposure, and about 50% is attributable to ingestion (see: DOE, 1987, Table 5.14). Uncertainty in these estimates is greater for ingestion than for external exposure.
(d) In this instance, 1 Gy is equivalent to 1 Sv.

**Table V-3**
**Insurance Premiums Paid by Ontario Power Generation (OPG) for Nuclear Liability and Terrorism Coverage of the Darlington Station, 2005-2012**

| Period | Premium for Period ($) |
|---|---|
| 2012 | 753,680 |
| 2011 | 749,654 |
| 2010 | 734,585 |
| 2009 | 728,262 |
| 2008 | 715,920 |
| 2007 | 708,934 |
| 2006 | 717,413 |
| 2005 | 714,373 |
| Total, 2005-2012 | 5,822,821 |
| Average Year, 2005-2012 | 727,853 |

**Notes:**
(a) Premium data were obtained from copies of annual invoices from Marsh Canada Limited to OPG. These copies were provided by OPG to Shawn-Patrick Stensil of Greenpeace Canada in February 2013, pursuant to a request by Stensil under the Freedom of Information and Protection of Privacy Act.
(b) Marsh Canada received the premium payments on behalf of the Nuclear Insurance Association of Canada (NIAC) and other insurance pools, which may have included British Nuclear Insurers and American Nuclear Insurers.
(c) In addition to paying the amounts shown to Marsh Canada, OPG also paid an 8% sales tax on each amount to the province of Ontario.
(d) The components of the total premium (i.e., nuclear liability, and terrorism) are available, for the years shown, only for 2005. In that year, the terrorism premium was $88,086 (12.3% of the total premium) and the nuclear liability premium was $626,287 (87.7% of the total premium).
(e) Prior to 2005, a combined premium payment was made for the Darlington and Pickering stations and, in earlier years, for the Bruce station as well.

**Table V-4**
**Accident-Probability Implications of Insurance Premiums Paid by OPG for Coverage Associated with Operation of the Darlington Station**

| Liability Limit: Coverage A, Accidents | Net Premium to Cover Stated Liability (per RY) | Implied Probability of Event (per RY) |
|---|---|---|
| $75 million | $127,000 | 1.69E-03 |
| $650 million | $508,000 to $762,000 | 7.82E-04 to 1.17E-03 |
| $1,000 million | $635,000 to $1,016,000 | 6.35E-04 to 1.02E-03 |

**Notes:**
(a) Table V-3 shows gross, pre-tax insurance premiums paid by OPG for nuclear liability and terrorism coverage of the 4-unit Darlington station, over the period 2005-2012. The annual average gross premium for the station during that period was $727,853. In 2005, the terrorism premium accounted for 12.3% of the gross premium. Here, it is assumed that 30% of the gross premium is allocated to: (i) terrorism premium; (ii) administration; (iii) contingency; (iv) reinsurance premium paid to the Canadian government; and (v) profit. Thus, 70% of the gross premium is assumed here to be the net premium that supports offsite Coverage A (i.e., legal liability for bodily injury or property damage) through the private insurers in the NIAC pool, for an accident not involving a malevolent act. Throughout the period 2005-2012 and currently, the limit on that liability is $75 million. Thus, the net premium per RY for a $75 million maximum liability = $727,853 x 0.7 x 0.25 = $127,000 per RY.
(b) Dermot Murphy of NIAC has said that increasing the liability limit from $75 million to $650 million would require a premium increase by a factor of approximately 4 to 6, while a limit of $1,000 million would require a premium increase by a factor of approximately 5 to 8. (See: Murphy, 2009.) These factors are applied in the second column of the table.
(c) The "implied probability of event", in the third column, is calculated by dividing the amount in the second column by the amount in the first column, for each row. This implied probability represents NIAC's assessment of the probability of a claim up to the liability limit.
(d) As indicated in note (a), above, the "implied probability of event" that is calculated here applies to an accident in which offsite damage (i.e., bodily injury or property damage) arises from a release of radioactive material at Darlington. The calculation shown here does not apply to a release caused by a malevolent act.

**Table VI-1**
**Potential Sabotage Events at a Spent-Fuel Storage Pool, as Postulated in NRC's August 1979 GEIS on Handling and Storage of Spent LWR Fuel**

| Event Designator | General Description of Event | Additional Details |
|---|---|---|
| Mode 1 | • Between 1 and 1,000 fuel assemblies undergo extensive damage by high-explosive charges detonated under water<br>• Adversaries commandeer the central control room and hold it for approx. 0.5 hr to prevent the ventilation fans from being turned off | • One adversary can carry 3 charges, each of which can damage 4 fuel assemblies<br>• Damage to 1,000 assemblies (i.e., by 83 adversaries) is a "worst-case bounding estimate" |
| Mode 2 | • Identical to Mode 1 except that, in addition, an adversary enters the ventilation building and removes or ruptures the HEPA filters | |
| Mode 3 | • Identical to Mode 1 within the pool building except that, in addition, adversaries breach two opposite walls of the building by explosives or other means | • Adversaries enter the central control room or ventilation building and turn off or disable the ventilation fans |
| Mode 4 | • Identical to Mode 1 except that, in addition, adversaries use an additional explosive charge or other means to breach the pool liner and 1.5 m-thick concrete floor of the pool | |

**Notes:**
(a) Information in this table is from Appendix J of: NRC, 1979.
(b) The postulated fuel damage ruptures the cladding of each rod in an affected fuel assembly, releasing "contained gases" (gap activity) to the pool water, whereupon the released gases bubble to the water surface and enter the air volume above that surface.

**Table VI-2**
**Potential Types of Attack on a Reactor or Spent-Fuel Storage Facility, Leading to Atmospheric Release of Radioactive Material**

| Type of Event | Facility Behavior | Some Relevant Instruments and Modes of Attack | Characteristics of Atmospheric Release |
|---|---|---|---|
| Type 1: Vaporization or Pulverization | • All or part of facility is vaporized or pulverized | • Facility is within the fireball of a nuclear-weapon explosion | • Radioactive material in facility is lofted into the atmosphere and amplifies fallout from nuc. explosion |
| Type 2: Rupture and Dispersal (Large) | • Facility structures are broken open<br>• Fuel is dislodged from facility and broken apart<br>• Some ignition of zircaloy fuel cladding may occur, typically without sustained combustion | • Aerial bombing<br>• Artillery, rockets, etc.<br>• Effects of blast etc. outside the fireball of a nuclear-weapon explosion | • Solid pieces of various sizes are scattered in vicinity<br>• Gases and small particles form an aerial plume that travels downwind<br>• Some release of volatile species (esp. Cesium-137) if zirc. combustion occurs |
| Type 3: Rupture and Dispersal (Small) | • Facility structures are penetrated but retain basic shape<br>• Fuel may be damaged but most rods retain basic shape<br>• Damage to cooling systems could lead to zirc. combustion | • Vehicle bomb<br>• Impact by commercial aircraft<br>• Perforation by shaped charge | • Scattering and plume formation as in Type 2 event, but involving smaller amounts of material<br>• Substantial release of volatile species if zirc. combustion occurs |
| Type 4: Precise, Informed Targeting | • Facility structures are penetrated, creating a release pathway<br>• Zirc. combustion is initiated indirectly by damage to cooling systems, or by direct ignition | • Missiles (military or improvised) with tandem warheads<br>• Close-up use of attack instruments (e.g., shaped charge, incendiary, thermic lance) | • Scattering and plume formation as in Type 3 event<br>• Substantial release of volatile species, potentially exceeding amount in Type 3 release |

**Table VI-3**
**Some Potential Modes and Instruments of Attack on a Nuclear Power Plant**

| Attack Mode/Instrument | Characteristics | Present Defenses at US Plants |
|---|---|---|
| Commando-style attack | • Could involve heavy weapons and sophisticated tactics<br>• Successful attack would require substantial planning and resources | Alarms, fences, and armed guards, with offsite backup |
| Land-vehicle bomb | • Readily obtainable<br>• Highly destructive if detonated at target | Vehicle barriers at entry points to Protected Area |
| Small guided missile (anti-tank, etc.) | • Readily obtainable<br>• Highly destructive at point of impact | None if missile launched from offsite |
| Commercial aircraft | • More difficult to obtain than pre-9/11<br>• Can destroy larger, softer targets | None |
| Explosive-laden smaller aircraft | • Readily obtainable<br>• Can destroy smaller, harder targets | None |
| 10-kilotonne nuclear weapon | • Difficult to obtain<br>• Assured destruction if detonated at target | None |

**Notes:**
(a) This table is adapted from: Thompson, 2007, Table 7-4. Further citations are provided in that table and its supporting narrative. For additional, supporting information of more recent vintage, see: Ahearne et al, 2012, Chapter 5.
(b) Defenses at nuclear power plants around the world are typically no more robust than at US plants.

**Table VI-4**
**The Shaped Charge as a Potential Instrument of Attack**

| Category of Information | Selected Information in Category |
|---|---|
| General information | • Shaped charges have many civilian and military applications, and have been used for decades<br>• Applications include human-carried demolition charges or warheads for anti-tank missiles<br>• Construction and use does not require assistance from a government or access to classified information |
| Use in World War II | • The German MISTEL, designed to be carried in the nose of an un-manned bomber aircraft, is the largest known shaped charge<br>• Japan used a smaller version of this device, the SAKURA bomb, for kamikaze attacks against US warships |
| A large, contemporary device | • Developed by a US government laboratory for mounting in the nose of a cruise missile<br>• Described in detail in an unclassified, published report (citation is voluntarily withheld here)<br>• Purpose is to penetrate large thicknesses of rock or concrete as the first stage of a "tandem" warhead<br>• Configuration is a cylinder with a diameter of 71 cm and a length of 72 cm<br>• When tested in November 2002, created a hole of 25 cm diameter in tuff rock to a depth of 5.9 m<br>• Device has a mass of 410 kg; would be within the payload capacity of many general-aviation aircraft |
| A potential delivery vehicle | • A Beechcraft King Air 90 general-aviation aircraft can carry a payload of up to 990 kg at a speed of up to 460 km/hr<br>• The price of a used, operational King Air 90 in the USA can be as low as $0.4 million |

**Source:**
This table is adapted from Table 7-6 of: Thompson, 2009.

**Table VI-5**
**Performance of US Army Shaped Charges, M3 and M2A3**

| Target Material | Indicator | Value for Stated Type of Shaped Charge | |
|---|---|---|---|
| | | **Type: M3** | **Type: M2A3** |
| Reinforced concrete | Maximum wall thickness that can be perforated | 150 cm | 90 cm |
| | Depth of penetration in thick walls | 150 cm | 75 cm |
| | Diameter of hole | • 13 cm at entrance<br>• 5 cm minimum | • 9 cm at entrance<br>• 5 cm minimum |
| | Depth of hole with second charge placed over first hole | 210 cm | 110 cm |
| Armor plate | Perforation | At least 50 cm | 30 cm |
| | Average diameter of hole | 6 cm | 4 cm |

**Notes:**
(a) Data are from US Army Field Manual FM 5-25: Army, 1967, pp 13-15 and page 100.
(b) The M2A3 charge has a mass of 5 kg, a maximum diameter of 18 cm, and a total length of 38 cm including the standoff ring.
(c) The M3 charge has a mass of 14 kg, a maximum diameter of 23 cm, a charge length of 39 cm, and a standoff pedestal 38 cm long.

**Table X-1**
**IRSN Estimates of Costs Arising from a "Massive" Atmospheric Release of Radioactive Material from a French 900 MWe PWR**

| Cost Category | Estimated Cost (billion Euro) | | |
|---|---|---|---|
| | **Base Case** | **Low Case** | **High Case** |
| On-site costs | 10 | 5 | 15 |
| Off-site radiological costs | 106 | 38 | 281 |
| Contaminated territories | 393 | 130 | 4,875 |
| Image costs | 130 | 75 | 176 |
| Costs related to power production | 90 | 30 | 360 |
| Indirect effects | 31 | 9 | 50 |
| **Total (rounded)** | 760 | 290 | 5,760 |

**Notes:**
(a) Data are from: IRSN, 2007, Tables A4.4.4 and A4.4.5.
(b) The assumed release would be from the Dampierre nuclear generating station, which has four 900 MWe PWR units and is located on the Loire River south of Paris. The release is described (IRSN, 2007, page 37) as follows: "Par simplification, le scenario considere la dispersion en deux heures d'un tiers de l'inventaire du coeur, ce qui est le bon ordre de grandeur pour le cesium, contributeur preponderant des couts." Thus, the release apparently includes one-third of one reactor's core inventory of Cesium isotopes, which are said to be the major contributors to the estimated costs. The many radio-isotopes in a reactor core have widely varying volatilities and chemical properties. Thus, their release fractions will vary. The IRSN text, quoted above, does not address this matter.
(c) An estimate of the core inventory of Cs-137 in a 900 MWe PWR can be made by assuming: (i) total fuel mass = 75 Mg HM; (ii) average fuel burnup at discharge = 50 GWt-days per Mg HM; (iii) Cs-137 yield = 1.17E+14 Bq per GWt-day of fission; and (iv) one-third of the core is discharged at each refueling, and a refueling outage is imminent, so that average fuel burnup in the core = (2/3) x discharge burnup. With those assumptions, the core inventory of Cs-137 = 1.17E+14 x 75 x (2/3) x 50 = 2.9E+17 Bq. One-third of that inventory = 9.7E+16 Bq = 97 PBq.
(d) IRSN used the COSYMA code to estimate plume behavior and radiological impacts for 144 weather conditions. The "base case" estimates shown in the table are said to reflect median results. The "low case" (scenario favorable) and "high case" (scenario defavorable) estimates reflect non-median results and, apparently, changes in analytic assumptions.

**Table XI-1**
**Selected Approaches to Protecting Critical Infrastructure in the USA From Attack by Non-State Actors, and Some Strengths and Weaknesses of these Approaches**

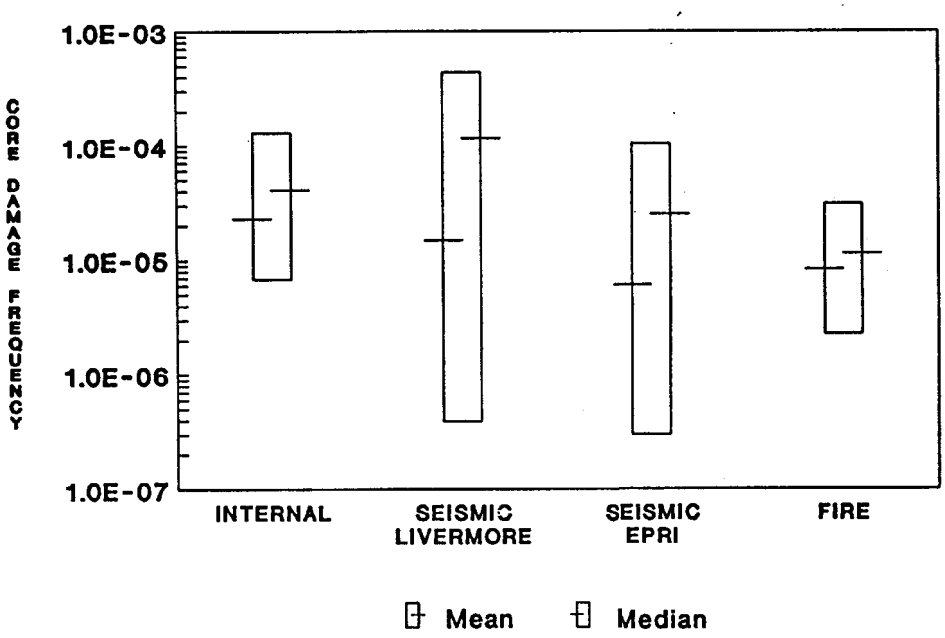
| Approach | Strengths | Weaknesses |
|---|---|---|
| Approach #1: Offensive military operations internationally | • Could deter or prevent governments from supporting non-State actors hostile to the USA | • Could promote growth of non-State groups hostile to the USA, and build sympathy for these groups in foreign populations<br>• Could be costly in terms of lives, money, etc. |
| Approach #2: International police cooperation within a legal framework | • Could identify and intercept potential attackers | • Implementation could be slow and/or incomplete<br>• Requires ongoing international cooperation |
| Approach #3: Surveillance and control of the domestic population | • Could identify and intercept potential attackers | • Could destroy civil liberties, leading to political, social, and economic decline of the USA |
| Approach #4: Secrecy about design and operation of infrastructure facilities | • Could prevent attackers from identifying points of vulnerability | • Could suppress a true understanding of risk<br>• Could contribute to political, social, and economic decline |
| Approach #5: Active defense of infrastructure facilities (by use of guards, guns, gates, etc.) | • Could stop attackers before they reach the target | • Requires ongoing expenditure & vigilance<br>• May require military involvement |
| Approach #6: Robust and inherently-safer design of infrastructure facilities<br><br>(**Note:** This approach could be part of a "protective deterrence" strategy for the USA.) | • Could allow target to survive attack without damage, thus contributing to protective deterrence<br>• Could substitute for other protective approaches, avoiding their costs and adverse impacts<br>• Could reduce risks from accidents & natural hazards | • Could involve higher capital costs |

**Notes:**
(a) These approaches could be used in parallel, with differing weightings.
(b) Approach #6 would contribute to "protective deterrence", which is distinct from "counter-attack deterrence".

**Table XII-1**
**Selected Options to Reduce the Risk of a Pool Fire at a PWR or BWR Plant**

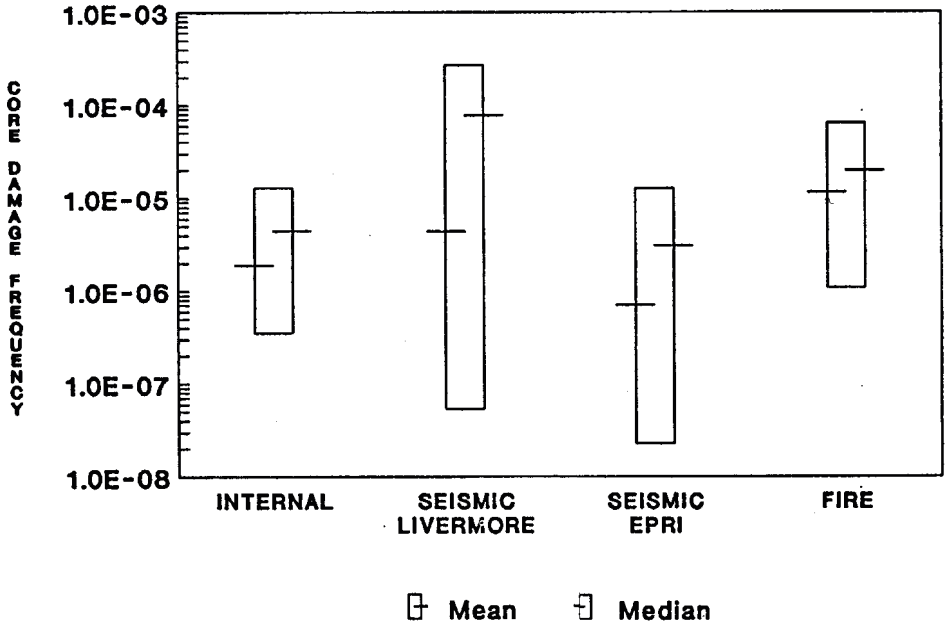
| Option | Passive or Active? | Does Option Address Fire Scenarios Arising From: | | Comments |
|---|---|---|---|---|
| | | Attack? | Other Events? | |
| Re-equip pool with low-density, open-frame racks | Passive | Yes | Yes | • Would substantially reduce pool inventory of radioactive material<br>• Would prevent auto-ignition of fuel in almost all cases |
| Install emergency water sprays above pool | Active | Yes | Yes | • Spray system must be highly robust<br>• Spraying water on overheated fuel could feed Zr-steam reaction<br>• Pool overflow could disable reactor safety systems (especially at BWRs with Mark I and II containments) |
| Mix hotter (younger) and colder (older) fuel in pool | Passive | Yes | Yes | • Could delay or prevent auto-ignition in some cases<br>• Would be ineffective if debris or residual water blocks air flow<br>• Could promote fire propagation to older fuel |
| Minimize movement of spent-fuel cask over pool | Active | No (Most cases) | Yes | • Could conflict with adoption of low-density, open-frame racks |
| Deploy air-defense system (e.g., Sentinel and Phalanx) at site | Active | Yes | No | • Implementation would require presence of military personnel at site |
| Develop enhanced onsite capability for damage control | Active | Yes | Yes | • Would require new equipment, staff and training<br>• Personnel must function in extreme environments |

**Figure V-1**
**Core Damage Frequency for Accidents at a Surry PWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150**



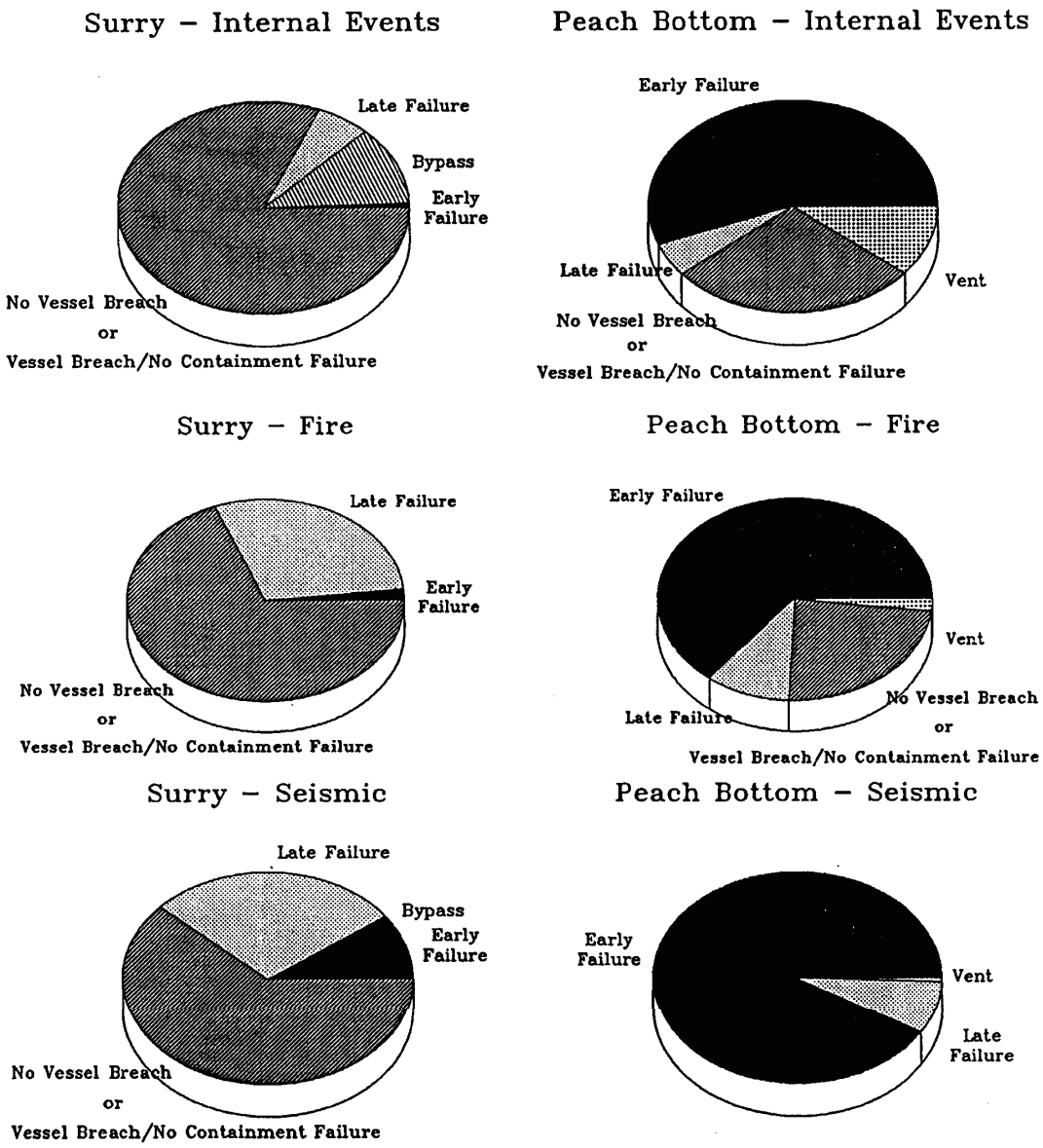

**Notes:**
(a) This figure is adapted from Figure 8.7 of: NRC, 1990.
(b) The bars range from the 5th percentile (lower bound) to the 95th percentile (upper bound) of the estimated core damage frequency (CDF). CDF values shown are per reactor-year (RY).
(c) "Internal" initiating events encompass equipment failure, human error, etc. "External" initiating events encompass earthquake, flood, strong wind, fire, etc.
(d) Two estimates are shown for the CDF from earthquakes (seismic effects). One estimate derives from seismic predictions done at Lawrence Livermore National Laboratory (Livermore), the other from predictions done at the Electric Power Research Institute (EPRI).
(e) CDFs were not estimated for external initiating events other than earthquake and fire.
(f) Malevolent acts were not considered.

**Figure V-2**
**Core Damage Frequency for Accidents at a Peach Bottom BWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150**



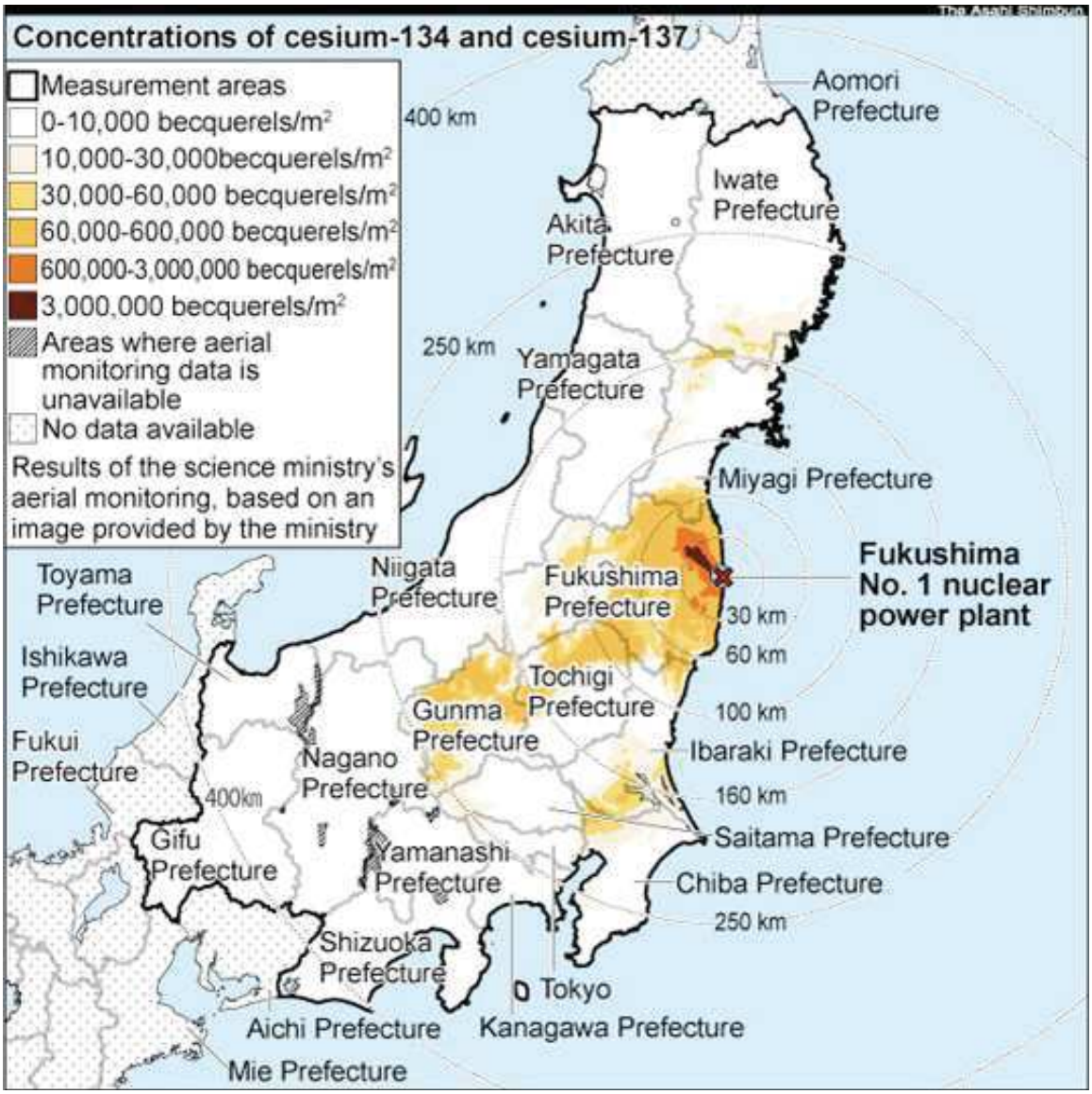

**Notes:**
(a) This figure is adapted from Figure 8.8 of: NRC, 1990.
(b) Notes (b) through (f) of Figure V-1 also apply here.

**Figure V-3**
**Conditional Probability of Containment Failure Following a Core-Damage Accident at a Surry PWR or Peach Bottom BWR Nuclear Power Plant, as Estimated in the NRC Study NUREG-1150**



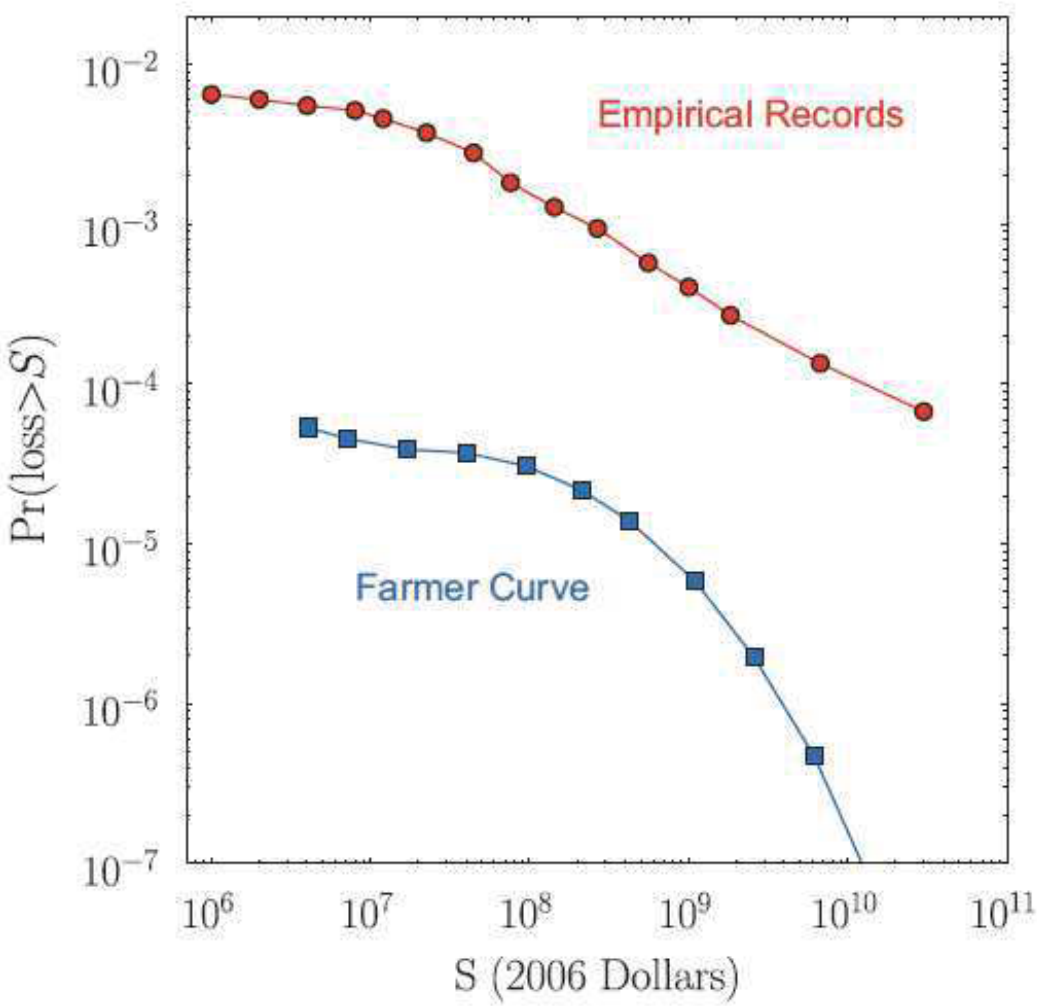

**Note:**
This figure is adapted from Figure 9.5 of: NRC, 1990.

**Figure V-4**
**Contamination of Land in Japan by Radioactive Cesium Released to Atmosphere During the Fukushima #1 Accident of 2011**



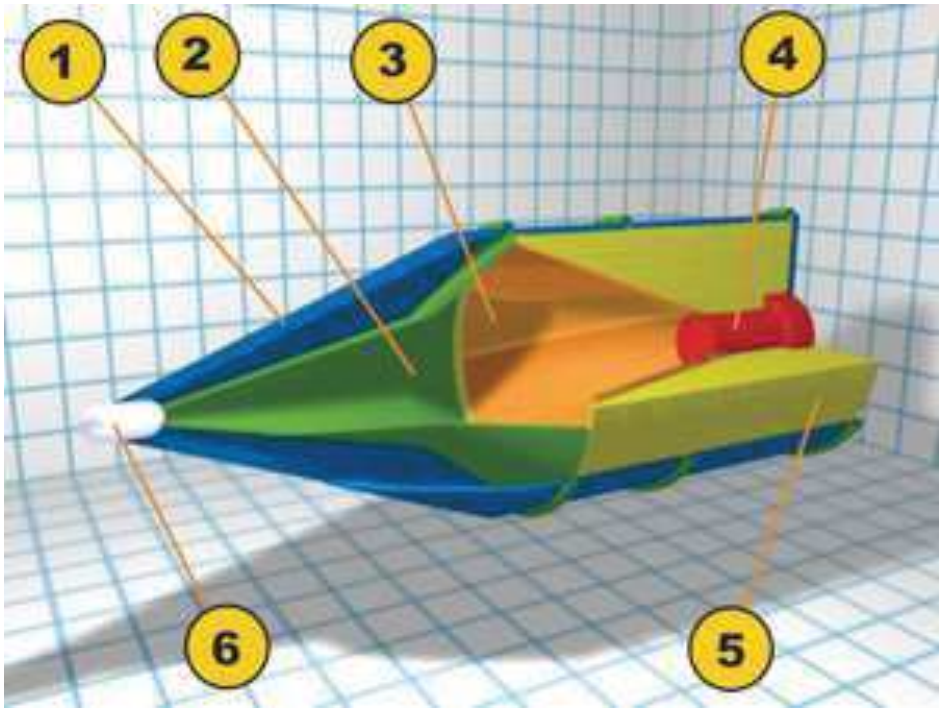

**Source:**
Asahi Shimbun, 2011.

**Figure V-5**
**Probability Distribution of Monetized Losses from Nuclear-Facility Incidents: Sornette et al's Comparison of Empirical Data with PRA Estimates**




**Notes:**
(a) This figure is a reproduction of Figure 1 from: Sornette et al, 2013.
(b) The curves shown are complementary cumulative distribution functions.
(c) The vertical axis is probability per reactor-year (or facility-year).
(d) The "Farmer Curve" is based on findings from NRC's Reactor Safety Study, which was the first reactor PRA. In this curve, monetized losses are associated with radiological impacts.
(e) The "Empirical Records" curve is based on Sovacool's compilation of data on 99 incidents at nuclear facilities. In this curve, monetized losses may, or may not, be associated with radiological impacts.

**Figure VI-1**
**Schematic View of a Generic Shaped-Charge Warhead**




**Notes:**
(a) Figure accessed on 4 March 2012 from: http://en.wikipedia.org/wiki/Shaped_charge
(b) Key:

Item 1: Aerodynamic cover
Item 2: Empty cavity
Item 3: Conical liner (typically made of ductile metal)
Item 4: Detonator
Item 5: Explosive
Item 6: Piezo-electric trigger

(c) Upon detonation, a portion of the conical liner would be formed into a high-velocity jet directed toward the target. The remainder of the liner would form a slower-moving slug of material.

**Figure VI-2**
**MISTEL System for Aircraft Delivery of a Shaped Charge, World War II**

**Notes:**
(a) Photograph accessed on 5 March 2012 from:
http://www.historyofwar.org/Pictures/pictures_Ju_88_mistel.html
(b) A shaped-charge warhead can be seen at the nose of the lower (converted bomber) aircraft, replacing the cockpit. The aerodynamic cover in front of the warhead would have a contact fuse at its tip, to detonate the shaped charge at the appropriate standoff distance.
(c) A human pilot in the upper (fighter) aircraft would control the entire rig, and would point it toward the target. Then, the upper aircraft would separate and move away, and the lower aircraft would be guided to the target by an autopilot.

**Figure VI-3**
**January 2008 Test of a Raytheon Shaped Charge, Intended as the Penetration (Precursor) Stage of a Tandem Warhead System**

**Before Test**

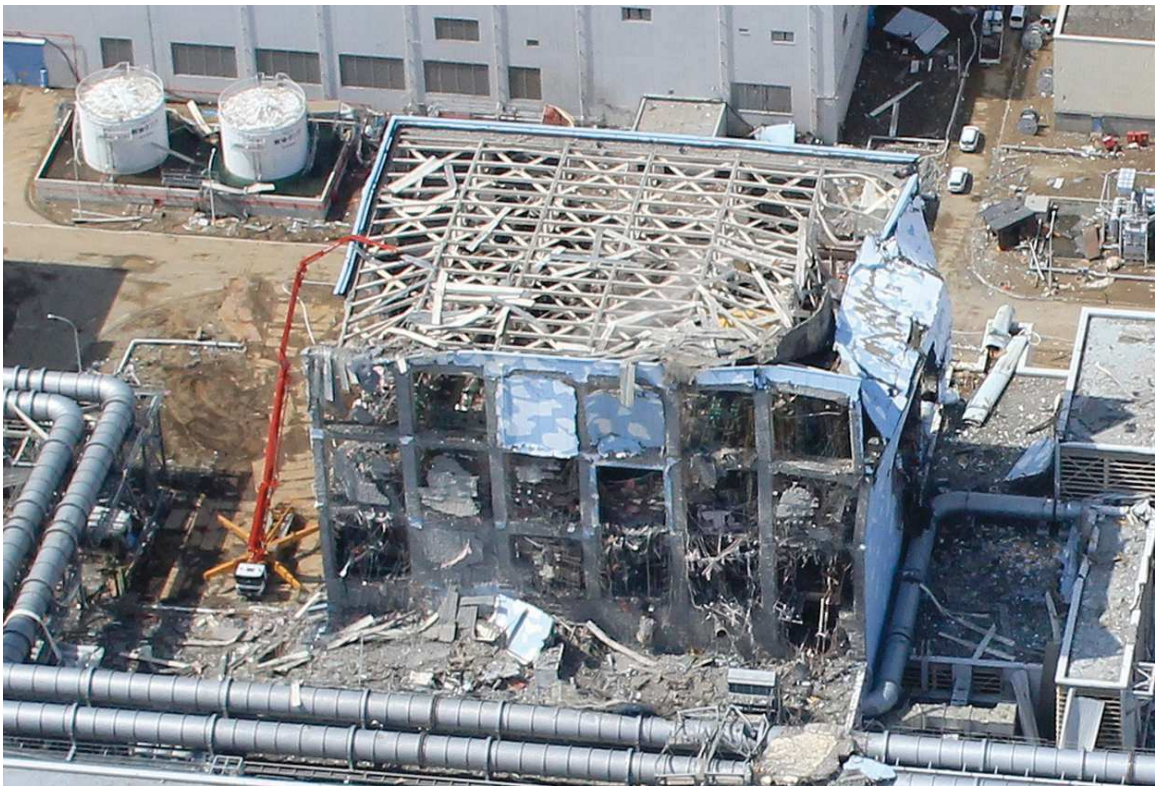
**After Test (viewed from the attacked face)**

**Notes:**
(a) These photographs are from: Raytheon, 2008. For additional, supporting information, see: Warwick, 2008.
(b) The shaped-charge jet penetrated about 5.9 m into a steel-reinforced concrete block with a thickness of 6.1 m. Although penetration was incomplete, the block was largely destroyed, as shown. Compressive strength of the concrete was 870 bar.
(c) The shaped charge had a diameter of 61 cm and contained 230 kg of high explosive. It was sized to fit inside the US Air Force's AGM-129 Advanced Cruise Missile.

**Figure VI-4**
**Aftermath of a Small-Aircraft Suicide Attack on an Office Building in Austin, Texas, February 2010**

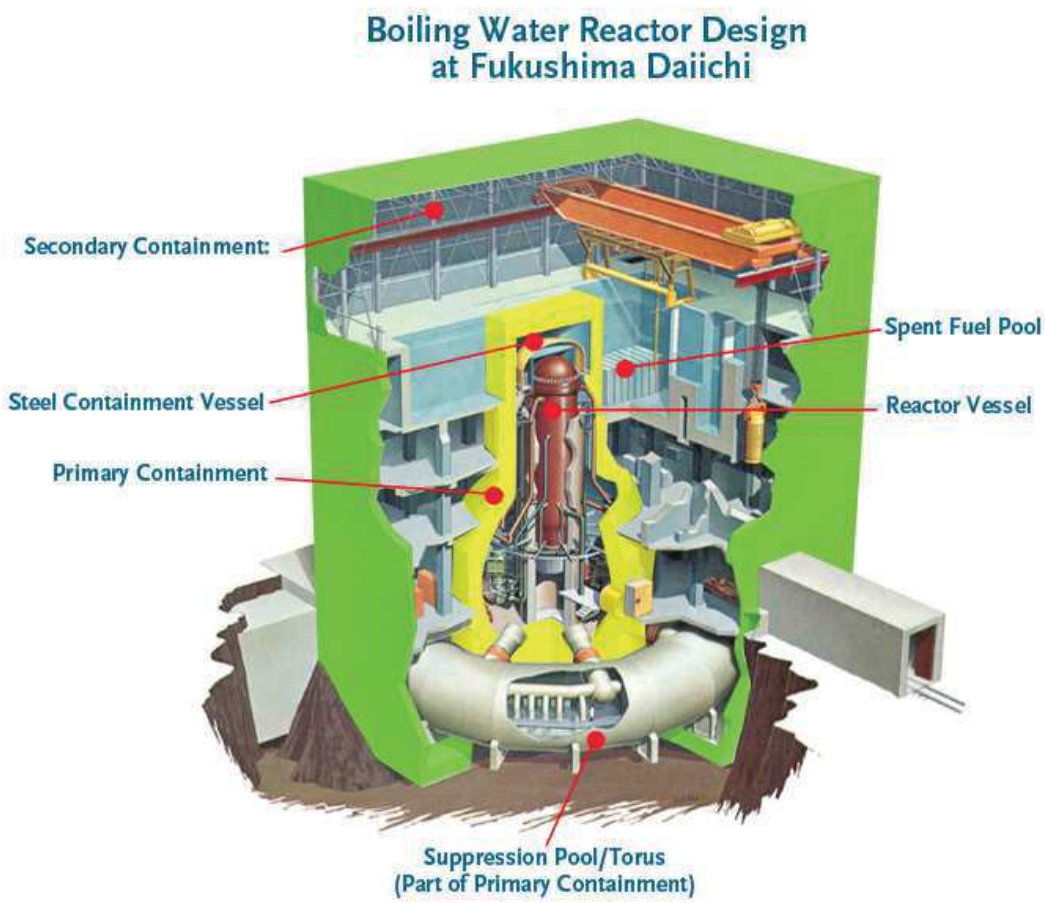
**Notes:**
(a) Photograph and information in these notes are from: Brick, 2010.
(b) A major tenant of the building was the Internal Revenue Service (IRS).
(c) The aircraft was a single-engine, fixed-wing Piper flown by its owner, Andrew Joseph Stack III, an Austin resident who worked as a computer engineer.
(d) A statement left by Mr Stack indicated that a dispute with the IRS had brought him to a point of suicidal rage.

**Figure VIII-1**
**Unit 4 at the Fukushima #1 Site During the 2011 Accident**



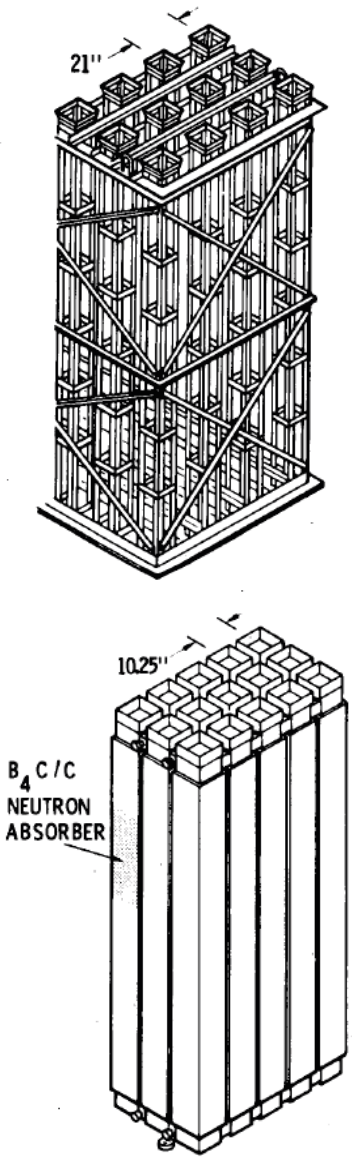
**Source:**
Accessed on 20 February 2012 from Ria Novosti at:
http://en.rian.ru/analysis/20110426/163701909.html; image by Reuters Air Photo Service.

**Figure VIII-2**
**Schematic View of a BWR Reactor with a Mark I Containment, as Used at the Fukushima #1 Site and Elsewhere**



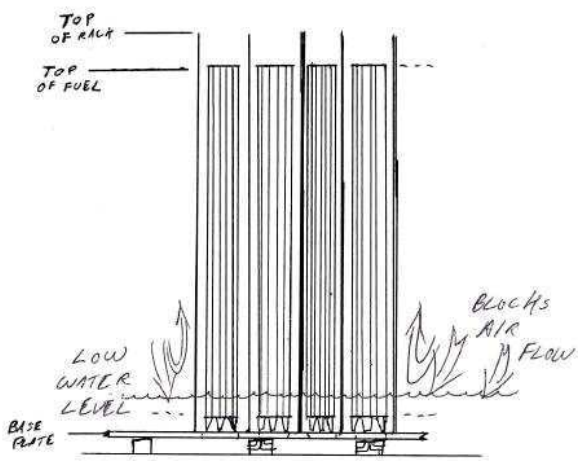

**Notes:**
(a) This figure accessed on 24 February 2012 from:
http://safetyfirst.nei.org/japan/background-on-fukushima-situation/
(b) All BWR reactors with Mark I containments have the same basic configuration. Details vary for specific reactors.

**Figure X-1**
**PWR Spent Fuel Storage Racks: Low-Density and High-Density Designs**




**Notes:**
(a) These drawings are from: Benjamin et al, 1979, page 18.
(b) The upper drawing shows a low-density, open-frame rack, and the lower drawing shows a high-density, closed-frame rack.

**Figure X-2**
**An Argonne Analyst's Illustration of the Effect of Residual Water on Heat Transfer from Spent Fuel in a Partially Drained Pool Equipped with High-Density Racks**




**Water addition:** **adding water to the bottom of an empty spent fuel pool can damage an assembly with a heat rate of 7kw or less that has reached equilibrium in air! -- *The water can block the circulation of air and cause the fuel assembly to overheat. The heat removed by the low level of water is insufficient to cool the assembly.***

**Notes:**
(a) Figure and accompanying text are from: Braun, 2010.
(b) Braun considers, as a typical example, a fuel assembly that would generate 10 MWt in a reactor at full power. According to Braun, at a time point after reactor shutdown of $1.0 \times 10^7$ sec (116 days), the assembly would produce 7.8 kW of decay heat.
(c) Braun goes on to discuss a related situation in which water level descends slowly from the top of the rack by boiling off due to decay heat. He says:

- "As the levels drop, steam from the boil-off will cool the uncovered parts of the fuel.
- At some point, the rising steam will be insufficient to cool the uncovered fuel and clad temperatures will rise until they reach the "ignition" point.
- Where is this level? Detailed calculations are needed. Experts suggest that it is somewhere between 20 and 80% of assembly height, possibly around the mid-point.
- When the water is at the bottom of the fuel, say about the 20% level, the steaming rate is probably insufficient to cool the rest of the assembly, and air circulation is not possible. So fuel assemblies that may be safe in air are likely to melt with a low water level.
- Detailed calculations are needed to address specific issues of geometry and heat transfer."

**APPENDIX B: Bibliography**

(Ahearne et al, 2012)
John F. Ahearne and eight other authors, with editing by Charles D. Ferguson and Frank A. Settle, *The Future of Nuclear Power in the United States* (Washington, DC: Federation of American Scientists, and Washington and Lee University, February 2012).

(Albrecht, 1979)
Ernst Albrecht, Minister-President of Lower Saxony, "Declaration of the state government of Lower Saxony concerning the proposed nuclear fuel center at Gorleben" (English translation), May 1979.

(Alvarez et al, 2003)
Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson, and Frank von Hippel, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States", *Science and Global Security,* Volume 11, 2003, pp 1-51.

(Armijo, 2013)
J. Sam Armijo (Chairman, NRC Advisory Committee on Reactor Safeguards), letter and enclosures to Ms. Diane Curran, Esq., 20 November 2013.

(Army, 1967)
Department of the Army, *Explosives and Demolitions, FM 5-25* (Washington, DC: Department of the Army, May 1967).

(Asahi Shimbun, 2011)
Asahi Shimbun, "Radioactive cesium spread as far as Gunma-Nagano border", 12 November 2011. Accessed on 28 November 2011 from:
http://ajw.asahi.com/article/0311disaster/fukushima/AJ2011111217258

(Barto et al, 2013a)
Andrew Barto and nine other authors, *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor, Draft Report* (Washington, DC: US Nuclear Regulatory Commission, June 2013).

(Barto et al, 2013b)
Andrew Barto and nine other authors, *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor* (Washington, DC: US Nuclear Regulatory Commission, October 2013). This document was published as an enclosure under the SECY memo: Satorius, 2013a.

(Benjamin et al, 1979)
Allan S. Benjamin and three other authors, *Spent Fuel Heatup Following Loss of Water During Storage, NUREG/CR-0649* (Washington, DC: US Nuclear Regulatory Commission, March 1979).

(Beyea et al, 2004)
Jan Beyea, Ed Lyman, and Frank von Hippel, "Damages from a Major Release of Cs-137 into the Atmosphere of the United States", *Science and Global Security*, Volume 12, 2004, pp 125-136.

(Beyea et al, 1979)
Jan Beyea, Yves Lenoir, Gene Rochlin, and Gordon Thompson (group chair), "Potential Accidents and Their Effects," Chapter 3 in *Report of the Gorleben International Review*, March 1979. (This chapter was prepared in English and translated into German for submission to the Lower Saxony State Government.)

(Braun, 2010)
Joseph C. Braun (Argonne National Laboratory), "Operational Safety of Spent Nuclear Fuel", viewgraphs for IAEA lecture, 2 December 2010.

(Brick, 2010)
Michael Brick, "Man Crashes Plane Into Texas IRS Office", *The New York Times*, 18 February 2010.

(CIA, 1987)
Central Intelligence Agency (Directorate of Intelligence), *The Chernobyl' Accident: Social and Political Implications* (Washington, DC: CIA, December 1987). This document was originally Secret but was released for publication in February 2011.

(Cochran, 2011)
Thomas Cochran (Natural Resources Defense Council), prepared statement for an appearance at joint hearings of the Subcommittee on Clean Air and Nuclear Safety, and the Committee on Environment and Public Works, US Senate, 12 April 2011.

(Collins and Hubbard, 2001)
T. E. Collins and G. Hubbard, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, NUREG-1738* (Washington, DC: US Nuclear Regulatory Commission, February 2001).

(Diet, 2012)
National Diet of Japan, *The official report of The Fukushima Nuclear Accident Independent Investigation Commission, Executive summary* (Tokyo: National Diet of Japan, 2012).

(DOE, 1987)
US Department of Energy, *Health and Environmental Consequences of the Chernobyl Nuclear Power Plant Accident, DOE/ER-0332* (Washington, DC: DOE, June 1987).

(Downer, 2013)
John Downer, "Disowning Fukushima: Managing the credibility of nuclear reliability assessment in the wake of disaster", *Regulation and Governance*, published online 22 July 2013, doi: 10.1111/rego.12029.

(Eltawila, 2001)
Farouk Eltawila (Office of Nuclear Regulatory Research, NRC), memorandum to Gary Holahan (Office of Nuclear Reactor Regulation, NRC), "RES Review of and Response to ACRS Comments on Spent Fuel Cladding Behavior Following a Loss-of-Water Accident During Pool Storage", 15 May 2001. Attached to this memorandum is an undated draft report: H. M. Chung (Argonne) and S. Basu (NRC), "Spent Fuel Cladding Behavior Following Loss-of-Water Accident During Pool Storage".

(Fleming, 2011)
Karl N. Fleming, "On The Issue of Integrated Risk – A PRA Practitioners Perspective", paper to support a presentation to NRC Commissioners at the meeting: Briefing on Severe Accidents and Options for Proceeding with Level 3 Probabilistic Risk Assessment Activities, 28 July 2011.

(Gallucci, 2012)
Raymond Gallucci, ""What – Me Worry?" "Why So Serious?": A Personal View on the Fukushima Nuclear Reactor Accidents", *Risk Analysis*, Volume 32, Number 9, 2012, pp 1444-1450.

(Gorbachev, 2006)
Mikhail Gorbachev, "Turning Point at Chernobyl", Project Syndicate, 14 April 2006.

(Hirsch et al, 1989)
H. Hirsch, T. Einfalt, O. Schumacher, and G. Thompson, *IAEA Safety Targets and Probabilistic Risk Assessment* (Hannover, Germany: Gesellschaft fur Okologische Forschung und Beratung, August 1989).

(Holtec, 2007)
Holtec International, "The HI-STORM 100 Storage System", accessed at http://www.holtecinternational.com/hstorm100.html on 17 June 2007.

(Holt and Andrews, 2012)
Mark Holt and Anthony Andrews, *Nuclear Power Plant Security and Vulnerabilities* (Washington, DC: Congressional Research Service, 28 August 2012).

(Honnellio and Rydell, 2007)
Anthony L. Honnellio and Stan Rydell, "Sabotage vulnerability of nuclear power plants", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 3, 2007, pp 312-321.

(IRSN, 2007)
Institut de Radioprotection et de Surete Nucleaire, *Examen de la methode d'analyse cout-benefice pour la surete, Rapport DSR No. 157, Annex du Chapitre 4, Evaluation Economique des Consequences d'Accidents Graves et Enseignements* (France: IRSN, 5 July 2007).

(Kemeny et al, 1979)
John G. Kemeny (chair) and eleven other commissioners, *Report of the President's Commission on the Accident at Three Mile Island* (Washington, DC: US Government Printing Office, October 1979).

(Knight and Slodkowski, 2013)
Sophie Knight and Antoni Slodkowski, "For many Fukushima evacuees, the truth is they won't be going home", *Reuters*, 11 November 2013, accessed on 19 November 2013 from: http://www.reuters.com/article/2013/11/11/us-japan-fukushima-idUSBRE9AA03Z20131111

(Kollar et al, 2013)
Lenka Kollar and three other authors, *Safeguards Approaches for Very Long-Term Storage of Spent Nuclear Fuel* (Argonne, Illinois: Argonne National Laboratory, July 2013).

(Lewis et al, 1978)
H. W. Lewis (chair) and six other authors, *Risk Assessment Review Group Report to the US Nuclear Regulatory Commission, NUREG/CR-0400* (Washington, DC: NRC, September 1978).

(Lindgren and Durbin, 2013)
E.R. Lindgren and S.G. Durbin, *Characterization of Thermal-Hydraulic and Ignition Phenomena in Prototypic, Full-Length Boiling Water Reactor Spent Fuel Assemblies After a Postulated Complete Loss-of-Coolant Accident, NUREG/CR-7143* (Washington, DC: NRC, March 2013).

(Morris et al, 2006)
Robert H. Morris and three other authors, "Using the VISAC program to calculate the vulnerability of nuclear power plants to terrorism", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 2, 2006, pp 193-211.

(Murphy, 2009)
Dermot Murphy, testimony to the Natural Resources Committee, Canadian Parliament, 18 November 2009, accessed on 21 March 2013 from:
http://openparliament.ca/committees/natural-resources/40-2/40/dermot-murphy-1/

(Natesan and Soppet, 2004)
K. Natesan and W.K. Soppet, *Air Oxidation Kinetics for Zr-Based Alloys, NUREG/CR-6846* (Washington, DC: NRC, June 2004).

(National Research Council, 2006)
National Research Council Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage (a committee of the Council's Board on Radioactive Waste Management), *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (Washington, DC: National Academies Press, 2006).

(NRC, 2013a)
US Nuclear Regulatory Commission, "10 CFR Part 51, Draft Waste Confidence Generic Environmental Impact Statement", *Federal Register*, Volume 78, Number 178, 13 September 2013, pp 56621-56622.

(NRC, 2013b)
US Nuclear Regulatory Commission, *Waste Confidence Generic Environmental Impact Statement, NUREG-2157, Draft Report for Comment* (Washington, DC: NRC, September 2013).

(NRC, 2013c)
US Nuclear Regulatory Commission, "10 CFR Part 51, Waste Confidence – Continued Storage of Spent Nuclear Fuel", *Federal Register*, Volume 78, Number 178, 13 September 2013, pp 56776-56805.

(NRC, 2013d)
US Nuclear Regulatory Commission website, "List of Power Reactor Units", updated 17 September 2013, accessed on 25 November 2013 from:
http://www.nrc.gov/reactors/operating/list-power-reactor-units.html

(NRC, 2000)
US Nuclear Regulatory Commission Staff, "NRC Staff Response to Intervenor's Request for Admission of Late-Filed Environmental Contentions", Docket No. 50-400-LA, ASLBP No. 99-762-02-LA, 3 March 2000.

(NRC, 1990)
US Nuclear Regulatory Commission, *Severe Accident Risks: An Assessment for Five US Nuclear Power Plants, NUREG-1150* (Washington, DC: Nuclear Regulatory Commission, December 1990).

(NRC, 1979)
US Nuclear Regulatory Commission, *Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0575* (Washington, DC: Nuclear Regulatory Commission, August 1979).

(NRC, 1975)
US Nuclear Regulatory Commission, *Reactor Safety Study, WASH-1400 (NUREG-75/014)* (Washington, DC: Nuclear Regulatory Commission, October 1975).

(Ontario Hydro, 1987)
Ontario Hydro, *Darlington NGS Probabilistic Safety Evaluation: Summary Report* (Toronto: Ontario Hydro, December 1987).

(OPG, 2012)
Ontario Power Generation, *Darlington NGS Risk Assessment Summary Report* (Toronto: Ontario Power Generation, 29 May 2012).

(Pascucci-Cahen and Patrick, 2012)
Ludivine Pascucci-Cahen and Momal Patrick (IRSN), "Massive radiological releases profoundly differ from controlled releases", paper for presentation at the Eurosafe conference, Brussels, 5-6 November 2012.

(Powers, 2000)
Dana A. Powers (Chairman, NRC Advisory Committee on Reactor Safeguards), letter to Richard A. Meserve (Chairman, NRC), "Subject: Draft Final Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants", 13 April 2000.

(Raytheon, 2008)
Raytheon Company, "Raytheon Unveils New Record-Breaking Bunker Busting Technology", 12 March 2008, accessed on 7 March 2012 at:
http://www.raytheon.com/newsroom/feature/bb_03-10/

(Satorius, 2013a)
Mark A. Satorius, memo to NRC Commissioners, "SECY-13-0112: Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor", 9 October 2013. Enclosed with this document was the study: Barto et al, 2013b.

(Satorius, 2013b)
Mark A. Satorius, memo to NRC Commissioners, "COMSECY-13-0030: Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel", 12 November 2013.

(Schroer and Modarres, 2013)
Suzanne Schroer and Mohammad Modarres, "An event classification schema for evaluating site risk in a multi-unit nuclear power plant probabilistic risk assessment", *Reliability Engineering and System Safety*, Volume 117, 2003, pp 40-51.

(Shlyakhter and Wilson, 1992)
Alexander Shlyakhter and Richard Wilson, "Chernobyl: the inevitable results of secrecy", *Public Understanding of Science*, Volume 1, July 1992, pp 251-259.

(Shrader-Frechette, 1985)
Kristin Shrader-Frechette, "Technological Risk and Small Probabilities", *Journal of Business Ethics*, Volume 4, 1985, pp 431-445.

(SKB, 2006)
Svensk Karnbranslehantering AB, "Clab", a brochure about Sweden's interim storage facility for spent nuclear fuel, 2006, accessed on 15 December 2013 at: http://www.skb.se/Templates/Standard 25480.aspx

(Sornette et al, 2013)
D. Sornette, T. Maillart, and W. Kroger, "Exploring the limits of safety analysis in complex technological systems", *International Journal of Disaster Risk Reduction*, in press, accepted 3 April 2013, http://dx.doi.org/10.1016/j.ijdrr.2013.04.002.

(Stohl et al, 2011)
A. Stohl, P. Seibert, G. Wotawa, D. Arnold, J.F. Burkhart, S. Eckhardt, C. Tapia, A. Vargas, and T.J. Yasunari, "Xenon-133 and caesium-137 releases into the atmosphere from the Fukushima Dai-ichi nuclear power plant: determination of the source term, atmospheric dispersion, and deposition," *Atmospheric Chemistry and Physics Discuss*ions, Volume 11, 2011, pp 28319-28394.

(Thomauske, 2003)
Bruno Thomauske, "Realization of the German Concept for Interim Storage of Spent Nuclear Fuel – Current Situation and Prospects", paper presented at the WM'03 Conference, Tucson, Arizona, 23-27 February 2003.

(Thompson, 2013a)
Gordon R. Thompson, Declaration, "Comments on the US Nuclear Regulatory Commission's Draft Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor", 1 August 2013.

(Thompson, 2013b)
Gordon R. Thompson, Declaration, "Recommendations for the US Nuclear Regulatory Commission's Consideration of Environmental Impacts of Long-Term, Temporary Storage of Spent Nuclear Fuel or Related High-Level Waste", 2 January 2013.

(Thompson, 2013c)
Gordon R. Thompson, *Handbook to Support Assessment of Radiological Risk Arising from Management of Spent Nuclear Fuel* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 31 January 2013).

(Thompson, 2009)
Gordon R. Thompson, *Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 6 February 2009).

(Thompson, 2008)
Gordon R. Thompson, "The US Effort to Dispose of High-Level Radioactive Waste", *Energy and Environment*, Volume 19, Nos. 3+4, 2008, pp 391-412.

(Thompson, 2007)
Gordon R. Thompson, *Risk-Related Impacts from Continued Operation of the Indian Point Nuclear Power Plants* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 28 November 2007).

(Thompson, 2005)
Gordon R. Thompson, *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 2 November 2005).

(Thompson, 2003)
Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security* (Cambridge, Massachusetts: Institute for Resource and Security Studies, January 2003).

(Throm, 1989)
E. D. Throm, *Regulatory Analysis for the Resolution of Generic Issue 82, "Beyond Design Basis Accidents in Spent Fuel Pools", NUREG-1353* (Washington, DC: US Nuclear Regulatory Commission, April 1989).

(Warwick, 2008)
Graham Warwick, "VIDEO: Raytheon tests bunker-busting tandem warhead", *Flightglobal*, 26 February 2008, accessed on 7 March 2012 from: http://www.flightglobal.com/news/articles/video-raytheon-tests-bunker-busting-tandem-warhead-221842/

(Windberg and Hozer, 2007)
Peter Windberg and Zoltan Hozer, "CODEX-CT-1 and CT-2 Integral Tests: Two Possible Scenarios of the Paks-2 Incident", paper presented at the international conference: Nuclear Energy for New Europe 2007, Slovenia, 10-13 September 2007.

**APPENDIX C: List of Exhibits**

**Exhibit #1**
Gordon R. Thompson, Declaration, "Recommendations for the US Nuclear Regulatory Commission's Consideration of Environmental Impacts of Long-Term, Temporary Storage of Spent Nuclear Fuel or Related High-Level Waste", 2 January 2013.

**Exhibit #2**
Andrew Barto and nine other authors, *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor, Draft Report* (Washington, DC: US Nuclear Regulatory Commission, June 2013).

**Exhibit #3**
Gordon R. Thompson, Declaration, "Comments on the US Nuclear Regulatory Commission's Draft Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor", 1 August 2013.

**Exhibit #4**
Ernst Albrecht, Minister-President of Lower Saxony, "Declaration of the state government of Lower Saxony concerning the proposed nuclear fuel center at Gorleben" (English translation), May 1979.

**Exhibit #5**
Gordon R. Thompson, *Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 6 February 2009).

**Exhibit #6**
Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson, and Frank von Hippel, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States", *Science and Global Security,* Volume 11, 2003, pp 1-51.

**Exhibit #7**
National Research Council Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage (a committee of the Council's Board on Radioactive Waste Management), *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (Washington, DC: National Academies Press, 2006).

**Exhibit #8**
Gordon R. Thompson, "The US Effort to Dispose of High-Level Radioactive Waste", *Energy and Environment*, Volume 19, Nos. 3+4, 2008, pp 391-412.

**Exhibit #9**
Gordon R. Thompson, *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 2 November 2005).

**Exhibit #10**
Gordon R. Thompson, *Handbook to Support Assessment of Radiological Risk Arising from Management of Spent Nuclear Fuel* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 31 January 2013).

**Exhibit #11**
Ludivine Pascucci-Cahen and Momal Patrick (IRSN), "Massive radiological releases profoundly differ from controlled releases", paper for presentation at the Eurosafe conference, Brussels, 5-6 November 2012.

**Exhibit #12**
Central Intelligence Agency (Directorate of Intelligence), *The Chernobyl' Accident: Social and Political Implications* (Washington, DC: CIA, December 1987). This document was originally Secret but was released for publication in February 2011.

**Exhibit #13**
Mikhail Gorbachev, "Turning Point at Chernobyl", Project Syndicate, 14 April 2006.

**Exhibit #14**
Kristin Shrader-Frechette, "Technological Risk and Small Probabilities", *Journal of Business Ethics*, Volume 4, 1985, pp 431-445.

**Exhibit #15**
H. W. Lewis (chair) and six other authors, *Risk Assessment Review Group Report to the US Nuclear Regulatory Commission, NUREG/CR-0400* (Washington, DC: NRC, September 1978).

**Exhibit #16**
John G. Kemeny (chair) and eleven other commissioners, *Report of the President's Commission on the Accident at Three Mile Island* (Washington, DC: US Government Printing Office, October 1979).

**Exhibit #17**
Alexander Shlyakhter and Richard Wilson, "Chernobyl: the inevitable results of secrecy", *Public Understanding of Science*, Volume 1, July 1992, pp 251-259.

**Exhibit #18**
National Diet of Japan, *The official report of The Fukushima Nuclear Accident Independent Investigation Commission, Executive summary* (Tokyo: National Diet of Japan, 2012).

**Exhibit #19**
John Downer, "Disowning Fukushima: Managing the credibility of nuclear reliability assessment in the wake of disaster", *Regulation and Governance*, published online 22 July 2013, doi: 10.1111/rego.12029.

**Exhibit #20**
Thomas Cochran (Natural Resources Defense Council), prepared statement for an appearance at joint hearings of the Subcommittee on Clean Air and Nuclear Safety, and the Committee on Environment and Public Works, US Senate, 12 April 2011.

**Exhibit #21**
Raymond Gallucci, ""What – Me Worry?" "Why So Serious?": A Personal View on the Fukushima Nuclear Reactor Accidents", *Risk Analysis*, Volume 32, Number 9, 2012, pp 1444-1450.

**Exhibit #22**
D. Sornette, T. Maillart, and W. Kroger, "Exploring the limits of safety analysis in complex technological systems", *International Journal of Disaster Risk Reduction*, in press, accepted 3 April 2013, http://dx.doi.org/10.1016/j.ijdrr.2013.04.002.

**Exhibit #23**
Ontario Power Generation, *Darlington NGS Risk Assessment Summary Report* (Toronto: Ontario Power Generation, 29 May 2012).

**Exhibit #24**
Appendix J of: US Nuclear Regulatory Commission, *Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0575* (Washington, DC: Nuclear Regulatory Commission, August 1979).

**Exhibit #25**
Allan S. Benjamin and three other authors, *Spent Fuel Heatup Following Loss of Water During Storage, NUREG/CR-0649* (Washington, DC: US Nuclear Regulatory Commission, March 1979).

**Exhibit #26**
Gordon R. Thompson, *Risk-Related Impacts from Continued Operation of the Indian Point Nuclear Power Plants* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 28 November 2007).

**Exhibit #27**
Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security* (Cambridge, Massachusetts: Institute for Resource and Security Studies, January 2003).

**Exhibit #28**
Mark Holt and Anthony Andrews, *Nuclear Power Plant Security and Vulnerabilities* (Washington, DC: Congressional Research Service, 28 August 2012).

**Exhibit #29**
John F. Ahearne and eight other authors, with editing by Charles D. Ferguson and Frank A. Settle, *The Future of Nuclear Power in the United States* (Washington, DC: Federation of American Scientists, and Washington and Lee University, February 2012).

**Exhibit #30**
Anthony L. Honnellio and Stan Rydell, "Sabotage vulnerability of nuclear power plants", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 3, 2007, pp 312-321.

**Exhibit #31**
Robert H. Morris and three other authors, "Using the VISAC program to calculate the vulnerability of nuclear power plants to terrorism", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 2, 2006, pp 193-211.

**Exhibit #32**
Lenka Kollar and three other authors, *Safeguards Approaches for Very Long-Term Storage of Spent Nuclear Fuel* (Argonne, Illinois: Argonne National Laboratory, July 2013).

**Exhibit #33**
Karl N. Fleming, "On The Issue of Integrated Risk – A PRA Practitioners Perspective", paper to support a presentation to NRC Commissioners at the meeting: Briefing on Severe Accidents and Options for Proceeding with Level 3 Probabilistic Risk Assessment Activities, 28 July 2011.

**Exhibit #34**
Suzanne Schroer and Mohammad Modarres, "An event classification schema for evaluating site risk in a multi-unit nuclear power plant probabilistic risk assessment", *Reliability Engineering and System Safety*, Volume 117, 2003, pp 40-51.

**Exhibit #35**
Andrew Barto and nine other authors, *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor* (Washington, DC: US Nuclear Regulatory Commission, October 2013). This document is provided here with its cover memo: Mark A. Satorius, memo to NRC Commissioners, "SECY-13-0112: Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor", 9 October 2013.

**Exhibit #36**
Mark A. Satorius, memo to NRC Commissioners, "COMSECY-13-0030: Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel", 12 November 2013.

**Exhibit #37**
E. D. Throm, *Regulatory Analysis for the Resolution of Generic Issue 82, "Beyond Design Basis Accidents in Spent Fuel Pools", NUREG-1353* (Washington, DC: US Nuclear Regulatory Commission, April 1989).

**Exhibit #38**
T. E. Collins and G. Hubbard, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, NUREG-1738* (Washington, DC: US Nuclear Regulatory Commission, February 2001).

**Exhibit #39**
US Nuclear Regulatory Commission Staff, "NRC Staff Response to Intervenor's Request for Admission of Late-Filed Environmental Contentions", Docket No. 50-400-LA, ASLBP No. 99-762-02-LA, 3 March 2000.

**Exhibit #40**
J. Sam Armijo (Chairman, NRC Advisory Committee on Reactor Safeguards), letter and enclosures to Ms. Diane Curran, Esq., 20 November 2013.

**Exhibit #41**
Dana A. Powers (Chairman, NRC Advisory Committee on Reactor Safeguards), letter to Richard A. Meserve (Chairman, NRC), "Subject: Draft Final Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants", 13 April 2000.

**Exhibit #42**
Farouk Eltawila (Office of Nuclear Regulatory Research, NRC), memorandum to Gary Holahan (Office of Nuclear Reactor Regulation, NRC), "RES Review of and Response to ACRS Comments on Spent Fuel Cladding Behavior Following a Loss-of-Water Accident During Pool Storage", 15 May 2001. Attached to this memorandum is an undated draft report: H. M. Chung (Argonne) and S. Basu (NRC), "Spent Fuel Cladding Behavior Following Loss-of-Water Accident During Pool Storage".

**Exhibit #43**
K. Natesan and W.K. Soppet, *Air Oxidation Kinetics for Zr-Based Alloys, NUREG/CR-6846* (Washington, DC: NRC, June 2004).

**Exhibit #44**
E.R. Lindgren and S.G. Durbin, *Characterization of Thermal-Hydraulic and Ignition Phenomena in Prototypic, Full-Length Boiling Water Reactor Spent Fuel Assemblies After a Postulated Complete Loss-of-Coolant Accident, NUREG/CR-7143* (Washington, DC: NRC, March 2013).

**Exhibit #45**
Peter Windberg and Zoltan Hozer, "CODEX-CT-1 and CT-2 Integral Tests: Two Possible Scenarios of the Paks-2 Incident", paper presented at the international conference: Nuclear Energy for New Europe 2007, Slovenia, 10-13 September 2007.

**Exhibit #46**
Jan Beyea, Ed Lyman, and Frank von Hippel, "Damages from a Major Release of Cs-137 into the Atmosphere of the United States", *Science and Global Security*, Volume 12, 2004, pp 125-136.

**Exhibit #47**
Institut de Radioprotection et de Surete Nucleaire, *Examen de la methode d'analyse cout-benefice pour la surete, Rapport DSR No. 157, Annex du Chapitre 4, Evaluation Economique des Consequences d'Accidents Graves et Enseignements* (France: IRSN, 5 July 2007).

**Exhibit #48**
Svensk Karnbranslehantering AB, "Clab", a brochure about Sweden's interim storage facility for spent nuclear fuel, published in 2006, accessed on 15 December 2013 at: http://www.skb.se/Templates/Standard____25480.aspx

**Exhibit #49**
Bruno Thomauske, "Realization of the German Concept for Interim Storage of Spent Nuclear Fuel – Current Situation and Prospects", paper presented at the WM'03 Conference, Tucson, Arizona, 23-27 February 2003.

**APPENDIX D: Curriculum Vitae**

**Curriculum Vitae for Gordon R. Thompson**
**June 2011**

Professional expertise

• Technical and policy analysis in the fields of energy, environment, sustainable development, human security, and international security.

Current appointments

• Executive director, Institute for Resource & Security Studies (IRSS), Cambridge, Massachusetts (since 1984).
• Senior research scientist, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts (since 2002).

Education

• D.Phil., applied mathematics, Oxford University (Balliol College), 1973.
• B.E., mechanical engineering, Univ. of New South Wales, Sydney, Australia, 1967.
• B.Sc., mathematics & physics, Univ. of New South Wales, 1966.

Project sponsors and tasks (selected)

• Nautilus Institute and RMIT University, 2009-2011: conduct policy and technical analysis on transfer of nuclear power plant technology to consumer countries.
• Attorney General of Massachusetts, 2006-2008 and 2011: analyze risk issues and prepare expert testimony associated with the Pilgrim and Vermont Yankee nuclear power plants; current analysis addresses lessons learned from the Fukushima accident of 2011.
• CharityHelp International and other sponsors, 2009-2011: co-convene the Connectivity to Enhance Global Human Security initiative.
• US Institute of Peace and other sponsors, 2005-2011: co-convene the Working Group on US-Iran Health Science Cooperation.
• Texans for a Sound Energy Policy, 2009: review of the US Nuclear Regulatory Commission's Draft Waste Confidence Decision.
• Green Energy Coalition, Pembina Institute, and Ontario Sustainable Energy Association, 2008: prepared testimony for submission to the Ontario Energy Board.
• Greenpeace Canada, 2007-2011: conduct technical and policy analysis on risk and sustainability issues related to the use of nuclear energy.
• World Health Organization, 2006-2007: conducted policy analysis on the potential for "health-bridge" programs to improve cooperation within and between nations.

• Sierra Club of Canada, 2006-2007: prepared a strategy for development of planning and public-engagement tools to facilitate action on climate change.
• Mothers for Peace, California, 2002-2009: analyzed risk issues and prepared expert testimony associated with the Diablo Canyon nuclear power plants.
• Riverkeeper, New York, 2007-2008: analyzed risk issues and prepared expert testimony associated with the Indian Point nuclear power plants.
• Minnesota Center for Environmental Advocacy, and Minnesotans for an Energy Efficient Economy, 2005-2006: conducted technical analysis and provided expert testimony regarding the Monticello nuclear power plant.
• California Energy Commission, 2005: conducted technical analysis and participated in an expert workshop regarding safety and security of commercial nuclear facilities.
• Committee on Radioactive Waste Management (a committee appointed by the UK government), 2005: provided expert advice and technical analysis on long-term safety and security of radioactive waste management.
• Legal Resources Centre, Cape Town, South Africa, 2004-2007: conducted technical analysis regarding the proposed South African pebble bed modular nuclear reactor.
• STAR Foundation, New York, 2002-2004: reviewed planning and actions for decommissioning of research reactors at Brookhaven National Laboratory.
• Attorney General of Utah, 2003: conducted technical analysis and provided expert testimony regarding a proposed national storage facility for spent nuclear fuel.
• Citizens Awareness Network, Massachusetts, 2002-2003: conducted analysis on robust storage of spent nuclear fuel.
• Tides Center, California, 2002-2004: conducted analysis for the Santa Susana Field Laboratory (SSFL) Advisory Panel regarding the history of releases of hazardous material from the SSFL.
• Orange County, North Carolina, 1999-2002: assessed risk issues associated with the Harris nuclear power plant, identified risk-reduction options, and prepared expert testimony.
• William and Flora Hewlett Foundation and other sponsors, 1999-2009: performed research and project development for conflict-management projects, through IRSS's International Conflict Management Program.
• STAR Foundation, New York, 2000-2001: assessed risk issues associated with the Millstone nuclear power plant, identified risk-reduction options, and prepared expert testimony.
• Massachusetts Water Resources Authority, 2000: evaluated risks associated with water supply and wastewater systems that serve greater Boston.
• Canadian Senate, Energy & Environment Committee, 2000: reviewed risk issues associated with the Pickering Nuclear Generating Station.
• Greenpeace International, Amsterdam, 2000: reviewed impacts associated with the La Hague nuclear complex in France.
• Government of Ireland, 1998-2001: developed framework for assessment of impacts and alternative options associated with the Sellafield nuclear complex in the UK.
• Clark University, Worcester, Massachusetts, 1998-1999: participated in confidential review of outcomes of a major foundation's grants related to climate change.

• UN High Commissioner for Refugees, 1998: co-developed a strategy for conflict management in the CIS region.
• General Council of County Councils (Ireland), W. Alton Jones Foundation (USA), and Nuclear Free Local Authorities (UK), 1996-2000: assessed environmental and economic issues of nuclear fuel reprocessing in the UK; assessed alternative options.
• Environmental School, Clark University, Worcester, Massachusetts, 1996: session leader at the Summer Institute, "Local Perspectives on a Global Environment".
• Greenpeace Germany, Hamburg, 1995-1996: performed a study on war, terrorism and nuclear power plants.
• HKH Foundation, New York, and Winston Foundation for World Peace, Washington, DC, 1994-1996: studies and workshops on preventive action and its role in US national security planning.
• Carnegie Corporation of New York, Winston Foundation for World Peace, Washington, DC, and others, 1995: collaboration with the Organization for Security and Cooperation in Europe to facilitate improved coordination of activities and exchange of knowledge in the field of conflict management.
• World Bank, 1993-1994: a study on management of data describing the performance of projects funded by the Global Environment Facility (joint project of IRSS and Clark University).
• International Physicians for the Prevention of Nuclear War, 1993-1994: a study on the international control of weapons-usable fissile material.
• Government of Lower Saxony, Hannover, Germany, 1993: analysis of standards for radioactive waste disposal.
• University of Vienna (using funds supplied by the Austrian government), 1992: review of radioactive waste management at the Dukovany nuclear power plant, Czech Republic.
• Sandia National Laboratories, 1992-1993: advice to the US Department of Energy's Office of Foreign Intelligence.
• US Department of Energy and Battelle Pacific Northwest Laboratories, 1991-1992: advice for the Intergovernmental Panel on Climate Change regarding the design of an information system on technologies that can limit greenhouse gas emissions (joint project of IRSS, Clark University and the Center for Strategic and International Studies).
• Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1992-1993: development and publication of recommendations for strengthening the International Atomic Energy Agency.
• MacArthur Foundation, Chicago, Illinois, W. Alton Jones Foundation, Charlottesville, Virginia, and other funding sources, 1984-1993: policy analysis and public education on a "global approach" to arms control and disarmament.
• Energy Research Foundation, Columbia, South Carolina, and Peace Development Fund, Amherst, Massachusetts, 1988-1992: review of the US government's tritium production (for nuclear weapons) and its implications.
• Coalition of Environmental Groups, Toronto, Ontario (using funds supplied by Ontario Hydro under the direction of the Ontario government), 1990-1993: coordination and conduct of analysis and preparation of testimony on accident risk of nuclear power plants.
• Greenpeace International, Amsterdam, Netherlands, 1988-1990: review of probabilistic risk assessment for nuclear power plants.

• Bellerive Foundation, Geneva, Switzerland, 1989-1990: planning for a June 1990 colloquium on disarmament, and editing of proceedings.
• Iler Research Institute, Harrow, Ontario, 1989-1990: analysis of regulatory response to boiling-water reactor accident potential.
• Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1988-1989: analysis of future options for NATO (joint project of IRSS and the Institute for Peace and International Security).
• Nevada Nuclear Waste Project Office, Carson City, Nevada (via Clark University), 1989-1990: analyses of risk aspects of radioactive waste management and disposal.
• Ontario Nuclear Safety Review (conducted by the Ontario government), Toronto, Ontario, 1987: review of safety aspects of CANDU reactors.
• Washington Department of Ecology, Olympia, Washington, 1987: analyses of risk aspects of a proposed radioactive waste repository at Hanford.
• Natural Resources Defense Council, Washington, DC, 1986-1987: preparation of expert testimony on hazards of the Savannah River Plant, South Carolina.
• Lakes Environmental Association, Bridgton, Maine, 1986: analysis of federal regulations for disposal of radioactive waste.
• Greenpeace Germany, Hamburg, 1986: participation in an international study on the hazards of nuclear power plants.
• Three Mile Island Public Health Fund, Philadelphia, Pennsylvania, 1983-1989: studies related to the Three Mile Island nuclear power plant and emergency response planning.
• Attorney General, Commonwealth of Massachusetts, 1984-1989: analyses of the safety of the Seabrook nuclear power plant, and preparation of expert testimony.
• Union of Concerned Scientists, Cambridge, Massachusetts, 1980-1985: studies on energy demand and supply, nuclear arms control, and the safety of nuclear installations.
• Conservation Law Foundation of New England, Boston, Massachusetts, 1985: preparation of expert testimony on cogeneration potential at a Maine paper mill.
• Town & Country Planning Association, London, UK, 1982-1984: coordination and conduct of a study on safety and radioactive waste implications of the proposed Sizewell nuclear power plant, and testimony to the Sizewell Public Inquiry.
• US Environmental Protection Agency, Washington, DC, 1980-1981: assessment of the cleanup of Three Mile Island Unit 2 nuclear power plant.
• Center for Energy & Environmental Studies, Princeton University, Princeton, New Jersey, and Solar Energy Research Institute, Golden, Colorado, 1979-1980: studies on the potentials of renewable energy sources.
• Government of Lower Saxony, Hannover, Federal Republic of Germany, 1978-1979: coordination and conduct of studies on safety and security aspects of the proposed Gorleben nuclear fuel cycle center.

<u>Other experience (selected)</u>

• Principal investigator, project on "Exploring the Role of 'Sustainable Cities' in Preventing Climate Disruption", involving IRSS and three other organizations, 1990-1991.
• Visiting fellow, Peace Research Centre, Australian National University, 1989.

• Principal investigator, Three Mile Island emergency planning study, involving IRSS, Clark University and other partners, 1987-1989.
• Co-leadership (with Paul Walker) of a study group on nuclear weapons proliferation, Institute of Politics, Harvard University, 1981.
• Foundation (with others) of an ecological political movement in Oxford, UK, which contested the 1979 Parliamentary election.
• Conduct of cross-examination and presentation of expert testimony, on behalf of the Political Ecology Research Group, at the 1977 Public Inquiry into proposed expansion of reprocessing capacity at Windscale, UK.
• Conduct of research on plasma theory (while a D.Phil candidate), as an associate staff member, Culham Laboratory, UK Atomic Energy Authority, 1969-1973.
• Service as a design engineer on coal-fired power plants, New South Wales Electricity Commission, Sydney, Australia, 1968.

Publications (selected)

• *New and Significant Information from the Fukushima Daiichi Accident in the Context of Future Operation of the Pilgrim Nuclear Power Plant*, a report for the Attorney General, Commonwealth of Massachusetts, June 2011.
• *Outline of a Code of Conduct for Transfer of Nuclear Power Plant Technology to Consumer Countries*, a report for Nautilus Institute and RMIT University, April 2011.
• *Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination*, a report for Texans for a Sound Energy Policy, Victoria, Texas, February 2009.
• *Scope of the EIS for New Nuclear Power Plants at the Darlington Site in Ontario: Accidents, Malfunctions and the Precautionary Approach*, a report for Greenpeace Canada, November 2008.
• *Cost Implications of the Residual Radiological Risk of Nuclear Generation of Electricity in Ontario*, a report for the Green Energy Coalition et al, July 2008.
• "The US Effort to Dispose of High-Level Radioactive Waste", *Energy and Environment*, Volume 19, Numbers 3 and 4 (joint issue), 2008, pp 391-412.
• *Design and Siting Criteria for Nuclear Power Plants in the 21st Century*, a report for Greenpeace Canada, January 2008.
• *Risk-Related Impacts from Continued Operation of the Indian Point Nuclear Power Plants*, a report for Riverkeeper, Tarrytown, New York, November 2007.
• *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site*, a report for San Luis Obispo Mothers for Peace, California, June 2007.
• *Health as a Bridge for Peace: Achievements, Challenges, and Opportunities for Action by WHO* (with Paula Gutlove), a report for the Department for Health Action in Crises, World Health Organization, Geneva, December 2006.
• "Using Psychosocial Healing in Postconflict Reconstruction" (with Paula Gutlove), in Mari Fitzduff and Chris E. Stout (eds), *The Psychology of Resolving Global Conflicts: From War to Peace*, Praeger Security International, 2006.

• "What Role for Nuclear Power in a Sustainable Civilization?", *The Green Cross Optimist*, Spring 2006, pp 28-30.
• *Radiological Risk of Homeport Basing of a Nuclear-Propelled Aircraft Carrier in Yokosuka, Japan*, a report for the Citizens Coalition Concerning the Homeporting of a CVN in Yokosuka, June 2006.
• *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, a report for the Attorney General, Commonwealth of Massachusetts, May 2006.
• *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, a report for the UK Committee on Radioactive Waste Management, November 2005.
• "Plasma, policy and progress", *The Australian Mathematical Society Gazette*, Volume 32, Number 3, 2005, pp 162-168.
• "A Psychosocial-Healing Approach to Post-Conflict Reconstruction" (with Paula Gutlove), *Mind & Human Interaction*, Volume 14, Number 1, 2005, pp 35-63.
• "Designing Infrastructure for New Goals and Constraints", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, 27-28 April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-02, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
• "Potential Radioactive Releases from Commercial Reactors and Spent Fuel", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, 27-28 April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-03, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
• *Safety of the Proposed South African Pebble Bed Modular Reactor*, a report for the Legal Resources Centre, Cape Town, South Africa, 12 January 2005.
• *Releases of Hazardous Material from the Santa Susana Field Laboratory: A Retrospective Review*, a report for the SSFL Advisory Panel, June 2004.
• *Decommissioning of Research Reactors at Brookhaven National Laboratory: Status, Future Options and Hazards*, a report for STAR Foundation, East Hampton, New York, April 2004.
• "Psychosocial Healing and Post-Conflict Social reconstruction in the Former Yugoslavia" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 20, Number 2, April-June 2004, pp 136-150.
• "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States" (with Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane and Frank N. von Hippel), *Science and Global Security*, Volume 11, 2003, pp 1-51.
• "Health, Human Security, and Social Reconstruction in Afghanistan" (with Paula Gutlove and Jacob Hale Russell), in John D. Montgomery and Dennis A. Rondinelli (eds), *Beyond Reconstruction in Afghanistan*, Palgrave Macmillan, 2004.

• *Psychosocial Healing: A Guide for Practitioners, based on programs of the Medical Network for Social Reconstruction in the Former Yugoslavia* (with Paula Gutlove), IRSS, Cambridge, Massachusetts and OMEGA Health Care Center, Graz, Austria, May 2003.
• *A Call for Action to Protect the Nation Against Enemy Attack on Nuclear Power Plants and Spent Fuel*, and a Supporting Document, San Luis Obispo Mothers for Peace, California, April 2003 and May 2003.
• "Human Security: Expanding the Scope of Public Health" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 19, 2003, pp 17-34.
• *Social Reconstruction in Afghanistan through the Lens of Health and Human Security* (with Paula Gutlove and Jacob Hale Russell), IRSS, Cambridge, Massachusetts, May 2003.
• *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security*, a report for Citizens Awareness Network, Shelburne Falls, Massachusetts, January 2003.
• *Medical Network for Social Reconstruction in the Former Yugoslavia: A Survey of Participants' Views on the Network's Goals and Achievements*, IRSS, Cambridge, Massachusetts, September 2001.
• *The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated by a Severe Reactor Accident*, a report for Orange County, North Carolina, November 2000.
• *A Review of the Accident Risk Posed by the Pickering 'A' Nuclear Generating Station,* a report for the Standing Committee on Energy, Environment and Natural Resources, Canadian Senate, August 2000.
• *High-Level Radioactive Liquid Waste at Sellafield: An Updated Review*, a report for the UK Nuclear Free Local Authorities, June 2000.
• *Hazard Potential of the La Hague Site: An Initial Review*, a report for Greenpeace International, May 2000.
• *A Strategy for Conflict Management: Integrated Action in Theory and Practice* (with Paula Gutlove), IRSS, Cambridge, Massachusetts, March 1999.
• *Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant*, a report for Orange County, North Carolina, February 1999.
• *High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy*, IRSS, Cambridge, Massachusetts, June 1998.
• "Science, democracy and safety: why public accountability matters", in F. Barker (ed), *Management of Radioactive Wastes: Issues for local authorities*, Thomas Telford, London, 1998.
• "Conflict Management and the OSCE" (with Paula Gutlove), *OSCE/ODIHR Bulletin*, Volume 5, Number 3, Fall 1997.
• *Safety of the Storage of Liquid High-Level Waste at Sellafield* (with Peter Taylor), Nuclear Free Local Authorities, UK, November 1996.
• *Assembling Evidence on the Effectiveness of Preventive Actions, their Benefits, and their Costs: A Guide for Preparation of Evidence*, IRSS, Cambridge, Massachusetts, August 1996.
• *War, Terrorism and Nuclear Power Plants,* Peace Research Centre, Australian National University, Canberra, October 1996.

• "The Potential for Cooperation by the OSCE and Non-Governmental Actors on Conflict Management" (with Paula Gutlove), *Helsinki Monitor*, Volume 6 (1995), Number 3.
• "Potential Characteristics of Severe Reactor Accidents at Nuclear Plants", "Monitoring and Modelling Atmospheric Dispersion of Radioactivity Following a Reactor Accident" (with Richard Sclove, Ulrike Fink and Peter Taylor), "Safety Status of Nuclear Reactors and Classification of Emergency Action Levels", and "The Use of Probabilistic Risk Assessment in Emergency Response Planning for Nuclear Power Plant Accidents" (with Robert Goble), in D. Golding, J. X. Kasperson and R. E. Kasperson (eds), *Preparing for Nuclear Power Plant Accidents*, Westview Press, Boulder, Colorado, 1995.
• *A Data Manager for the Global Environment Facility* (with Robert Goble), Environment Department, The World Bank, June 1994.
• *Preventive Diplomacy and National Security* (with Paula Gutlove), Winston Foundation for World Peace, Washington, DC, May 1994.
• *Opportunities for International Control of Weapons-Usable Fissile Material*, International Physicians for the Prevention of Nuclear War, Cambridge, Massachusetts, January 1994.
• "Article III and IAEA Safeguards", in F. Barnaby and P. Ingram (eds), *Strengthening the Non-Proliferation Regime*, Oxford Research Group, Oxford, UK, December 1993.
• *Risk Implications of Potential New Nuclear Plants in Ontario* (prepared with the help of eight consultants), a report for the Coalition of Environmental Groups, Toronto, submitted to the Ontario Environmental Assessment Board, November 1992 (3 volumes).
• *Strengthening the International Atomic Energy Agency*, IRSS, Cambridge, Massachusetts, September 1992.
• *Design of an Information System on Technologies that can Limit Greenhouse Gas Emissions* (with Robert Goble and F. Scott Bush), Center for Strategic and International Studies, Washington, DC, May 1992.
• *Managing Nuclear Accidents: A Model Emergency Response Plan for Power Plants and Communities* (with six other authors), Westview Press, Boulder, CO, 1992.
• "Let's X-out the K" (with Steven C. Sholly), *Bulletin of the Atomic Scientists*, March 1992, pp 14-15.
• "A Worldwide Programme for Controlling Fissile Material", and "A Global Strategy for Nuclear Arms Control", in F. Barnaby (ed), *Plutonium and Security*, Macmillan Press, UK, 1992.
• *No Restart for K Reactor* (with Steven C. Sholly), IRSS, Cambridge, Massachusetts, October 1991.
• *Regulatory Response to the Potential for Reactor Accidents: The Example of Boiling-Water Reactors,* IRSS, Cambridge, Massachusetts, February 1991.
• *Peace by Piece: New Options for International Arms Control and Disarmament*, IRSS, Cambridge, Massachusetts, January 1991.
• *Developing Practical Measures to Prevent Climate Disruption* (with Robert Goble), CENTED Research Report No. 6, Clark University, Worcester, Massachusetts, August 1990.
• "Treaty a Useful Relic", *Bulletin of the Atomic Scientists*, July/August 1990, pp 32-33.

• "Practical Steps for the 1990s", in Sadruddin Aga Khan (ed), *Non-Proliferation in a Disarming World*, Proceedings of the Groupe de Bellerive's 6th International Colloquium, Bellerive Foundation, Geneva, Switzerland, 1990.
• *A Global Approach to Controlling Nuclear Weapons*, IRSS, Cambridge, Massachusetts, October 1989.
• *IAEA Safety Targets and Probabilistic Risk Assessment* (with three other authors), Greenpeace International, Amsterdam, August 1989.
• *New Directions for NATO* (with Paul Walker and Pam Solo), published jointly by IRSS and the Institute for Peace and International Security (both of Cambridge, Massachusetts), December 1988.
• "Verifying a Halt to the Nuclear Arms Race", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
• "Verification of a Cutoff in the Production of Fissile Material", in F.Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
• "Severe Accident Potential of CANDU Reactors," Consultant's Report in *The Safety of Ontario's Nuclear Power Reactors*, Ontario Nuclear Safety Review, Toronto, February 1988.
• *Nuclear-Free Zones* (edited with David Pitt), Croom Helm Ltd, Beckenham, UK, 1987.
• *Risk Assessment Review For the Socioeconomic Impact Assessment of the Proposed High-Level Nuclear Waste Repository at Hanford Site, Washington* (edited; written with five other authors), prepared for the Washington Department of Ecology, December 1987.
• *The Nuclear Freeze Revisited* (with Andrew Haines), Nuclear Freeze and Arms Control Research Project, Bristol, UK, November 1986. Variants of the same paper have appeared as Working Paper No. 18, Peace Research Centre, Australian National University, Canberra, February 1987, and in *ADIU Report*, University of Sussex, Brighton, UK, Jan/Feb 1987, pp 6-9.
• *International Nuclear Reactor Hazard Study* (with fifteen other authors), Greenpeace, Hamburg, Federal Republic of Germany (2 volumes), September 1986.
• "What happened at Reactor Four" (the Chernobyl reactor accident), *Bulletin of the Atomic Scientists*, August/September 1986, pp 26-31.
• *The Source Term Debate: A Report by the Union of Concerned Scientists* (with Steven C. Sholly), Union of Concerned Scientists, Cambridge, Massachusetts, January 1986.
• "Checks on the spread" (a review of three books on nuclear proliferation), *Nature*, 14 November 1985, pp 127-128.
• Editing of *Perspectives on Proliferation*, August 1985, published by the Proliferation Reform Project, IRSS.
• "A Turning Point for the NPT ?", *ADIU Report*, University of Sussex, Brighton, UK, Nov/Dec 1984, pp 1-4.
• "Energy Economics", in J. Dennis (ed), *The Nuclear Almanac*, Addison-Wesley, Reading, Massachusetts, 1984.
• "The Genesis of Nuclear Power", in J. Tirman (ed), *The Militarization of High Technology*, Ballinger, Cambridge, Massachusetts, 1984.
• *A Second Chance: New Hampshire's Electricity Future as a Model for the Nation* (with Linzee Weld), Union of Concerned Scientists, Cambridge, Massachusetts, 1983.

• *Safety and Waste Management Implications of the Sizewell PWR* (prepared with the help of six consultants), a report to the Town & Country Planning Association, London, UK, 1983.
• *Utility-Scale Electrical Storage in the USA: The Prospects of Pumped Hydro, Compressed Air, and Batteries*, Princeton University report PU/CEES #120, 1981.
• *The Prospects for Wind and Wave Power in North America*, Princeton University report PU/CEES # 117, 1981.
• *Hydroelectric Power in the USA: Evolving to Meet New Needs*, Princeton University report PU/CEES # 115, 1981.
• Editing and part authorship of "Potential Accidents & Their Effects", Chapter III of *Report of the Gorleben International Review*, published in German by the Government of Lower Saxony, FRG, 1979; Chapter III published in English by the Political Ecology Research Group, Oxford, UK.
• *A Study of the Consequences to the Public of a Severe Accident at a Commercial FBR located at Kalkar, West Germany*, Political Ecology Research Group, 1978.

Expert presentations and testimony (selected)

• Egyptian Council for Foreign Affairs, Cairo, May 2011: presentation, "Nuclear Technology and Global Child Health: Threats and Opportunities".
• Bibliotecha Alexandrina, Egypt, April 2011: presentation, "Accelerating a Green-Technology Transition: A Leading Role for the BA".
• Conference, *Prospects for Nuclear Non-Proliferation and Disarmament*, Cairo, October 2010: presentation (with Paula Gutlove), "The Potential for Near-Term Confidence-Building Measures and Cooperative Actions for an Eventual Middle East NWFZ, Promoting the 2012 Conference".
• Blue Ribbon Commission on America's Nuclear Future, Washington, DC, September 2010: presentation to the Subcommittee on transportation & storage of radioactive waste.
• Green Cross Strategy Workshop, Geneva, May 2010: presentation, "Nuclear Weapons and Power: Issues and Opportunities".
• Munk Centre for International Studies, University of Toronto, March 2010: presentation (with Paula Gutlove), "Demonstrating a New Approach to Stability in Afghanistan: Remote Engagement for Community Empowerment and Rural Development".
• Maxwell School, Syracuse University, February 2009: presentation, "A Second Track for Climate Negotiations: The Biosphere as Common Property".
• Marsh Institute, Clark University, February 2009: presentation, "Green Energy, Economic Renewal and Societal Learning: Research/Action Opportunities for Academia".
• Society for Risk Analysis annual meeting, Boston, Massachusetts, December 2008: presentation, "Multi-Criteria Frameworks for Considering Diverse Risks in Infrastructure Design".
• Institute of Environmental Studies, University of New South Wales, Sydney, Australia, April 2008: presentation, "Citizen Engagement for Sustainable Society".
• Department of Urban and Regional Planning, Shaheed Beheshti University, Tehran, April 2008: presentation, "Sustainable Cities: Challenges and Opportunities".

• National Academy of Sciences, Washington, DC, January 2008: presentation, "What do interested parties think about the expansion of nuclear energy?"
• Abt Associates, Cambridge, Massachusetts, March 2007: presentation, "Creating Informed Action on Climate Change".
• Universities of Medical Science in Tabriz and Isfahan, Iran, April 2007: presentation, "Healthy Design of the Built Environment".
• Minnesota Public Utilities Commission, 2006: testimony regarding trends, risks and costs associated with management of spent fuel from the Monticello nuclear power plant.
• Presentation, "Are Nuclear Installations Terrorist Targets?", at the conference, *Nuclear Energy: Does it Have a Future?*, Drogheda, County Louth, Ireland, 10-11 March 2005.
• Presentation at the session, "UN Security Council Resolution 1244 and Final Status for Kosovo", at the conference, *Lessons Learned from the Balkan Conflicts*, Boston College, Chestnut Hill, Massachusetts, 16-17 October 2004.
• California Public Utilities Commission, 2004: testimony regarding the nature and cost of potential measures for enhanced defense of the Diablo Canyon nuclear power plant.
• European Parliament, 2003: invited presentation to EP members regarding safety and security issues at the Sellafield nuclear site in the UK, and broader implications.
• US Congress, 2002 and 2003: invited presentations at member-sponsored staff briefings on vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
• Numerous public forums in the USA, 2001-2006: invited presentations to public officials and general audiences regarding vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
• UK Consensus Conference on Radioactive Waste Management, 1999: invited testimony on information and decision-making.
• Joint Committee on Public Enterprise and Transport, Irish Parliament, 1999: invited testimony on nuclear fuel reprocessing and international security.
• UK and Irish Parliaments, 1998: invited presentations to members on risks and alternative options associated with nuclear fuel reprocessing in the UK.
• Center for Russian Environmental Policy, Moscow, 1996: invited presentation at a forum in parallel with the G-7 Nuclear Safety Summit.
• Lacey Township Zoning Board, New Jersey, 1995: testimony regarding radioactive waste management.
• Ontario Court of Justice, Toronto, Ontario, 1993: testimony regarding Canada's Nuclear Liability Act.
• Oxford Research Group, seminar on "The Plutonium Legacy", Rhodes House, Oxford, UK, 1993: invited presentation on nuclear safeguards.
• Defense Nuclear Facilities Safety Board, Washington, DC, 1991: testimony regarding the proposed restart of K-reactor, Savannah River Site.
• Conference to consider amending the Partial Test Ban Treaty, United Nations, New York, 1991: presentation on a global approach to arms control and disarmament.
• US Department of Energy, hearing on draft EIS for new production reactor capacity, Columbia, South Carolina, 1991: testimony on tritium need and implications of tritium production options.

• Society for Risk Analysis, 1990 annual meeting, New Orleans, special session on nuclear emergency planning: presentation on real-time techniques for anticipating emergencies.
• Parliamentarians' Global Action, 11th Annual Parliamentary Forum, United Nations, Geneva, 1990: invited presentation on the potential for multilateral nuclear arms control.
• Advisory Committee on Nuclear Facility Safety, Washington, DC, 1989: testimony on public access to information and on government accountability.
• Peace Research Centre, Australian National University, seminar on "Australia and the Fourth NPT Review Conference", Canberra, 1989: invited presentation regarding a universal nuclear weapons non-proliferation regime.
• Carnegie Endowment for International Peace, Conference on "Nuclear Non-Proliferation and the Role of Private Organizations", Washington, DC, 1989: invited presentation on options for reform of the non-proliferation regime.
• US Department of Energy, EIS scoping hearing, Columbia, South Carolina, 1988: testimony on appropriate scope of an EIS for new production reactor capacity.
• International Physicians for the Prevention of Nuclear War, 6th and 7th Annual Congresses, Koln, FRG, 1986 and Moscow, USSR, 1987: invited presentations on relationships between nuclear power and the threat of nuclear war.
• County Council, Richland County, South Carolina, 1987: testimony on implications of severe reactor accidents at the Savannah River Plant.
• Maine Land Use Regulation Commission, 1985: testimony on cogeneration potential at facilities of Great Northern Paper Company.
• Interfaith Hearings on Nuclear Issues, Toronto, Ontario, 1984: invited presentations on options for Canada's nuclear trade and Canada's involvement in nuclear arms control.
• Sizewell Public Inquiry, UK, 1984: testimony on safety and radioactive waste implications of the proposed Sizewell nuclear power plant.
• New Hampshire Public Utilities Commission, 1983: testimony on electricity demand and supply options for New Hampshire.
• Atomic Safety & Licensing Board, US Nuclear Regulatory Commission, 1983: testimony on use of filtered venting at the Indian Point nuclear power plant.
• US National Advisory Committee on Oceans and Atmosphere, 1982: testimony on implications of ocean disposal of radioactive waste.
• Environmental & Energy Study Conference, US Congress, 1982: invited presentation on implications of radioactive waste management.

**Curriculum Vitae for Gordon R. Thompson**
**January 2016**

Professional expertise

• Technical and policy analyses in the fields of energy, environment, sustainable development, human security, and international security.

Current appointments

• Executive director, Institute for Resource & Security Studies (IRSS), Cambridge, Massachusetts (since 1984).
• Senior research scientist, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts (since 2002).

Education

• D.Phil., applied mathematics, Oxford University (Balliol College), 1973.
• B.E., mechanical engineering, Univ. of New South Wales, Sydney, Australia, 1967.
• B.Sc., mathematics & physics, Univ. of New South Wales, 1966.

Project sponsors and tasks (selected)

• Individual donors to IRSS, 2013-present: development of analytic and citizen-engagement methodologies to assist broad-based societal navigation in the 21st century.
• Program on Science and Global Security (Princeton University), Managing the Atom Project (Harvard University), and China Arms Control and Disarmament Association, 2011-2015: technical and policy analyses, participation in expert workshops, and public presentations on risk and sustainability issues re. nuclear fuel reprocessing worldwide.
• National Consortium for the Study of Terrorism and Responses to Terrorism, University of Maryland, 2015: technical advice re. a study on the potential for violent, non-state actors to acquire fissile material.
• A US-wide consortium of environmental organizations, 2012-2014: technical and policy analyses and provision of expert testimony re. management of spent nuclear fuel.
• Greenpeace Canada, 2007-2014: technical and policy analyses on risk and sustainability issues re. the use of nuclear energy.
• Nautilus Institute, 2011-2013: technical analyses, and participation in expert workshops in China and ROK, re. risks arising from management of spent nuclear fuel.
• Sierra Club Canada, 2013: analyses of risk issues and provision of expert testimony re. a proposed deep geologic repository for radioactive waste in Ontario.
• Attorney General of Massachusetts, 2006-2008 and 2011-2012: analyses of risk issues and provision of expert testimony re. the Pilgrim and Vermont Yankee nuclear power plants; work in the later period took account of the Fukushima accident of 2011.

• Nautilus Institute and RMIT University, 2009-2011: policy and technical analyses on transfer of nuclear power technology to consumer countries.
• CharityHelp International and other sponsors, 2009-2011: co-convening of the Connectivity to Enhance Global Human Security initiative.
• US Institute of Peace and other sponsors, 2005-2011: co-convening of the Working Group on US-Iran Health Science Cooperation.
• Texans for a Sound Energy Policy, 2009: review of the US Nuclear Regulatory Commission's Draft Waste Confidence Decision.
• Green Energy Coalition, Pembina Institute, and Ontario Sustainable Energy Association, 2008: provision of testimony to the Ontario Energy Board.
• World Health Organization, 2006-2007: policy analyses on the potential for "health-bridge" programs to improve cooperation within and between nations.
• Sierra Club Canada, 2006-2007: preparation of a strategy for development of planning and public-engagement tools to facilitate action on climate change.
• Mothers for Peace, California, 2002-2009: analyses of risk issues and provision of expert testimony re. the Diablo Canyon nuclear power plants.
• Riverkeeper, New York, 2007-2008: analyses of risk issues and provision of expert testimony re. the Indian Point nuclear power plants.
• Minnesota Center for Environmental Advocacy, and Minnesotans for an Energy Efficient Economy, 2005-2006: technical analyses and provision of expert testimony re. the Monticello nuclear power plant.
• California Energy Commission, 2005: technical analyses and participation in an expert workshop re. safety and security of commercial nuclear facilities.
• Committee on Radioactive Waste Management (a committee appointed by the UK government), 2005: provision of expert advice and technical analyses on long-term safety and security of radioactive waste management.
• Legal Resources Centre, Cape Town, South Africa, 2004-2007: technical analyses re. the proposed South African pebble bed modular nuclear reactor.
• STAR Foundation, New York, 2002-2004: review of planning and actions for decommissioning of research reactors at Brookhaven National Laboratory.
• Attorney General of Utah, 2003: technical analyses and provision of expert testimony re. a proposed national storage facility for spent nuclear fuel.
• Citizens Awareness Network, Massachusetts, 2002-2003: technical and policy analyses on robust storage of spent nuclear fuel.
• Tides Center, California, 2002-2004: analyses for the Santa Susana Field Laboratory (SSFL) Advisory Panel re. the history of releases of hazardous material from the SSFL.
• Orange County, North Carolina, 1999-2002: assessment of risk issues associated with the Harris nuclear power plant, identification of risk-reduction options, and provision of expert testimony.
• William and Flora Hewlett Foundation and other sponsors, 1999-2009: research and project development for conflict-management projects, through IRSS's International Conflict Management Program.
• STAR Foundation, New York, 2000-2001: assessment of risk issues re. the Millstone nuclear power plant, identification of risk-reduction options, and provision of expert testimony.

• Massachusetts Water Resources Authority, 2000: assessment of risks re. water supply and wastewater systems that serve greater Boston.
• Canadian Senate, Energy & Environment Committee, 2000: review of risk issues re. the Pickering Nuclear Generating Station.
• Greenpeace International, Amsterdam, 2000: review of impacts associated with the La Hague nuclear complex in France.
• Government of Ireland, 1998-2001: development of a framework for assessment of impacts and alternative options associated with the Sellafield nuclear complex in the UK.
• Clark University, Worcester, Massachusetts, 1998-1999: participation in a confidential review of outcomes of a major foundation's grants related to climate change.
• UN High Commissioner for Refugees, 1998: co-development of a strategy for conflict management in the CIS region.
• General Council of County Councils (Ireland), W. Alton Jones Foundation (USA), and Nuclear Free Local Authorities (UK), 1996-2000: assessment of environmental and economic issues re. nuclear fuel reprocessing in the UK; identification of alternative options.
• Environmental School, Clark University, Worcester, Massachusetts, 1996: session leader at the Summer Institute, “Local Perspectives on a Global Environment”.
• Greenpeace Germany, Hamburg, 1995-1996: a study on war, terrorism and nuclear power plants.
• HKH Foundation, New York, and Winston Foundation for World Peace, Washington, DC, 1994-1996: studies and workshops on preventive action and its role in US national security planning.
• Carnegie Corporation of New York, Winston Foundation for World Peace, Washington, DC, and others, 1995: collaboration with the Organization for Security and Cooperation in Europe to facilitate improved coordination of activities and exchange of knowledge in the field of conflict management.
• World Bank, 1993-1994: a study on management of data describing the performance of projects funded by the Global Environment Facility (joint project of IRSS and Clark University).
• International Physicians for the Prevention of Nuclear War, 1993-1994: a study on international control of weapons-usable fissile material.
• Government of Lower Saxony, Hannover, Germany, 1993: analyses of standards for radioactive waste disposal.
• University of Vienna (using funds supplied by the Austrian government), 1992: review of radioactive waste management at the Dukovany nuclear power plant, Czech Republic.
• Sandia National Laboratories, 1992-1993: advice to the US Department of Energy's Office of Foreign Intelligence.
• US Department of Energy and Battelle Pacific Northwest Laboratories, 1991-1992: advice for the Intergovernmental Panel on Climate Change regarding the design of an information system on technologies that can limit greenhouse gas emissions (joint project of IRSS, Clark University and the Center for Strategic and International Studies).
• Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1992-1993: development and publication of recommendations for strengthening the International Atomic Energy Agency.

• MacArthur Foundation, Chicago, Illinois, W. Alton Jones Foundation, Charlottesville, Virginia, and other funding sources, 1984-1993: policy analyses and public education on a "global approach" to arms control and disarmament.
• Energy Research Foundation, Columbia, South Carolina, and Peace Development Fund, Amherst, Massachusetts, 1988-1992: review of the US government's tritium production (for nuclear weapons) and its implications.
• Coalition of Environmental Groups, Toronto, Ontario (using funds supplied by Ontario Hydro under the direction of the Ontario government), 1990-1993: coordination and conduct of analyses and provision of testimony on accident risk of nuclear power plants.
• Greenpeace International, Amsterdam, Netherlands, 1988-1990: review of probabilistic risk assessment for nuclear power plants.
• Bellerive Foundation, Geneva, Switzerland, 1989-1990: planning for a June 1990 colloquium on disarmament, and editing of proceedings.
• Iler Research Institute, Harrow, Ontario, 1989-1990: analyses of regulatory response to boiling-water reactor accident potential.
• Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1988-1989: analyses of future options for NATO (joint project of IRSS and the Institute for Peace and International Security).
• Nevada Nuclear Waste Project Office, Carson City, Nevada (via Clark University), 1989-1990: analyses of risk aspects of radioactive waste management and disposal.
• Ontario Nuclear Safety Review (conducted by the Ontario government), Toronto, Ontario, 1987: review of safety aspects of CANDU reactors.
• Washington Department of Ecology, Olympia, Washington, 1987: analyses of risk issues re. a proposed radioactive waste repository at Hanford.
• Natural Resources Defense Council, Washington, DC, 1986-1987: provision of expert testimony on risk issues re. military production reactors at the Savannah River Plant, South Carolina.
• Lakes Environmental Association, Bridgton, Maine, 1986: analyses of federal regulations for disposal of radioactive waste.
• Greenpeace Germany, Hamburg, 1986: participation in an international study on the hazards of nuclear power plants.
• Three Mile Island Public Health Fund, Philadelphia, Pennsylvania, 1983-1989: studies re. the Three Mile Island nuclear power plant and emergency response planning.
• Attorney General of Massachusetts, 1984-1989: analyses of risk issues re. Seabrook nuclear power plant, and provision of expert testimony.
• Union of Concerned Scientists, Cambridge, Massachusetts, 1980-1985: studies on energy demand and supply, nuclear arms control, and the safety of nuclear installations.
• Conservation Law Foundation of New England, Boston, Massachusetts, 1985: provision of expert testimony on cogeneration potential at a Maine paper mill.
• Town & Country Planning Association, London, UK, 1982-1984: coordination and conduct of a study on safety and radioactive waste implications of the proposed Sizewell nuclear power plant, and testimony to the Sizewell Public Inquiry.
• US Environmental Protection Agency, Washington, DC, 1980-1981: assessment of the cleanup of Three Mile Island Unit 2 nuclear power plant.

• Center for Energy & Environmental Studies, Princeton University, Princeton, New Jersey, and Solar Energy Research Institute, Golden, Colorado, 1979-1980: studies on the potentials of renewable energy sources.
• Government of Lower Saxony, Hannover, Federal Republic of Germany, 1978-1979: coordination and conduct of studies on safety and security aspects of the proposed Gorleben nuclear fuel cycle center.

Other experience (selected)

• Principal investigator, project on "Exploring the Role of 'Sustainable Cities' in Preventing Climate Disruption", involving IRSS and three other organizations, 1990-1991.
• Visiting fellow, Peace Research Centre, Australian National University, 1989.
• Principal investigator, Three Mile Island emergency planning study, involving IRSS, Clark University and other partners, 1987-1989.
• Co-leadership (with Paul Walker) of a study group on nuclear weapons proliferation, Institute of Politics, Harvard University, 1981.
• Foundation (with others) of an ecological political movement in Oxford, UK, which contested the 1979 Parliamentary election.
• Conduct of cross-examination and presentation of expert testimony, on behalf of the Political Ecology Research Group, at the 1977 Public Inquiry into proposed expansion of reprocessing capacity at Windscale, UK.
• Conduct of research on plasma theory (while a D.Phil student), as an associate staff member, Culham Laboratory, UK Atomic Energy Authority, 1969-1973.
• Service as a design engineer on coal-fired power plants, New South Wales Electricity Commission, Sydney, Australia, 1968.

Publications (selected)

• "Mutual-Gains Negotiation as a Leadership Tool for the 21st Century" (with Paula Gutlove), *Management Magazine*, Simmons School of Management, Fall 2015, pp 12-14.
• "The Iran Nuclear Agreement: A Test of US Leadership" (with Paula Gutlove), *The World Post*, 2 September 2015.
• *Plutonium Separation in Nuclear Power Programs: Status, Problems, and Prospects of Civilian Reprocessing Around the World* (with ten other authors), a report by the International Panel on Fissile Materials, 2015.
• "Ebola and Human Security" (with Paula Gutlove), *Asia Times Online*, 21 October 2014.
• *Radiological Risk at Nuclear Fuel Reprocessing Plants*, a report for the Program on Science and Global Security, Princeton University, July 2014.
• *Radiological Risk at Nuclear Fuel Reprocessing Plants, Appendix A: La Hague Site*, a report for the Program on Science and Global Security, Princeton University, May 2014.
• *Darlington Refurbishment: Risk Issues Require Greater Attention*, a report for Greenpeace Canada, February 2014.
• *Comments on the US Nuclear Regulatory Commission's Waste Confidence Generic*

*Environmental Impact Statement, Draft Report for Comment (September 2013)*, a declaration on behalf of a US-wide consortium of environmental organizations, December 2013.
• *Radiological Risk at Nuclear Fuel Reprocessing Plants, Appendix B: Rokkasho Site*, a report for the Program on Science and Global Security, Princeton University, November 2013.
• "Systems Integration for Sustainable Outcomes: A Proposed Curriculum", proceedings of the conference, *Engineering Education for Sustainable Development – EESD13*, Cambridge University, UK, September 2013.
• *Comments on OPG's Proposal to Develop a Deep Geologic Repository for Radioactive Waste: A Neglected Potential for Malevolent Acts*, a report for Sierra Club Canada, August 2013.
• *Handbook to Support Assessment of Radiological Risk Arising from Management of Spent Nuclear Fuel*, a report for Nautilus Institute for Security and Sustainability, January 2013.
• "Unmasking the truth: The science and policy of low-dose ionizing radiation", *Bulletin of the Atomic Scientists*, Volume 68, Issue 3, 2012, pp 44-50.
• *New and Significant Information from the Fukushima Daiichi Accident in the Context of Future Operation of the Pilgrim Nuclear Power Plant*, a report for the Attorney General, Commonwealth of Massachusetts, June 2011.
• *Outline of a Code of Conduct for Transfer of Nuclear Power Plant Technology to Consumer Countries*, a report for Nautilus Institute and RMIT University, April 2011.
• *Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination*, a report for Texans for a Sound Energy Policy, Victoria, Texas, February 2009.
• *Scope of the EIS for New Nuclear Power Plants at the Darlington Site in Ontario: Accidents, Malfunctions and the Precautionary Approach*, a report for Greenpeace Canada, November 2008.
• *Cost Implications of the Residual Radiological Risk of Nuclear Generation of Electricity in Ontario*, a report for the Green Energy Coalition et al, July 2008.
• "The US Effort to Dispose of High-Level Radioactive Waste", *Energy and Environment*, Volume 19, Numbers 3 and 4 (joint issue), 2008, pp 391-412.
• *Design and Siting Criteria for Nuclear Power Plants in the 21st Century*, a report for Greenpeace Canada, January 2008.
• *Risk-Related Impacts from Continued Operation of the Indian Point Nuclear Power Plants*, a report for Riverkeeper, Tarrytown, New York, November 2007.
• *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site*, a report for San Luis Obispo Mothers for Peace, California, June 2007.
• *Health as a Bridge for Peace: Achievements, Challenges, and Opportunities for Action by WHO* (with Paula Gutlove), a report for the Department for Health Action in Crises, World Health Organization, Geneva, December 2006.

• "Using Psychosocial Healing in Postconflict Reconstruction" (with Paula Gutlove), in Mari Fitzduff and Chris E. Stout (eds), *The Psychology of Resolving Global Conflicts: From War to Peace*, Praeger Security International, 2006.
• "What Role for Nuclear Power in a Sustainable Civilization?", *The Green Cross Optimist*, Spring 2006, pp 28-30.
• *Radiological Risk of Homeport Basing of a Nuclear-Propelled Aircraft Carrier in Yokosuka, Japan*, a report for the Citizens Coalition Concerning the Homeporting of a CVN in Yokosuka, June 2006.
• *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, a report for the Attorney General, Commonwealth of Massachusetts, May 2006.
• *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, a report for the UK Committee on Radioactive Waste Management, November 2005.
• "Plasma, policy and progress", *The Australian Mathematical Society Gazette*, Volume 32, Number 3, 2005, pp 162-168.
• "A Psychosocial-Healing Approach to Post-Conflict Reconstruction" (with Paula Gutlove), *Mind & Human Interaction*, Volume 14, Number 1, 2005, pp 35-63.
• "Designing Infrastructure for New Goals and Constraints", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-02, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
• "Potential Radioactive Releases from Commercial Reactors and Spent Fuel", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-03, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
• *Safety of the Proposed South African Pebble Bed Modular Reactor*, a report for the Legal Resources Centre, Cape Town, South Africa, 12 January 2005.
• *Releases of Hazardous Material from the Santa Susana Field Laboratory: A Retrospective Review*, a report for the SSFL Advisory Panel, June 2004.
• *Decommissioning of Research Reactors at Brookhaven National Laboratory: Status, Future Options and Hazards*, a report for STAR Foundation, East Hampton, New York, April 2004.
• "Psychosocial Healing and Post-Conflict Social reconstruction in the Former Yugoslavia" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 20, Number 2, April-June 2004, pp 136-150.
• "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States" (with Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane and Frank N. von Hippel), *Science and Global Security*, Volume 11, 2003, pp 1-51.

• "Health, Human Security, and Social Reconstruction in Afghanistan" (with Paula Gutlove and Jacob Hale Russell), in John D. Montgomery and Dennis A. Rondinelli (eds), *Beyond Reconstruction in Afghanistan*, Palgrave Macmillan, 2004.
• *Psychosocial Healing: A Guide for Practitioners, based on programs of the Medical Network for Social Reconstruction in the Former Yugoslavia* (with Paula Gutlove), IRSS, Cambridge, Massachusetts and OMEGA Health Care Center, Graz, Austria, May 2003.
• *A Call for Action to Protect the Nation Against Enemy Attack on Nuclear Power Plants and Spent Fuel*, and a Supporting Document, San Luis Obispo Mothers for Peace, California, April 2003 and May 2003.
• "Human Security: Expanding the Scope of Public Health" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 19, 2003, pp 17-34.
• *Social Reconstruction in Afghanistan through the Lens of Health and Human Security* (with Paula Gutlove and Jacob Hale Russell), IRSS, Cambridge, Massachusetts, May 2003.
• *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security*, a report for Citizens Awareness Network, Shelburne Falls, Massachusetts, January 2003.
• *Medical Network for Social Reconstruction in the Former Yugoslavia: A Survey of Participants' Views on the Network's Goals and Achievements*, IRSS, Cambridge, Massachusetts, September 2001.
• *The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated by a Severe Reactor Accident*, a report for Orange County, North Carolina, November 2000.
• *A Review of the Accident Risk Posed by the Pickering 'A' Nuclear Generating Station,* a report for the Standing Committee on Energy, Environment and Natural Resources, Canadian Senate, August 2000.
• *High-Level Radioactive Liquid Waste at Sellafield: An Updated Review*, a report for the UK Nuclear Free Local Authorities, June 2000.
• *Hazard Potential of the La Hague Site: An Initial Review*, a report for Greenpeace International, May 2000.
• *A Strategy for Conflict Management: Integrated Action in Theory and Practice* (with Paula Gutlove), IRSS, Cambridge, Massachusetts, March 1999.
• *Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant*, a report for Orange County, North Carolina, February 1999.
• *High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy*, IRSS, Cambridge, Massachusetts, June 1998.
• "Science, democracy and safety: why public accountability matters", in F. Barker (ed), *Management of Radioactive Wastes: Issues for local authorities*, Thomas Telford, London, 1998.
• "Conflict Management and the OSCE" (with Paula Gutlove), *OSCE/ODIHR Bulletin*, Volume 5, Number 3, Fall 1997.
• *Safety of the Storage of Liquid High-Level Waste at Sellafield* (with Peter Taylor), Nuclear Free Local Authorities, UK, November 1996.
• *Assembling Evidence on the Effectiveness of Preventive Actions, their Benefits, and their Costs: A Guide for Preparation of Evidence*, IRSS, Cambridge, Massachusetts, August 1996.

• *War, Terrorism and Nuclear Power Plants,* Peace Research Centre, Australian National University, Canberra, October 1996.
• "The Potential for Cooperation by the OSCE and Non-Governmental Actors on Conflict Management" (with Paula Gutlove), *Helsinki Monitor*, Volume 6 (1995), Number 3.
• "Potential Characteristics of Severe Reactor Accidents at Nuclear Plants", "Monitoring and Modelling Atmospheric Dispersion of Radioactivity Following a Reactor Accident" (with Richard Sclove, Ulrike Fink and Peter Taylor), "Safety Status of Nuclear Reactors and Classification of Emergency Action Levels", and "The Use of Probabilistic Risk Assessment in Emergency Response Planning for Nuclear Power Plant Accidents" (with Robert Goble), in D. Golding, J. X. Kasperson and R. E. Kasperson (eds), *Preparing for Nuclear Power Plant Accidents*, Westview Press, Boulder, Colorado, 1995.
• *A Data Manager for the Global Environment Facility* (with Robert Goble), Environment Department, The World Bank, June 1994.
• *Preventive Diplomacy and National Security* (with Paula Gutlove), Winston Foundation for World Peace, Washington, DC, May 1994.
• *Opportunities for International Control of Weapons-Usable Fissile Material*, International Physicians for the Prevention of Nuclear War, Cambridge, Massachusetts, January 1994.
• "Article III and IAEA Safeguards", in F. Barnaby and P. Ingram (eds), *Strengthening the Non-Proliferation Regime*, Oxford Research Group, Oxford, UK, December 1993.
• *Risk Implications of Potential New Nuclear Plants in Ontario* (prepared with the help of eight consultants), a report for the Coalition of Environmental Groups, Toronto, submitted to the Ontario Environmental Assessment Board, November 1992 (3 volumes).
• *Strengthening the International Atomic Energy Agency*, IRSS, Cambridge, Massachusetts, September 1992.
• *Design of an Information System on Technologies that can Limit Greenhouse Gas Emissions* (with Robert Goble and F. Scott Bush), Center for Strategic and International Studies, Washington, DC, May 1992.
• *Managing Nuclear Accidents: A Model Emergency Response Plan for Power Plants and Communities* (with six other authors), Westview Press, Boulder, Colorado, 1992.
• "Let's X-out the K" (with Steven C. Sholly), *Bulletin of the Atomic Scientists*, March 1992, pp 14-15.
• "A Worldwide Programme for Controlling Fissile Material", and "A Global Strategy for Nuclear Arms Control", in F. Barnaby (ed), *Plutonium and Security*, Macmillan Press, UK, 1992.
• *No Restart for K Reactor* (with Steven C. Sholly), IRSS, Cambridge, Massachusetts, October 1991.
• *Regulatory Response to the Potential for Reactor Accidents: The Example of Boiling-Water Reactors,* IRSS, Cambridge, Massachusetts, February 1991.
• *Peace by Piece: New Options for International Arms Control and Disarmament*, IRSS, Cambridge, Massachusetts, January 1991.
• *Developing Practical Measures to Prevent Climate Disruption* (with Robert Goble), CENTED Research Report No. 6, Clark University, August 1990.
• "Treaty a Useful Relic", *Bulletin of the Atomic Scientists*, July/August 1990, pp 32-33.

• "Practical Steps for the 1990s", in Sadruddin Aga Khan (ed), *Non-Proliferation in a Disarming World*, Proceedings of the Groupe de Bellerive's 6th International Colloquium, Bellerive Foundation, Geneva, Switzerland, 1990.
• *A Global Approach to Controlling Nuclear Weapons*, IRSS, Cambridge, Massachusetts, October 1989.
• *IAEA Safety Targets and Probabilistic Risk Assessment* (with three other authors), Greenpeace International, Amsterdam, August 1989.
• *New Directions for NATO* (with Paul Walker and Pam Solo), published jointly by IRSS and the Institute for Peace and International Security (both of Cambridge, Massachusetts), December 1988.
• "Verifying a Halt to the Nuclear Arms Race", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
• "Verification of a Cutoff in the Production of Fissile Material", in F.Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
• "Severe Accident Potential of CANDU Reactors", Consultant's Report in *The Safety of Ontario's Nuclear Power Reactors*, Ontario Nuclear Safety Review, Toronto, February 1988.
• *Nuclear-Free Zones* (edited with David Pitt), Croom Helm Ltd, Beckenham, UK, 1987.
• *Risk Assessment Review For the Socioeconomic Impact Assessment of the Proposed High-Level Nuclear Waste Repository at Hanford Site, Washington* (edited; written with five other authors), report prepared for the Washington Department of Ecology, December 1987.
• *The Nuclear Freeze Revisited* (with Andrew Haines), Nuclear Freeze and Arms Control Research Project, Bristol, UK, November 1986. Variants of the same paper have appeared as Working Paper No. 18, Peace Research Centre, Australian National University, Canberra, February 1987, and in *ADIU Report*, University of Sussex, Brighton, UK, Jan/Feb 1987, pp 6-9.
• *International Nuclear Reactor Hazard Study* (with fifteen other authors), Greenpeace, Hamburg, Federal Republic of Germany (2 volumes), September 1986.
• "What happened at Reactor Four" (the Chernobyl reactor accident), *Bulletin of the Atomic Scientists*, August/September 1986, pp 26-31.
• *The Source Term Debate: A Report by the Union of Concerned Scientists* (with Steven C. Sholly), Union of Concerned Scientists, Cambridge, Massachusetts, January 1986.
• "Checks on the spread" (a review of three books on nuclear proliferation), *Nature*, 14 November 1985, pp 127-128.
• Editing of *Perspectives on Proliferation*, August 1985, published by the Proliferation Reform Project, IRSS.
• "A Turning Point for the NPT ?", *ADIU Report*, University of Sussex, Brighton, UK, Nov/Dec 1984, pp 1-4.
• "Energy Economics", in J. Dennis (ed), *The Nuclear Almanac*, Addison-Wesley, Reading, Massachusetts, 1984.
• "The Genesis of Nuclear Power", in J. Tirman (ed), *The Militarization of High Technology*, Ballinger, Cambridge, Massachusetts, 1984.
• *A Second Chance: New Hampshire's Electricity Future as a Model for the Nation* (with Linzee Weld), Union of Concerned Scientists, Cambridge, Massachusetts, 1983.

• *Safety and Waste Management Implications of the Sizewell PWR* (prepared with the help of six consultants), a report to the Town & Country Planning Association, London, UK, 1983.
• *Utility-Scale Electrical Storage in the USA: The Prospects of Pumped Hydro, Compressed Air, and Batteries*, Princeton University report PU/CEES #120, 1981.
• *The Prospects for Wind and Wave Power in North America*, Princeton University report PU/CEES # 117, 1981.
• *Hydroelectric Power in the USA: Evolving to Meet New Needs*, Princeton University report PU/CEES # 115, 1981.
• Editing, coordination, and part authorship of "Potential Accidents & Their Effects", Chapter III of *Report of the Gorleben International Review*, published in German by the Government of Lower Saxony, FRG, 1979; Chapter III published in English by the Political Ecology Research Group, Oxford, UK.
• *A Study of the Consequences to the Public of a Severe Accident at a Commercial FBR located at Kalkar, West Germany*, Political Ecology Research Group, Oxford, UK, 1978.

Expert presentations and testimony (selected)

• NRC Commissioners' Briefing on Spent Fuel Pool Safety and Consideration of Expedited Transfer of Spent Fuel to Dry Casks, Rockville, Maryland, January 2014, presentation: "Imperatives for Expedited Transfer".
• Asahi-Princeton Symposium on Managing Spent Fuel – To Reprocess or Store, Tokyo, December 2013, presentation: "Radiological Risk at the Rokkasho Reprocessing Plant".
• Conference, *Engineering Education for Sustainable Development – EESD13*, Cambridge University, UK, September 2013, presentation: "Systems Integration for Sustainable Outcomes: A Proposed Curriculum".
• Experts Meeting on Safety of Spent Fuel Storage after Fukushima, Seoul, ROK, June 2013: presentation, "Storage of Spent Fuel: Options and their Characteristics".
• Nautilus Institute Working Group Meeting on Spent Fuel, Radiological Risk, Deep Borehole, etc., Beijing, China, May 2013: presentation, "Assessment of SNF Radiological Risk: Review of Methodology, and Application to a Case Study from USA".
• US Nuclear Regulatory Commission's Annual Regulatory Information Conference, Rockville, Maryland, March 2013, presentation: "The Case for Expedited Transfer of Spent Fuel to Dry Storage."
• Workshop on the Safety and Security of China's Nuclear Facilities, Shenzhen, China, January 2013: presentation, "Radiological Risk in Spent Fuel Management and Reprocessing".
• Nautilus Institute Working Group Meeting, Resilience and Security of Spent Fuel in NE Asia, Seoul, ROK, April 2012: presentation, "A Handbook to Support Assessment of Radiological Risk Arising from Management of Spent Nuclear Fuel".
• Energy Futures Working Group, Global Green USA, Washington, DC, March 2012, presentation: "Sustainability Principles for Design of Infrastructure".

• Regional Seminar on Nuclear Fuel Supply, Reprocessing, and Disposal in Asia, Beijing, China, October 2011, presentation: "A Sustainability Framework for Assessing Investments in Nuclear Infrastructure".
• Harvard & Peking University Workshop on the Economics of Nuclear Reprocessing and the Availability of Uranium, Beijing, China, October 2011, presentation, "Liquid High-Level Waste: Risks and Options".
• Egyptian Council for Foreign Affairs, Cairo, May 2011: presentation, "Nuclear Technology and Global Child Health: Threats and Opportunities".
• Bibliotecha Alexandrina (BA), Egypt, April 2011: presentation, "Accelerating a Green-Technology Transition: A Leading Role for the BA".
• Conference, *Prospects for Nuclear Non-Proliferation and Disarmament*, Cairo, October 2010: presentation (with Paula Gutlove), "The Potential for Near-Term Confidence-Building Measures and Cooperative Actions for an Eventual Middle East NWFZ, Promoting the 2012 Conference".
• Blue Ribbon Commission on America's Nuclear Future, Washington, DC, September 2010: presentation to the Subcommittee on transportation & storage of radioactive waste.
• Green Cross Strategy Workshop, Geneva, Switzerland, May 2010: presentation, "Nuclear Weapons and Power: Issues and Opportunities".
• Munk Centre for International Studies, University of Toronto, March 2010: presentation (with Paula Gutlove), "Demonstrating a New Approach to Stability in Afghanistan: Remote Engagement for Community Empowerment and Rural Development".
• Marsh Institute and Kasperson Library Seminar, Clark University, October 2009: presentation, "Navigating the Socio-Technical Transition to Sustainability".
• Maxwell School, Syracuse University, February 2009: presentation, "A Second Track for Climate Negotiations: The Biosphere as Common Property".
• Society for Risk Analysis annual meeting, Boston, Massachusetts, December 2008: presentation, "Multi-Criteria Frameworks for Considering Diverse Risks in Infrastructure Design".
• Institute of Environmental Studies, University of New South Wales, Sydney, Australia, April 2008: presentation, "Citizen Engagement for Sustainable Society".
• Department of Urban and Regional Planning, Shaheed Beheshti University, Tehran, April 2008: presentation, "Sustainable Cities: Challenges and Opportunities".
• National Academy of Sciences, Washington, DC, January 2008: presentation, "What do interested parties think about the expansion of nuclear energy?"
• Abt Associates, Cambridge, Massachusetts, March 2007: presentation, "Creating Informed Action on Climate Change".
• Universities of Medical Science in Tabriz and Isfahan, Iran, April 2007: presentation, "Healthy Design of the Built Environment".
• Minnesota Public Utilities Commission, 2006: testimony regarding trends, risks and costs associated with management of spent fuel from the Monticello nuclear power plant.
• Presentation, "Are Nuclear Installations Terrorist Targets?", at the conference, *Nuclear Energy: Does it Have a Future?*, Drogheda, County Louth, Ireland, March 2005.
• Presentation at the session, "UN Security Council Resolution 1244 and Final Status for Kosovo", at the conference, *Lessons Learned from the Balkan Conflicts*, Boston College, Chestnut Hill, Massachusetts, October 2004.

• California Public Utilities Commission, 2004: testimony regarding the nature and cost of potential measures for enhanced defense of the Diablo Canyon nuclear power plant.
• European Parliament (EP), 2003: invited presentation to EP members regarding safety and security issues at the Sellafield nuclear site in the UK, and broader implications.
• US Congress, 2002 and 2003: invited presentations at member-sponsored staff briefings on vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
• Numerous public forums in the USA, 2001-2006: invited presentations to public officials and general audiences regarding vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
• UK Consensus Conference on Radioactive Waste Management, 1999: invited testimony on information and decision-making.
• Joint Committee on Public Enterprise and Transport, Irish Parliament, 1999: invited testimony on nuclear fuel reprocessing and international security.
• UK and Irish Parliaments, 1998: invited presentations to members on risks and alternative options associated with nuclear fuel reprocessing in the UK.
• Center for Russian Environmental Policy, Moscow, 1996: invited presentation at a forum in parallel with the G-7 Nuclear Safety Summit.
• Lacey Township Zoning Board, New Jersey, 1995: testimony regarding radioactive waste management.
• Ontario Court of Justice, Toronto, Ontario, 1993: testimony regarding Canada's Nuclear Liability Act.
• Oxford Research Group, seminar on “The Plutonium Legacy”, Rhodes House, Oxford, UK, 1993: invited presentation on nuclear safeguards.
• Defense Nuclear Facilities Safety Board, Washington, DC, 1991: testimony regarding the proposed restart of K-reactor, Savannah River Site.
• Conference to consider amending the Partial Test Ban Treaty, United Nations, New York, 1991: presentation on a global approach to arms control and disarmament.
• US Department of Energy, hearing on draft EIS for new production reactor capacity, Columbia, South Carolina, 1991: testimony on tritium need and implications of tritium production options.
• Society for Risk Analysis, 1990 annual meeting, New Orleans, special session on nuclear emergency planning: presentation on real-time techniques for anticipating emergencies.
• Parliamentarians' Global Action, 11th Annual Parliamentary Forum, United Nations, Geneva, 1990: invited presentation on the potential for multilateral nuclear arms control.
• Advisory Committee on Nuclear Facility Safety, Washington, DC, 1989: testimony on public access to information and on government accountability.
• Peace Research Centre, Australian National University, seminar on “Australia and the Fourth NPT Review Conference”, Canberra, 1989: invited presentation regarding a universal nuclear weapons non-proliferation regime.
• Carnegie Endowment for International Peace, Conference on “Nuclear Non-Proliferation and the Role of Private Organizations”, Washington, DC, 1989: invited presentation on options for reform of the non-proliferation regime.
• US Department of Energy, EIS scoping hearing, Columbia, South Carolina, 1988: testimony on appropriate scope of an EIS for new production reactor capacity.

• International Physicians for the Prevention of Nuclear War, 6th and 7th Annual Congresses (Koln, FRG, 1986, and Moscow, USSR, 1987): invited presentations on relationships between nuclear power and the threat of nuclear war.
• County Council, Richland County, South Carolina, 1987: testimony on implications of severe accidents at military reactors at the Savannah River Plant.
• Maine Land Use Regulation Commission, 1985: testimony on cogeneration potential at facilities of Great Northern Paper Company.
• Interfaith Hearings on Nuclear Issues, Toronto, Ontario, 1984: invited presentations on options for Canada's nuclear trade and Canada's involvement in nuclear arms control.
• Sizewell Public Inquiry, UK, 1984: testimony on safety and radioactive waste implications of the proposed Sizewell nuclear power plant.
• New Hampshire Public Utilities Commission, 1983: testimony on electricity demand and supply options for New Hampshire.
• Atomic Safety & Licensing Board, US Nuclear Regulatory Commission, 1983: testimony on use of filtered venting at the Indian Point nuclear power plant.
• US National Advisory Committee on Oceans and Atmosphere, 1982: testimony on implications of ocean disposal of radioactive waste.
• Environmental & Energy Study Conference, US Congress, 1982: invited presentation on implications of radioactive waste management.

Miscellaneous

• Married, two children.
• Extensive experience in public speaking and interviews by representatives of print and electronic media.
• Author of numerous essays and letters in newspapers and magazines.

Contact information

Institute for Resource and Security Studies
27 Ellsworth Avenue, Cambridge, Massachusetts 02139, USA
Phone: 617-491-5177

# Tab 14

Cite as 90 NRC 31 (2019) **LBP-19-7**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**ATOMIC SAFETY AND LICENSING BOARD**

**Before Administrative Judges:**

**Paul S. Ryerson,** Chairman
**Nicholas G. Trikouros**
**Dr. Gary S. Arnold**

**In the Matter of** **Docket No. 72-1050-ISFSI**
**(ASLBP No. 19-959-01-ISFSI-BD01)**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **August 23, 2019**

This proceeding concerns Interim Storage Partners LLC's application to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in Andrews County, Texas. The Board considered petitions to intervene and requests for a hearing from four petitioners: (1) Beyond Nuclear, Inc. (Beyond Nuclear); (2) Sierra Club; (3) Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition (SEED), and Leona Morgan, individually; and (4) Fasken Land and Minerals, Ltd., and Permian Basin Land and Royalty Organization (together, Fasken). The Board determined that, although Beyond Nuclear, Sierra Club, SEED, and Fasken demonstrated standing, only Sierra Club proffered an admissible contention.

**RULES OF PRACTICE: INTERVENTION**

To intervene as a party in an adjudicatory proceeding, a petitioner must (1) establish it has standing; and (2) proffer at least one admissible contention.

**RULES OF PRACTICE: STANDING**

The Commission directs licensing boards to construe the petition in favor of the petitioner when determining whether a petitioner has demonstrated standing.

**RULES OF PRACTICE: STANDING (BURDEN)**

It is each petitioner's burden to demonstrate that standing requirements are met.

**RULES OF PRACTICE: INTERVENTION (STANDING)**

A petitioner may show traditional standing. This requires a showing that a person or organization has suffered or might suffer a concrete and particularized injury that is: (1) fairly traceable to the challenged action; (2) likely redressable by a favorable decision; and (3) arguably within the zone of interests protected by the governing statutes.

**RULES OF PRACTICE: STANDING (PROXIMITY PLUS PRESUMPTION)**

A proximity plus standard is applied on a case-by-case basis, taking into account the nature of the proposed action and the significance of the radioactive source. The smaller the risk of offsite consequences, the closer a petitioner must be to be realistically threatened. Although the Commission has not established a clear standard, the relevant distance from a consolidated interim storage facility is likely less than 50 miles because such a storage facility is essentially a passive structure rather than an operating facility, and therefore has less chance of widespread radioactive release.

**RULES OF PRACTICE: STANDING (REPRESENTATIONAL)**

An organization may try to establish representational standing based on the standing of one or more individual members. To establish representational standing, an organization must: (1) show that the interests it seeks to protect are germane to its own purpose; (2) identify at least one member who qualifies for standing in his or her own right; (3) show that it is authorized by that member

to request a hearing on his or her behalf; and (4) show that neither the claim asserted nor the relief requested requires an individual member's participation in the organization's legal action.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

An admissible contention must: (1) state the specific legal or factual issue to be raised or controverted; (2) provide a brief explanation for the basis of the contention; (3) demonstrate that the issue raised in the contention is within the scope of the proceeding; (4) demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding; (5) concisely state the alleged facts or expert opinions that support the petitioner's position and on which the petitioner intends to rely at an evidentiary hearing, including references to the specific sources and documents on which the petitioner intends to rely; and (6) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes or, if the application is alleged to be deficient, by identifying such deficiencies and the supporting reasons for this allegation.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

The contention admissibility rules are strict by design. The hearing process is reserved for genuine, material controversies between knowledgeable litigants. Failure to satisfy even one of the requirements requires a board to reject the contention.

**RULES OF PRACTICE: CONTENTIONS (PLEADING)**

The NRC requires a petitioner to read the pertinent portions of the license application, including the Safety Analysis Report and the Environmental Report, state the applicant's position and the petitioner's opposing view, and explain why it disagrees with the applicant.

**RULES OF PRACTICE: CONTENTIONS (PLEADING)**

A contention cannot be admitted on bare assertions and speculation alone.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

All contentions must be based on documents or other information available

at the time the petition is to be filed. Petitioners have an obligation to raise issues in licensing proceedings as soon as the information becomes available to them. For environmental contentions, petitioners must file contentions based on the applicant's Environmental Report.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

To be admissible, a contention proposing alternative inputs or methodologies must present some factual or expert basis for why the proposed changes in the analysis are warranted (e.g., why the inputs or methodology used is unreasonable, and the proposed changes or methodology would be more appropriate).

**RULES OF PRACTICE: CONTENTIONS (ADOPTING)**

To adopt another petitioner's contentions, a participant must (1) demonstrate standing; and (2) have proffered its own admissible contention.

**RULES OF PRACTICE: MOTION TO STRIKE**

The Commission will not permit, in a reply, the filing of new arguments or new legal theories that opposing parties have not had an opportunity to address. Rather, NRC regulations demand a level of discipline and preparedness on the part of petitioners, who are required by our contention admissibility requirements to set forth their claims in detail at the outset of a proceeding.

**RULES OF PRACTICE: CONTENTIONS (CHALLENGE TO COMMISSION REGULATIONS)**

No NRC rule or regulation may be challenged in a contention unless the petitioner seeks and obtains a waiver from the Commission in accordance with 10 C.F.R. § 2.335.

**RULES OF PRACTICE: CONTENTIONS (CHALLENGE TO COMMISSION REGULATIONS)**

Sections 2.335 and 72.46(e) of 10 C.F.R. bar any contention challenging an NRC-approved storage cask design that has been incorporated by reference in a spent fuel storage facility application.

**RULES OF PRACTICE: FILING OF DOCUMENTS**

Documents on which petitioners rely should be filed in their entirety on the Electronic Information Exchange — not by means of hyperlinks in pleadings. For adjudicatory documents (pleadings and exhibits), parties are discouraged from using hyperlinks because of concerns about the integrity of the hearing record. Hyperlinks and internet sources can change over time, and can be edited (or even deleted); accordingly, licensing boards strongly discourage this practice.

**NEPA: ENVIRONMENTAL IMPACT STATEMENT**

The National Environmental Policy Act mandates that federal agencies prepare an environmental impact statement before undertaking any major federal actions significantly affecting the quality of the human environment. The preparation of an environmental impact statement is meant to ensure that federal agencies will not act on incomplete information, only to regret their decision after it is too late to correct.

**NEPA: HARD LOOK**

The National Environmental Policy Act requires agencies to take a hard look at environmental consequences of the proposed action, and imposes a duty upon the agency to both consider every significant aspect of the environmental impact of a proposed action and inform the public of its analysis and conclusion.

**NEPA: SCOPE OF REVIEW**

The National Environmental Policy Act does not necessitate certainty or precision nor does it mandate particular results from the agency. Rather, the National Environmental Policy Act requires an estimate of anticipated (not unduly speculative) impacts from the agency. The statutory obligations seek to guarantee process, not specific outcomes.

**NEPA: RULE OF REASON**

The National Environmental Policy Act's hard look mandate notwithstanding, the agency is not obligated to analyze every conceivable aspect of the project before it. Instead, this hard look is subject to a rule of reason, meaning that the agency need not perform analyses concerning events that would be considered worst-case scenarios involving the project, or those considered remote and highly speculative.

**NEPA: CUMULATIVE IMPACTS ANALYSIS**

Under the National Environmental Policy Act, an environmental impact statement must analyze not only the direct impacts of a proposed action, but also the indirect and cumulative impacts of past, present, and reasonably foreseeable future actions. However, an environmental impact statement must include other related actions only when those actions have been formally proposed and are pending before an agency. Consistent with the rule of reason, the Commission has held that projects that are merely contemplated and not concrete or reasonably certain do not warrant consideration in a cumulative impact analysis.

**NEPA: SITE SELECTION CRITERIA**

There are no specific requirements under 10 C.F.R. Part 51 for an applicant's site selection criteria; the criteria are examined for reasonableness. Moreover, the site selection process is driven by the purpose and need specified in the application, and the NRC may accord substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project so long as the application is not artificially narrow as to circumvent the requirement that reasonable alternatives must be considered.

**NEPA: CEQ REGULATIONS**

Although as an independent agency the NRC is not necessarily bound by the regulations of the Council on Environmental Quality (CEQ), the Commission instructs boards to look to CEQ regulations for guidance.

**NEPA: CEQ REGULATIONS**

Council on Environmental Quality regulations recognize that accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing the National Environmental Policy Act. In furtherance of this directive, federal agencies must, in their environmental analyses, identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions.

**ENVIRONMENTAL JUSTICE**

Environmental justice became a federally mandated NEPA consideration in 1994. Executive Order 12898 directed federal agencies to identify and address disproportionately high and adverse human health or environmental effects of

its programs, policies, and activities on minority populations and low-income populations.

**ENVIRONMENTAL JUSTICE**

Responding to Commission precedent and Executive Order 12898, the NRC promulgated its Environmental Justice Policy Statement and revised guidance documents to incorporate the guiding principles from those decisions. The policy statement directs the NRC Staff to conduct a more thorough site selection analysis if the percentage in the impacted area significantly exceeds that of the State or County percentage for either the minority or low-income population. NRC guidance specifies that an applicant's environmental report should include a discussion of the methods used to identify and quantify impacts on low-income and minority populations, the location and significance of any environmental impacts during construction on populations that are particularly sensitive, and any additional information pertaining to mitigation.

**ADJUDICATORY PROCEEDINGS: SCOPE OF REVIEW**

Whether an applicant will find that alternative commercially viable is not an issue before a licensing board, because the business decision of whether to use a license has no bearing on a licensee's ability to safely conduct the activities the license authorizes.

**CONTINUED STORAGE RULE**

The Continued Storage Rule provides that applicants for reactor or spent fuel storage facility licenses are not required to discuss the environmental impacts of spent nuclear fuel storage for the period following the term of their license.

**CONTINUED STORAGE RULE**

The Continued Storage Rule incorporates the analyses and impact determinations from the continued storage generic environmental impact statement.

**NUCLEAR WASTE POLICY ACT**

The Nuclear Waste Policy Act bars the United States Department of Energy from constructing a monitored retrieval storage facility before the NRC licenses construction of a repository, but does not prohibit a private company from seeking a license to construct a consolidated interim storage facility at any time.

**FOREIGN OWNERSHIP**

The Atomic Energy Act sections 103 and 104 apply, by their terms, only to production and utilization facilities. An independent spent fuel storage facility under Part 72 is neither a production nor a utilization facility.

**TABLE OF CONTENTS**


I. BACKGROUND . . . . . 39
  A. General . . . . . 39
  B. Procedural History . . . . . 42

II. STANDING ANALYSIS . . . . . 47
  A. Beyond Nuclear . . . . . 48
  B. Sierra Club . . . . . 50
  C. Joint Petitioners . . . . . 50
  D. Fasken . . . . . 51

III. LEGAL STANDARDS . . . . . 52
  A. Legal Standards Governing Contention Admissibility . . . . . 52
  B. NEPA Legal Standards . . . . . 54
  C. The Continued Storage Rule . . . . . 55

IV. CONTENTION ANALYSIS . . . . . 56
  A. Beyond Nuclear . . . . . 56
  B. Sierra Club . . . . . 59
  C. Joint Petitioners . . . . . 87
  D. Fasken . . . . . 109

V. RULING ON PETITIONS . . . . . 118

VI. ORDER . . . . . 118


## MEMORANDUM AND ORDER

**(Ruling on Petitions for Intervention and Requests for Hearing)**

Before the Board are four petitions to intervene and requests for a hearing concerning a license application by Interim Storage Partners LLC (ISP) to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C (GTCC) waste in Andrews County, Texas. The petitioners are: (1) Beyond Nuclear, Inc. (Beyond Nuclear); (2) Sierra Club; (3) a coalition of Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information

Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, individually (collectively, Joint Petitioners); and (4) Fasken Land and Minerals, and Permian Basin Land and Royalty Organization (together, Fasken).

As ISP has revised its license application in response to petitioners' contentions and to the NRC Staff's requests for additional information, both the Board's and the NRC Staff's views as to the admissibility of various contentions have changed. The NRC Staff now contends that only one of the four petitions for a hearing should be granted because, in the Staff's view, only Beyond Nuclear has both demonstrated standing and proffered an admissible contention.[1] ISP opposes the standing of all petitioners and asserts that none of their proffered contentions is admissible.

The Board concludes that Sierra Club has demonstrated standing and has proffered one admissible contention. In accordance with 10 C.F.R. § 2.309(a), we grant Sierra Club's petition and admit it as a party to this proceeding. The admitted contention will be adjudicated under the procedures in 10 C.F.R. Part 2, Subpart L.

The other three petitions are denied. Although Beyond Nuclear has demonstrated standing, it has not proffered an admissible contention. Among the eight Joint Petitioners, only Sustainable Energy and Economic Development Coalition (SEED) has demonstrated standing. SEED's petition, however, must be denied for lack of an admissible contention. Although Fasken has established standing, it has not proffered an admissible contention.

## I. BACKGROUND

### A. General

Typically, after nuclear fuel is used at a nuclear plant, it is cooled and stored in a spent fuel pool. After a certain amount of time, the spent fuel is loaded into canisters, welded shut, and then stored in casks at an onsite independent spent fuel storage installation.[2] When a plant owner chooses to permanently shut down its nuclear plant, it may initiate the decommissioning process immediately, or it

[1] *See* NRC Staff's Consolidated Response to Petitions to Intervene and Requests for Hearing Filed by: Sierra Club; [Joint Petitioners] (Dec. 10, 2018) [hereinafter NRC Staff Consol. Answer] (asserting that Sierra Club Contentions 4 and 9 and Joint Petitioners Contention 3 are partly admissible); NRC Staff's Response to Petitions to Intervene and Requests for Hearing Filed by [Fasken] (Nov. 23, 2018) [hereinafter NRC Staff Answer to Fasken] (asserting that Fasken Contention 2 is partly admissible). *But see* Tr. at 201-05 (NRC Staff counsel stating at oral argument that only Beyond Nuclear proffers an admissible contention in part).

[2] *See* NRC, Safety of Spent Fuel Storage, NUREG/BR-0528, at 1-2 (Apr. 2017).

may wait years to start the process. Regardless of how the company proceeds, the spent nuclear fuel accumulated by the plant over its lifetime will remain at the plant site. The storage of spent nuclear fuel costs money for security and maintenance.

Congress likely did not envision this situation when it passed the Nuclear Waste Policy Act of 1982 (NWPA).[3] Congress contemplated that the U.S. Department of Energy (DOE) would build a national nuclear waste repository, and that the nuclear power companies would help pay for it. Under section 302 of the NWPA, power reactor licensees were required to pay into a nuclear waste fund for construction of the repository.[4] In exchange, section 302(a)(5)(B) committed DOE to begin disposing of the nuclear power plants' spent fuel no later than January 31, 1998. When a permanent repository failed to materialize, the power plant licensees sued and began to recover from the federal government substantial damages to cover the cost of continuing to store spent fuel at their sites.[5] Contract damage lawsuits under the NWPA are now commonplace, and the federal government pays out damages on a regular basis.[6]

Shortly after DOE's application for authorization to construct a geologic repository at Yucca Mountain, Nevada was eventually submitted to the NRC in June 2008,[7] Congress stopped funding the Yucca Mountain project, and a pending adjudication before a licensing board was suspended in September 2011.[8] To date, almost eight years later, Congress has provided no new funding for a permanent nuclear waste repository at Yucca Mountain. As lack of congressional funding for a permanent repository persists, spent fuel is likely to be stored at decommissioned sites across the country, and will continue to accumulate at the sites of the nation's operating reactors.

This proceeding concerns a possible temporary solution: interim, consolidated storage of spent nuclear fuel by private industry. Both DOE and nuclear power plant owners potentially have an interest in contracting to use such a facility. DOE might want to take responsibility for the nuclear plants' spent fuel, pay a private company to store it, and stop paying out damages. The nuclear plant owners, on the other hand, might be willing to apply their ongoing damage

---

[3] Nuclear Waste Policy Act of 1982, 42 U.S.C. §§ 10101-10270 (1983) [hereinafter NWPA].

[4] 42 U.S.C. § 10222.

[5] *See, e.g., Nat'l Ass'n of Regulatory Util. Comm'rs v. U.S. Dep't of Energy,* 736 F.3d 517, 520 (D.C. Cir. 2013); *Me. Yankee Atomic Power Co. v. United States,* 225 F.3d 1336, 1341-42 (Fed. Cir. 2000); *Ind. Mich. Power Co. v. U.S. Dep't of Energy,* 88 F.3d 1272, 1276-77 (D.C. Cir. 1996).

[6] *See, e.g., Nat'l Ass'n of Regulatory Util. Comm'rs,* 736 F.3d at 520.

[7] *See* Letter from Edward F. Sproat III, Director, DOE Office of Civilian Radioactive Waste Management, to Michael F. Weber, Director, NRC Office of Nuclear Material Safety and Safeguards (NMSS) (June 3, 2008) (ADAMS Accession No. ML081560407).

[8] *U.S. Department of Energy* (High-Level Waste Repository), LBP-11-24, 74 NRC 368 (2011).

payments toward paying a private company to store their spent fuel offsite, so that it would no longer be their responsibility to keep onsite and secure. Because the NWPA was drafted on the premise that DOE would not accept the spent fuel until a permanent repository becomes operational,[9] however, as discussed *infra* only the second option would be consistent with the terms of the statute.

Two companies — Holtec International and Interim Storage Partners LLC — apparently see a business opportunity in the congressional stalemate that has resulted in DOE's inability to take ownership of spent fuel. Both companies submitted applications to the NRC proposing to construct consolidated interim storage facilities (CISFs) to initially store spent fuel for a forty-year term.

As the licensing board in the *Holtec* proceeding observed (and as relevant here to ISP), there are substantial differences between the licensing and regulatory requirements for a CISF and for the Yucca Mountain permanent repository.[10] For example, NRC's regulations require DOE to demonstrate a reasonable expectation that its repository would meet specified performance standards throughout the "period of geologic stability," defined to "end 1 million years after disposal,"[11] while the requirements for a CISF under Part 72 apply to renewable terms of no more than "40 years from the date of issuance."[12] Moreover, while Yucca Mountain was authorized by statute to store 70,000 metric tons of high-level radioactive waste,[13] ISP is initially requesting to store no more than 5,000 metric tons of spent fuel and GTCC waste.[14] While DOE's permanent repository would be constructed at least 700 feet below the surface,[15] ISP's spent fuel would be stored above ground on a concrete pad.[16] And, all parts of ISP's storage system use canisters and casks that have been separately approved and

---

[9] *See* 42 U.S.C. § 10222(a)(5)(A).

[10] *Holtec International* (HI-STORE Consolidated Interim Storage Facility), LBP-19-4, 89 NRC 353, 359 (2019).

[11] 10 C.F.R. § 63.302.

[12] *Id.* § 72.42(a).

[13] 42 U.S.C. § 10134(d).

[14] WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050 (rev. 2 July 2018) at 1-1 [hereinafter ER] (ADAMS Accession No. ML18221A405 (package)). ISP's Environmental Report, however, analyzes the potential full 8-phase capacity of up to 40,000 metric tons of uranium (MTU).

[15] DOE, Office of Civilian Radioactive Waste Management, Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, Summary at S-7 (June 2008).

[16] Interim Storage Partners LLC License Application, Docket 72-1050, Andrews County, Texas, (rev. 2 July 2018) at 3-1 [hereinafter ISP License Application] ("The dry cask storage systems will be located on top of the concrete pads constructed at the CISF.") (ADAMS Accession No. ML18206A483).

issued certificates of compliance by the NRC, and therefore are not part of ISP's license application for the Texas storage facility.[17]

Holtec filed its application for a New Mexico-sited CISF in March 2017, and the public was afforded an opportunity to request a hearing and petition to intervene.[18] In *Holtec,*[19] six groups of petitioners across seven states lodged petitions. Although more than forty contentions were proffered, the *Holtec* board held that none met the Commission's standards for a hearing.[20] Notwithstanding termination of the *Holtec* adjudicatory proceeding at the board level, the NRC Staff continues to review the company's application for a HI-STORE CISF in New Mexico. Multiple appeals of the *Holtec* board's decision are currently pending before the Commission.

Most petitioners in this case also petitioned in *Holtec.* Many of the contentions that were proffered in *Holtec* are similar if not identical to those proffered in this proceeding, and for good reason: Both proposed interim storage facilities must meet the safety requirements in 10 C.F.R. Part 72 and the environmental requirements in 10 C.F.R. Part 51. Moreover, the proposed sites are similar geographically — they would be built approximately 40 miles from each other. Despite these similarities, however, the Board recognizes that the sites and the applications in these two proceedings are not the same.

### B. Procedural History

In April 2016, Waste Control Specialists LLC (WCS) submitted its initial license application to the NRC to construct and operate a CISF for a term of forty years.[21] A year later, WCS requested that the NRC suspend its safety and environmental reviews and public participation concerning its application.[22] Accordingly, the NRC halted all activities.[23] During this period, WCS and Orano CIS LLC joined together to form ISP, with its sole corporate purpose "to license,

---

[17] *See* ISP License Application at 2-1 (tbl. 2-1) (listing only six NRC-approved cask systems to be stored at the ISP CISF).

[18] Holtec International's HI-STORE Consolidated Interim Storage Facility for Interim Storage of Spent Nuclear Fuel, 83 Fed. Reg. 32,919, 32,919-24 (July 16, 2018).

[19] *Holtec,* LBP-19-4, 89 NRC at 358.

[20] *Id.* at 461; *see* 10 C.F.R. § 2.309(f)(1).

[21] Waste Control Specialists LLC, Application for a License for a Consolidated Interim Spent Fuel Storage Facility (Apr. 28, 2016) (ADAMS Accession No. ML16133A100).

[22] Joint Request to Withdraw the *Federal Register* Notice Providing an Opportunity to Submit Hearing Requests (Apr. 19, 2017), Attach. 1, Letter from Rod Baltzer, WCS President and CEO, to NRC Document Control Desk (Apr. 18, 2017) (ADAMS Accession No. ML17109A480).

[23] *See Waste Control Specialists LLC* (Consolidated Interim Storage Facility), CLI-17-10, 85 NRC 221, 222 (2017) (granting WCS's and NRC Staff's request to suspend all activity and withdraw the hearing opportunity on the WCS CISF application).

design, construct and operate the CISF at the Waste Control Specialists site in Andrews, Texas."[24]

On August 29, 2018, after receiving a revised license application from ISP,[25] the NRC issued a *Federal Register* notice that allowed the public to request a hearing and petition to intervene by October 29, 2018.[26] The Secretary of the Commission (SECY) later extended this deadline to November 13, 2018.[27] ISP's application states that it intends to construct and operate its CISF on approximately 100 acres in Andrews County, Texas.[28] In the first phase of its storage project, ISP seeks to store 5,000 metric tons of uranium (MTUs) (including some mixed oxide fuel and GTCC waste) in six canister systems for a 40-year term.[29] If its initial license is granted, ISP plans to request license amendments for "authorization to possess and store an additional 5,000 MTUs of [spent nuclear fuel] for each of seven subsequent expansion phases to be completed over the course of 20 years."[30] ISP thus anticipates that, after completion of its eight planned phases, its CISF would store 40,000 MTUs of spent fuel and GTCC waste, which is the amount analyzed in ISP's Environmental Report.[31]

On September 14, 2018, the Commission received simultaneous motions from Beyond Nuclear and Fasken to dismiss both this proceeding and the *Holtec* proceeding as violating the NWPA.[32] ISP[33] and the NRC Staff opposed.[34] Although

---

[24] ISP License Application at 1-4.

[25] Letter from Jeffery D. Isakson, ISP, to NRC Document Control Desk (June 8, 2018) (ADAMS Accession No. ML18166A003).

[26] Interim Storage Partners Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44,070, 44,070-75 (Aug. 29, 2018), corrected, 83 Fed. Reg. 44,680 (Aug. 31, 2018) (correcting the deadline date for petitioners to request a hearing to October 29, 2018).

[27] Order of the Secretary (Oct. 25, 2018) at 2.

[28] ER at 1-1.

[29] *Id.*

[30] *Id.*

[31] *Id.*

[32] Beyond Nuclear, Inc.'s Motion to Dismiss Licensing Proceedings for HI-STORE [CISF] and WCS [CISF] for Violation of the [NWPA] (Sept. 14, 2018). Because Fasken's initial motion to dismiss both CISF proceedings was only filed and served in the *Holtec* docket, Fasken filed its identical motion to dismiss in this docket on September 28, 2018. Motion of [Fasken] to Dismiss Licensing Proceedings for HI-STORE [CISF] and WCS [CISF] (Sept. 28, 2018).

[33] [ISP's] Response Opposing Beyond Nuclear, Inc.'s Unauthorized September 14, 2018 Filing (Sept. 24, 2018); [ISP's] Response Opposing [Fasken's] Unauthorized September 28, 2018 Filing (Oct. 5, 2018).

[34] Because the NRC Staff was a party in *Holtec,* the NRC Staff filed its single response to both Beyond Nuclear and Fasken in *Holtec* and in this proceeding. NRC Staff's Response to Motions to Dismiss Licensing Proceedings (Sept. 24, 2018).

SECY denied both motions on procedural grounds,[35] SECY observed that Beyond Nuclear had also filed a hearing petition[36] specific to this proceeding that incorporated by reference arguments contained in its motion to dismiss.[37] SECY then referred Beyond Nuclear's petition to intervene and Fasken's motion to the Atomic Safety and Licensing Board Panel to be considered under the Commission's contention admissibility standards in 10 C.F.R. § 2.309.[38]

On October 29, 2018, ISP[39] and the NRC Staff[40] filed answers to Beyond Nuclear's petition, and Beyond Nuclear replied.[41]

Fasken filed its petition for hearing on October 29, 2018.[42] On November 20, 2018, ISP filed answers opposing both Fasken's motion to dismiss this proceeding as referred to the Board by SECY (i.e., its referred contention) and Fasken's hearing petition.[43] The NRC Staff filed its answer to both Fasken's hearing petition and Fasken's referred contention on November 23, 2018.[44] Fasken filed separate replies to ISP and to the NRC Staff on November 28 and 30, 2018,

---

[35] Order of the Secretary, In the Matters of Holtec International (HI-STORE [CISF]) Docket 72-1051; Interim Storage Partners LLC (WCS [CISF]) Docket 72-1050 (Oct. 29, 2018) [hereinafter Order Denying Motions to Dismiss].

[36] Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Oct. 3, 2018) [hereinafter Beyond Nuclear Pet.].

[37] Order Denying Motions to Dismiss at 2.

[38] *Id.* at 2-3. On December 27, 2018, Beyond Nuclear petitioned the United States Court of Appeals for the District of Columbia Circuit to review SECY's order denying Beyond Nuclear's motion to dismiss and referring it as a petition to this Board. That appeal remains pending, although Beyond Nuclear has requested it be held in abeyance pending the outcome of this proceeding. *See* Notice of Beyond Nuclear's Petition for Review of NRC Order in D.C. Circuit U.S. Court of Appeals, Docket Nos. 72-1050 & 72-1051 (Jan. 16, 2019).

[39] [ISP's] Answer Opposing Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Oct. 29, 2018) [hereinafter ISP Answer to Beyond Nuclear].

[40] NRC Staff's Response to Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Oct. 29, 2018) [hereinafter NRC Staff Answer to Beyond Nuclear].

[41] Beyond Nuclear's Reply to Oppositions to Hearing Request and Petition to Intervene (Nov. 5, 2018).

[42] Petition of [Fasken] for Intervention and Request for Hearing (Oct. 29, 2018) [hereinafter Fasken Pet.]. On November 9, 2018, the ASLBP's Chief Administrative Judge granted a jointly-filed motion to establish a briefing schedule to Fasken's referred contention. The order set a separate deadline for ISP and the NRC Staff to file respective answers to the referred contention on November 23, 2018, and established Fasken's reply deadline for no later than November 30, 2018. Chief Administrative Judge Order (Granting Joint Motion to Establish Briefing Schedule) (Nov. 9, 2018) (unpublished).

[43] [ISP's] Answer Opposing [Fasken's] Motion to Dismiss as Referred to the ASLBP for Consideration Under 10 C.F.R. § 2.309 (Nov. 20, 2018); [ISP's] Answer Opposing Hearing Request and Petition to Intervene Filed by [Fasken] (Nov. 20, 2018) [hereinafter ISP Answer to Fasken].

[44] NRC Staff's Response to Petitions to Intervene and Requests for Hearing Filed by [Fasken] (Nov. 23, 2018) [hereinafter NRC Staff Answer to Fasken].

respectively.[45] Also on November 30, Fasken filed a single reply to both ISP and to the NRC Staff concerning its referred contention.[46]

On December 10, 2018, ISP moved to strike portions of Fasken's reply concerning its standing on its referred contention, and portions of Fasken's replies to ISP and to the NRC Staff concerning all of Fasken's proffered contentions.[47] Fasken opposed.[48]

On November 13, 2018, Sierra Club and Joint Petitioners filed their petitions to intervene and hearing requests.[49] On December 10, 2018, the NRC Staff submitted a consolidated answer[50] and ISP filed separate answers to Sierra Club[51] and Joint Petitioners.[52] Sierra Club and Joint Petitioners replied.[53]

On December 27, 2018, ISP filed separate motions to strike portions of Sierra Club's and Joint Petitioners' replies.[54] Sierra Club and Joint Petitioners opposed.[55]

On June 3, 2019, ISP's counsel submitted a letter to the Board.[56] The letter

---

[45] [Fasken's] Reply to ISP's Opposition to Hearing Request and Petition to Intervene (Nov. 28, 2018); [Fasken's] Reply to NRC Staff's Opposition to Hearing Request and Petition to Intervene (Nov. 30, 2018).

[46] Reply of [Fasken] to [ISP's] and Staff's Oppositions to Motion to Dismiss (Nov. 30, 2018).

[47] [ISP's] Motion to Strike Portions of the Replies Filed by [Fasken] (Dec. 10, 2018).

[48] [Fasken's] Opposition to [ISP's] Motion to Strike (Dec. 17, 2018).

[49] Petition to Intervene and Request for Adjudicatory Hearing by Sierra Club (Nov. 13, 2018) [hereinafter Sierra Club Pet.]; Petition of [Joint Petitioners] to Intervene, and Request for an Adjudicatory Hearing (Nov. 13, 2018) [hereinafter Joint Pet'rs Pet.]. Thereafter, Sierra Club and Joint Petitioners moved to disqualify this Board because the administrative judges in this proceeding are the same as those on the *Holtec* board. Motion of Sierra Club, [Joint Petitioners] for Disqualification of Atomic Safety and Licensing Board [(ASLB)] (Nov. 26, 2018). The Board denied the motion to disqualify and referred its decision to the Commission. Licensing Board Memorandum and Order (Denying and Referring Motion to Disqualify Board), LBP-18-6, 88 NRC 177, 180 (2018). The Commission affirmed. CLI-19-3, 89 NRC 236 (2019).

[50] NRC Staff's Consolidated Response to Petitions to Intervene and Requests for Hearing Filed By: Sierra Club; [Joint Petitioners] (Dec. 10, 2018) [hereinafter NRC Staff Consol. Answer].

[51] [ISP's] Answer Opposing Hearing Request and Petition to Intervene Filed by Sierra Club (Dec. 10, 2018) [hereinafter ISP Answer to Sierra Club].

[52] [ISP's] Answer Opposing Hearing Request and Petition to Intervene Filed by [Joint Petitioners] (Dec. 10, 2018) [hereinafter ISP Answer to Joint Pet'rs].

[53] Sierra Club's Reply to Answers filed by [ISP] and NRC Staff (Dec. 17, 2018) [hereinafter Sierra Club Reply to ISP and NRC Staff]; Combined Reply of [Joint Petitioners] to [ISP] and NRC Answers [hereinafter Joint Pet'rs Reply].

[54] [ISP's] Motion to Strike Portions of the Reply Filed by Sierra Club (Dec. 27, 2018); [ISP's] Motion to Strike Portions of the Reply Filed by [Joint Petitioners] (Dec. 27, 2018).

[55] Sierra Club's Answer to [ISP's] Motion to Strike Portions of Sierra Club's Reply (Jan. 2, 2019); Opposition of [Joint Petitioners] to [ISP] Motion to Strike (Dec. 30, 2018).

[56] Letter from Timothy P. Matthews, Counsel for [ISP], to Licensing Board (June 3, 2019) [hereinafter ISP June 3, 2019 Letter].

informed the Board and participants that ISP had submitted a partial response to the NRC Staff's Request for Additional Information (RAI) Part 1 and made two unrelated modifications to its license application that, it stated, could affect some of the proffered contentions in this proceeding.[57] First, ISP removed its request for an exemption under 10 C.F.R. § 72.30 concerning financial assurance.[58] Second, ISP revised its Environmental Report to "reflect the correct status of the lesser prairie chicken."[59] Finally, the letter stated that ISP's response to the Staff's RAI 2.2-2 includes a discussion of gas and oilfield operations in the vicinity of the proposed facility.[60]

On June 28, 2019, ISP submitted a second letter to the Board.[61] As in the earlier letter, ISP informed the Board and participants of new responses to the NRC Staff's RAIs, which in turn might affect participants' proffered contentions. ISP stated that it had submitted a partial response to the NRC Staff's RAI Part 3 and the NRC Staff's Transportation RAIs TR-1 through TR-10.[62] Additionally, ISP advised that it had revised sections 4.2.6, 4.2.7, 4.2.8, 4.2.9 and Attachment 4-1 of its Environmental Report to correspond with its RAI answers.[63]

Also on June 28, ISP submitted a written response to this Board's June 7 question as to whether, absent new legislation, DOE could lawfully assume ownership of the spent nuclear fuel in ISP's proposed facility.[64] ISP stated it agreed that "absent new legislation, the DOE could not lawfully assume ownership of the spent nuclear fuel" in its proposed CISF,[65] and, citing *Holtec,* contended that no admissible contention as to this issue remains in this proceeding.[66]

The Board heard oral arguments concerning standing and contention admissibility on July 10 and 11, 2019 in Midland, Texas. The Board encouraged,

---

[57] *Id.* at 1.

[58] *Id.* ("The Board and the parties may view this change as relevant to Beyond Nuclear's Proposed Contention, [Fasken's] Referred Motion to Dismiss, Sierra Club's Proposed Contentions 1 and 9, and [Joint Petitioners'] "Objection" and Proposed Contention 3.").

[59] *Id.* at 2 ("The Board and the parties may view this change as relevant to Sierra Club's Proposed Contention 13, and [Fasken's] Proposed Contention 5.").

[60] *Id.* ("The Board and the parties may view this information as relevant to [Fasken's] Proposed Contention 2 and Joint Petitioners' Proposed Contention 6.").

[61] Letter from Timothy P. Matthews, Counsel for [ISP], to Licensing Board (June 28, 2019) [hereinafter ISP June 28, 2019 Letter].

[62] *Id.* at 1.

[63] *Id.*; *id.* at 2 ("The Board and hearing participants may view portions of the revised ER sections and Attachment 4-1 as relevant to [Joint Petitioners'] Proposed Contention 1, Sierra Club's Proposed Contentions 4 and 16, and/or ISP's answers to those proposed contentions.").

[64] [ISP's] Response to the [ASLB's] Questions Regarding the U.S. [DOE's] Authority Under the [NWPA] (June 28, 2019) [hereinafter ISP June 28, 2019 Response to Board].

[65] *Id.* at 1.

[66] *Id.* (citing *Holtec,* LBP-19-4, 89 NRC at 376-82); *id.* at 3.

but did not require, each petitioner to address what it contends are relevant differences between this proceeding and the *Holtec* proceeding.[67]

## II. STANDING ANALYSIS

In a licensing proceeding such as this, the NRC must grant a hearing "upon the request of any person whose interest may be affected by the proceeding."[68] However, to determine whether a petitioner has a sufficient interest, the Commission applies contemporaneous judicial concepts of standing.[69] Although the Commission instructs us to construe the petition in favor of the petitioner when we determine standing,[70] it is nonetheless each petitioner's burden to demonstrate that standing requirements are met.[71] As relevant here, a petitioner may satisfy this burden in one of three ways.

First, a petitioner may show traditional standing. This requires a showing that a person or organization has suffered or might suffer a concrete and particularized injury that is: (1) fairly traceable to the challenged action; (2) likely redressable by a favorable decision; and (3) arguably within the zone of interests protected by the governing statutes[72] — here primarily the Atomic Energy Act (AEA) and the National Environmental Policy Act (NEPA).[73]

Second, a petitioner may take advantage of proximity presumptions the Commission has created to simplify standing requirements for individuals who reside within, or have frequent contacts with, a geographic zone of potential harm. In proceedings that involve construction or operation of a nuclear power plant, the zone is deemed to be the area within a 50-mile radius of the site.[74] In other proceedings, such as this one, a "proximity plus" standard is applied on a "case-by-case basis, taking into account the nature of the proposed action and the

---

[67] Licensing Board Order (Establishing Format for Oral Argument) (June 7, 2019) at 2 (unpublished).

[68] 42 U.S.C. § 2239(a)(1)(A).

[69] *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), CLI-15-25, 82 NRC 389, 394 (2015).

[70] *Id.*

[71] *See Commonwealth Edison Co.* (Zion Nuclear Power Station, Units 1 and 2), CLI-00-5, 51 NRC 90, 98 (2000). Section 2.309(d) of 10 C.F.R. specifies information that a petitioner should include in its petition to establish standing but does not set a standard a licensing board must apply when deciding whether that information is sufficient.

[72] *Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), CLI-09-20, 70 NRC 911, 915 (2009).

[73] 42 U.S.C. §§ 2011-2297; *id.* §§ 4321-4347.

[74] *PPL Bell Bend, LLC* (Bell Bend Nuclear Power Plant), CLI-10-7, 71 NRC 133, 138-39 (2010).

significance of the radioactive source."[75] The smaller the risk of offsite consequences, the closer a petitioner must be to be realistically threatened. Although the Commission has not established a clear standard, the relevant distance from a CISF is likely less than 50 miles because such a storage facility "is essentially a passive structure rather than an operating facility, and . . . therefore [has] less chance of widespread radioactive release."[76]

Third, like most petitioners here, an organization may try to establish representational standing based on the standing of one or more individual members. To establish representational standing, an organization must: (1) show that the interests it seeks to protect are germane to its own purpose; (2) identify at least one member who qualifies for standing in his or her own right; (3) show that it is authorized by that member to request a hearing on his or her behalf; and (4) show that neither the claim asserted nor the relief requested requires an individual member's participation in the organization's legal action.[77]

### A. Beyond Nuclear

Beyond Nuclear states that it is "a nonprofit, nonpartisan membership organization that aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abolish both to protect public health and safety, prevent environmental harms, and safeguard our future."[78] Of especial relevance, "Beyond Nuclear advocates for an end to the production of nuclear waste and for securing the existing reactor waste in hardened on-site storage until it can be permanently disposed of in a safe, sound, and suitable underground repository."[79]

Beyond Nuclear claims standing on several theories,[80] but we need consider only one. Beyond Nuclear submits the declaration of its member Rose M. Gardner, who lives within seven miles of the proposed facility and authorizes Beyond Nuclear to represent her.[81]

---

[75] *Georgia Institute of Technology* (Georgia Tech Research Reactor, Atlanta, Georgia), CLI-95-12, 42 NRC 111, 116-17 (1995); *see Sequoyah Fuels Corp. and General Atomics* (Gore, Oklahoma Site), CLI-94-12, 40 NRC 64, 75 n.22 (1994) ("[A] presumption based on geographic proximity is not confined solely to Part 50 reactor licenses, but is also applicable to materials cases where the potential for offsite consequences is obvious.").

[76] *Consumers Energy Co.* (Big Rock Point Independent Spent Fuel Storage Installation), CLI-07-19, 65 NRC 423, 426 (2007).

[77] *Consumers Energy Co.* (Palisades Nuclear Plant), CLI-07-18, 65 NRC 399, 409 (2007).

[78] Beyond Nuclear Pet. at 2.

[79] *Id.* at 2-3.

[80] *See id.* at 3-8.

[81] *See id.,* Ex. 2, Decl. of Rose M. Gardner (Sept. 13, 2018).

The NRC Staff does not oppose Beyond Nuclear's claim of standing,[82] and the Board agrees. Ms. Gardner's residence is well within the distance that has been found sufficient in other proceedings that involved spent fuel facilities.[83]

ISP opposes Beyond Nuclear's standing.[84] ISP argues that standing should not be presumed unless a petitioner resides within a facility's required offsite emergency planning zone.[85] Because the Commission does not impose any off-site emergency planning requirements on away-from-reactor facilities for dry storage of aged fuel, ISP claims that the Commission has determined generically that such facilities pose no significant offsite risks to health and safety.[86] Accordingly, ISP argues, no one who lives any distance beyond the fence line of its proposed site is entitled to a presumption of standing.

The Board disagrees. We decline to rule that the level of risk appropriate to triggering emergency planning requirements is necessarily the same as that sufficient to permit a concerned neighbor to file a petition. Among other things, a petitioner may be concerned about potential long-term effects that have nothing to do with a sudden emergency.

ISP would apparently have us deny standing to Ms. Gardner to challenge the storage of potentially up to 40,000 metric tons of spent fuel even if her home were located directly across the street. This seems neither realistic nor consistent with the Commission's direction to construe standing in favor of the petitioner.[87] Ms. Gardner is a person "whose interest may be affected" under section 189a of the AEA.

Beyond Nuclear has demonstrated standing. However, because Beyond Nuclear has not proffered an admissible contention, as discussed *infra,* its request for an evidentiary hearing must nonetheless be denied.

---

[82] NRC Staff Consol. Answer at 7.

[83] *See, e.g., Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), LBP-02-23, 56 NRC 413, 429 (2002) (ruling 17 miles sufficient and citing other NRC approvals of standing for petitioners within 10 miles of proposed spent fuel facility expansions); *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit 3), LBP-00-2, 51 NRC 25, 28 (2000) (finding standing of individual with part-time residence located 10 miles from spent fuel facility); *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), LBP-99-25, 50 NRC 25, 29-31 (1999) (finding standing of petitioner 17 miles from spent fuel facility); *Florida Power & Light Co.* (St. Lucie Nuclear Power Plant, Unit 1), LBP-88-10A, 27 NRC 452, 454-55, *aff'd,* ALAB-893, 27 NRC 627 (1988) (granting standing of individual living within 10 miles of spent fuel facility).

[84] ISP Answer to Beyond Nuclear at 5-21.

[85] *Id.* at 10-11.

[86] *Id.*

[87] *Turkey Point,* CLI-15-25, 82 NRC at 394.

### B. Sierra Club

Sierra Club is a well-known environmental organization. Like Beyond Nuclear, Sierra Club submits supporting declarations from several members who live in the vicinity of the proposed facility.[88] One member — Shirley Henson — states that she lives about six miles away.[89]

As discussed *supra,* this distance is well within the limits that have been found to confer standing to challenge much smaller storage facilities, and the NRC Staff agrees that Sierra Club has established standing.[90] And again, we are not persuaded by ISP's argument[91] that, even to commence a challenge, an individual who lives that close to a potentially massive facility for storing much of the nation's spent nuclear fuel must first demonstrate more.

Sierra Club has demonstrated standing.

### C. Joint Petitioners

Joint Petitioners are comprised of seven different organizations and one individual. Except for SEED, they each present a similar standing issue. They do not base their standing claims on their members' proximity to the proposed facility, but rather on their proximity to potential transportation routes by which spent nuclear fuel might travel to the proposed facility.[92]

This is too remote and speculative an interest on which to establish standing. As the Commission has stated: "[M]ere geographical proximity to potential transportation routes is insufficient to confer standing."[93]

SEED, on the other hand, has submitted the supporting declaration of one member — Brigitte Gardner-Aguilar — who lives in Eunice, New Mexico about

---

[88] *See* Sierra Club Pet., Decl. of Rose Gardner (Oct. 18, 2018); *id.,* Decl. of Shirley Henson (Oct. 23, 2018); *id.,* Decl. of Deanna Maria Dyer (Sept. 13, 2018); *id.,* Decl. of Gordon Wayne Dyer (Sept. 13, 2018); *id.,* Decl. of Danielle Marie Dyer (Sept. 13, 2018).

[89] *See id.,* Decl. of Shirley Henson (Oct. 23, 2018) ¶ 1. Rose Gardner also states that she lives six miles away; however, because Ms. Gardner submitted similar declarations on behalf of both Sierra Club and Beyond Nuclear, we consider her declaration only in connection with the standing of Beyond Nuclear. *See Big Rock Point ISFSI,* CLI-07-19, 65 NRC at 426 (explaining that "multiple representation might lead to confusion").

[90] NRC Staff Consol. Answer at 11.

[91] ISP Answer to Sierra Club at 7-14.

[92] Joint Pet'rs Pet. at 11-20.

[93] *U.S. Department of Energy* (Plutonium Export License), CLI-04-17, 59 NRC 357, 364 n.11 (2004) (quoting *Diablo Canyon ISFSI,* LBP-02-23, 56 NRC at 434); *see also EnergySolutions, LLC* (Radioactive Waste Import/Export Licenses), CLI-11-3, 73 NRC 613, 623 (2011) (denying petitioners' standing claim for failing to show there would be any impact from the transport of radioactive materials to be imported); *Holtec,* LBP-19-4, 89 NRC at 368 (discussing cases).

five miles from the proposed facility.[94] As discussed *supra,* this distance is well within the limits that have been found to confer standing to challenge much smaller storage facilities. At oral argument, the NRC Staff agreed that, through Ms. Gardner-Aguilar's declaration, SEED has submitted sufficient facts to establish standing.[95]

Although the other Joint Petitioners have not, SEED has demonstrated standing. However, because Joint Petitioners have not proffered an admissible contention, as discussed *infra,* SEED's request for an evidentiary hearing nonetheless must also be denied.

### D. Fasken

As set forth in the supporting Declaration of Tommy E. Taylor, Mr. Taylor is Vice President of Fasken Management, LLC, which is the general partner of Fasken Land and Minerals, Ltd.[96] Fasken is a member of Permian Basin Land and Royalty Organization (PBLRO), which is an association of oil and gas producers and royalty owners formed specifically in response to ISP's proposed facility.[97]

As stated in Mr. Taylor's Declaration, Fasken owns property that is within eighteen miles of the proposed facility. Mr. Taylor's employment duties require him to travel to and spend time in the area of the proposed CISF site.[98] Additionally, he is personally aware of other Fasken employees who "often" travel to the area for employment reasons.[99] As an officer of Fasken, he is concerned about the potential human health effects on Fasken employees, including the costs associated with medical care and treatment of radiation-related conditions.[100]

As stated in the supporting Declaration of D.K. Boyd, Mr. Boyd is an individual member of PBLRO.[101] He owns and ranches the Frying Pan Ranch, the closest part of which is only four miles from the proposed facility.[102]

---

[94] Joint Pet'rs Pet. at 33, *id.,* Decl. of Brigitte Gardner-Aguilar (Oct. 22, 2018).

[95] Tr. at 204. Initially, the NRC Staff opposed the standing of all Joint Petitioners, including SEED. NRC Staff Consol. Answer at 7-11. Because Joint Petitioners focused their standing claims primarily on proximity to potential transportation routes, rather than proximity to the proposed facility, it perhaps was not apparent that Ms. Gardner-Aguilar lives just as close or closer to the proposed facility as do Sierra Club members whose standing the Staff did not oppose. *See* NRC Staff Consol. Answer at 11.

[96] Fasken Pet., Ex. 1, Decl. of Tommy E. Taylor ¶ 1 (Oct. 29, 2018).

[97] *Id.* ¶¶ 1, 4.

[98] *Id.* ¶ 3.

[99] *Id.*

[100] *Id.* ¶ 11.

[101] *Id.,* Ex. 2, Decl. of D.K. Boyd (Oct. 29, 2018) ¶ 2.

[102] *Id.* ¶ 4.

Initially, the NRC Staff concluded that both Fasken and PBLRO had established standing.[103] At oral argument, however, the Staff revised its position to say that it found Mr. Boyd's declaration sufficient to establish standing for PBLRO but did not find Mr. Taylor's declaration sufficient to establish standing for Fasken. Thus, the Staff would now have the Board grant standing to PBLRO, but not to Fasken.[104]

Although the standing of Fasken and of Mr. Boyd is not as clear as the standing of the individual representatives of Beyond Nuclear, Sierra Club, and SEED, the Board concludes their proximity to the proposed facility is sufficient to confer standing on Fasken and representative standing on PBLRO. In light of the Commission's direction to construe standing claims in favor of the petitioner,[105] we agree with the NRC Staff's original view[106] that they both have shown enough.[107]

Fasken and PBLRO have demonstrated standing.[108] However, as discussed *infra,* because Fasken and PBLRO have not proffered an admissible contention, their request for an evidentiary hearing nonetheless must be denied.

## III. LEGAL STANDARDS

### A. Legal Standards Governing Contention Admissibility

For its hearing request to be granted, in addition to demonstrating standing, a petitioner must proffer at least one admissible contention.[109]

An admissible contention must: (1) state the specific legal or factual issue to be raised or controverted; (2) provide a brief explanation for the basis of the contention; (3) demonstrate that the issue raised in the contention is within the scope of the proceeding; (4) demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding; (5) concisely state the alleged facts or expert opinions that

---

[103] NRC Staff Answer to Fasken at 6-7.

[104] Tr. at 316-17.

[105] *Turkey Point,* CLI-15-25, 82 NRC at 394.

[106] NRC Staff Answer to Fasken at 6-7.

[107] It would seem desirable, however, for the Commission to provide more specific guidance concerning how licensing boards should balance the relevant considerations when standing to challenge a fuel storage facility is not based simply upon nearby residence. *See Strata Energy, Inc.* (Ross In Situ Recovery Uranium Project), LBP-12-3, 75 NRC 164, 189 n.27, *aff'd,* CLI-12-12, 75 NRC 603 (2012).

[108] Because Fasken has demonstrated standing based on its original petition and supporting declarations, we deny as moot ISP's motion to strike as it pertains to the standing portion of Fasken's replies.

[109] 10 C.F.R. § 2.309(a).

support the petitioner's position and on which the petitioner intends to rely at an evidentiary hearing, including references to the specific sources and documents on which the petitioner intends to rely; and (6) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes or, if the application is alleged to be deficient, by identifying such deficiencies and the supporting reasons for this allegation.[110]

A further requirement applies to several contentions addressed *infra.* No NRC rule or regulation may be challenged in a contention unless the petitioner seeks and obtains a waiver from the Commission in accordance with 10 C.F.R. § 2.335. No petitioner in this proceeding has sought such a waiver.

The contention admissibility rules are "strict by design."[111] The Commission has observed that they "properly 'reserve [the] hearing process for genuine, material controversies between knowledgeable litigants.'"[112] Failure to satisfy even one of the requirements requires the Board to reject the contention.[113]

This six-factor standard resulted from the Commission's effort to "raise the threshold bar for an admissible contention."[114] Previously, licensing boards would sometimes admit contentions "that appeared to be based on little more than speculation," and petitioners would try to "unearth" admissible contentions "through cross-examination."[115] Rather than expend agency time and resources on vague and unsupported claims,[116] the Commission strengthened the contention admissibility standards to what they are today — standards that afford evidentiary hearings only to those who "proffer at least some minimal factual and legal foundation in support of their contentions."[117]

Therefore, although a petitioner need not prove its contention at this stage, mere notice pleading of proffered contentions is insufficient.[118] Rather, the NRC requires a petitioner to read the pertinent portions of the license application, including the Safety Analysis Report (SAR) and the Environmental Report, state

---

[110] *Id.* § 2.309(f)(1)(i)-(vi).

[111] *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001).

[112] *FirstEnergy Nuclear Operating Co.* (Davis-Besse Nuclear Power Station, Unit 1), CLI-12-8, 75 NRC 393, 396 (2012) (quoting *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 219 (2003)).

[113] *See Entergy Nuclear Operations, Inc.* (Indian Point, Unit 2), CLI-16-5, 83 NRC 131, 136 (2016).

[114] *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 334 (1999).

[115] *Id.*

[116] *See* Changes to the Adjudicatory Process, 69 Fed. Reg. 2182, 2202 (Jan. 14, 2004).

[117] *Oconee,* CLI-99-11, 49 NRC at 334.

[118] *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003).

the applicant's position and the petitioner's opposing view, and explain why it disagrees with the applicant.[119]

### B. NEPA Legal Standards

NEPA mandates that federal agencies prepare an environmental impact statement (EIS) before undertaking any "major Federal actions significantly affecting the quality of the human environment."[120] The preparation of an EIS is meant to ensure that federal agencies "will not act on incomplete information, only to regret [their] decision after it is too late to correct."[121] NEPA requires agencies to take a "'hard look' at environmental consequences" of the proposed action,[122] and imposes a duty upon the agency to both "consider every significant aspect of the environmental impact of a proposed action"[123] and "inform the public" of its analysis and conclusion.[124]

NEPA's "hard look" mandate notwithstanding, the agency is not obligated to analyze every conceivable aspect of the project before it.[125] Instead, this "hard look" is subject to a "rule of reason,"[126] meaning that the agency need not perform analyses concerning events that would be considered "worst-case" scenarios involving the project,[127] or those considered "remote and highly speculative."[128] NEPA does not necessitate "certainty or precision" nor does it mandate particular results from the agency.[129] Rather, NEPA requires "an *estimate* of

---

[119] Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,170-71 (Aug. 11, 1989).

[120] 42 U.S.C. § 4332(2)(C); *see also Nat. Res. Def. Council v. NRC,* 823 F.3d 641, 643 (D.C. Cir. 2016).

[121] *Marsh v. Or. Nat. Res. Council,* 490 U.S. 360, 371 (1989).

[122] *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 350 (1989) (quoting *Kleppe v. Sierra Club,* 427 U.S. 390, 410 n.21 (1976)).

[123] *Balt. Gas & Elec. v. Nat. Res. Def. Council, Inc.,* 462 U.S. 87, 97 (1983) (quoting *Vt. Yankee Nuclear Power Corp. v. Nat. Res. Def. Council, Inc.,* 435 U.S. 519, 553 (1978)).

[124] *Id.* (citing *Weinberger v. Catholic Action of Haw./Peace Educ. Project,* 454 U.S. 139, 143 (1981).

[125] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 349 (2002).

[126] *Nat. Res. Def. Council, Inc. v. Morton,* 458 F.2d 827, 834 (D.C. Cir. 1972).

[127] *Private Fuel Storage,* CLI-02-25, 56 NRC at 352.

[128] *Limerick Ecology Action, Inc. v. NRC,* 869 F.2d 719, 754-55 (3d Cir. 1989).

[129] *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005).

anticipated (not unduly speculative) impacts" from the agency.[130] The statutory obligations seek to "guarantee process, not specific outcomes."[131]

At this stage of the proceeding, the NRC Staff has not issued an EIS for the proposed ISP facility. NRC regulations nonetheless require petitioners to file environmental contentions "based on documents or other information at the time the petition is to be filed," i.e., the applicant's environmental report.[132] Although it is the NRC Staff's responsibility to comply with NEPA in its later-issued EIS,[133] we analyze contentions challenging the Environmental Report now as if those contentions will migrate as challenges to the Staff's later-issued EIS.[134]

### C. The Continued Storage Rule

In *New York v. NRC,*[135] four states, an Indian community, and a number of environmental groups challenged a 2010 revision to the NRC's Waste Confidence Decision.[136] The United States Court of Appeals for the District of Columbia Circuit held that the NRC had inadequately performed its NEPA evaluation by not considering the "environmental effects of failing to secure permanent storage" and ruled that the agency "must conduct a true [environmental assessment] regarding the extension of temporary storage."[137] In response, the NRC developed

---

[130] *Id.* (emphasis in original).

[131] *Massachusetts v. NRC,* 708 F.3d 63, 67 (1st Cir. 2013) (citing *Town of Winthrop v. FAA,* 535 F.3d 1, 4 (1st Cir. 2008).

[132] 10 C.F.R. § 2.309(f)(2); *see also Powertech (USA), Inc.* (Dewey-Burdock In Situ Uranium Recovery Facility), CLI-16-20, 84 NRC 219, 231 (2016).

[133] 42 U.S.C. §§ 4321 *et seq.*

[134] *See Powertech,* CLI-16-20, 84 NRC at 231; *see also Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), CLI-15-17, 82 NRC 33, 42 n.58 (2015) ("[A] contention 'migrates' when a licensing board construes a contention challenging [an environmental report] . . . as a challenge to a subsequently issued Staff NEPA document without the petitioner amending the contention.").

[135] 681 F.3d 471 (D.C. Cir. 2012).

[136] In 2010, the Commission promulgated a rule that made five findings: (1) safe disposal of high-level waste and spent nuclear fuel in a mined geologic repository is technically feasible; (2) at least one mined geologic repository will be available when necessary; (3) high-level waste and spent nuclear fuel will be safely managed until a repository is available; (4) spent fuel can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite spent fuel storage facilities; and (5) onsite or offsite storage for spent nuclear fuel will be made available if needed. *See* 10 C.F.R. § 51.23 (2010) (75 Fed. Reg. 81,037, 81,037-76 (Dec. 23, 2010)).

[137] *New York,* 681 F.3d at 473, 483.

the Generic Environmental Impact Statement (GEIS) for Continued Storage of Spent Nuclear Fuel[138] and promulgated the Continued Storage Rule.[139]

The Continued Storage GEIS considers, among other things, environmental impacts of short-term storage (60 years beyond the cessation of reactor operations), long-term storage (100 years after that period), and indefinite storage of spent nuclear fuel for both at-reactor and away-from-reactor sites.[140] The Continued Storage Rule incorporates the analyses and impact determinations from the Continued Storage GEIS.[141] Of especial importance is that neither the Continued Storage Rule nor the Continued Storage GEIS states a preference for any particular storage method (i.e., spent fuel pool storage versus dry cask storage).

The Continued Storage Rule provides that applicants for reactor or spent fuel storage facility licenses "are not required to discuss the environmental impacts of spent nuclear fuel storage" for the period following the term of their license.[142] Instead, the NRC's EIS is deemed to incorporate the impact determinations of the Continued Storage GEIS.[143]

As with all challenges to the Commission's regulations, a petitioner is barred from challenging the Continued Storage Rule unless the petitioner obtains a waiver from the Commission.[144]

## IV. CONTENTION ANALYSIS

### A. Beyond Nuclear

Beyond Nuclear's sole contention states:

> The NRC must dismiss ISP's license application and terminate this proceeding because the application violates the NWPA. The proceeding must be dismissed because the central premise of ISP's application — that the U.S. Department of Energy ("DOE") will be responsible for the spent fuel that is transported to and stored at the proposed interim facility — violates the NWPA. Under the NWPA, the DOE is precluded from taking title to spent fuel unless and until a permanent repository has opened. 42 U.S.C. §§ 10222(a)(5)(A), 10143.[145]

---

[138] 1 NMSS, [GEIS] for Continued Storage of Spent Nuclear Fuel, NUREG-2157 (Sept. 2014) (ADAMS Accession No. ML14196A105) [hereinafter Continued Storage GEIS].

[139] Final Rule, Continued Storage of Spent Nuclear Fuel, 79 Fed. Reg. 56,238, 56,238-63 (Sept. 19, 2014); 10 C.F.R. § 51.23 [hereinafter Continued Storage Rule].

[140] Continued Storage GEIS at 1-13 to -15, 4-1 to 5-65.

[141] 10 C.F.R. § 51.23(a).

[142] *Id.* § 51.23(b).

[143] *Id.*

[144] *See* 10 C.F.R. § 2.335(a)-(b).

[145] Beyond Nuclear Pet. at 8-9.

Similar to the Holtec application, ISP's license application states that either DOE or other holders of the title to spent nuclear fuel will hold title to the spent fuel destined for storage at the proposed facility.[146] Unlike in *Holtec,* initially ISP also sought an exemption from the NRC's financial assurance regulations in the event that DOE were to hold title.[147]

Beyond Nuclear's contention encompasses three separate claims: First, as the law now stands, DOE cannot, consistent with the NWPA, presently take title to private power companies' spent nuclear fuel.[148] Second, ISP therefore cannot properly seek an exemption from NRC regulations based on the possibility of DOE's taking title.[149] Third, references in ISP's application to the option of private ownership are allegedly "meaningless and unsupported," serving as "nothing more than fig leaves" over the essential premise of ISP's proposal — that its storage facility "will be built *only* if DOE owns the waste."[150]

Beyond Nuclear's first two claims are now moot. ISP responded to the Board's written questions by stating: "Applicant agrees that, absent new legislation, the DOE could not lawfully assume ownership of the spent nuclear fuel in the proposed interim storage facility."[151] ISP also withdrew its request for an exemption from the financial assurance requirements set forth in 10 C.F.R. § 72.30.[152] There is no dispute on these points. (The NWPA's prohibition on DOE's taking title to private power companies' spent nuclear fuel before a permanent national repository becomes operational is discussed at length in *Holtec,* and will not be repeated here.[153])

Beyond Nuclear's third claim also does not raise a genuine dispute with ISP's application,[154] which includes the option of contracting directly with nuclear plant owners that currently hold title to their spent fuel. As in *Holtec,*[155] whether ISP will find that alternative commercially viable is not an issue before the Board, because the business decision of whether to use a license has no bearing on a licensee's ability to safely conduct the activities the license authorizes. As the Commission instructs us, "the NRC is not in the business of regulating the

---

[146] ISP License Application at 1-1 to -2.

[147] *Id.* at 1-7.

[148] Beyond Nuclear Pet. Ex. 1 at 19-22.

[149] *Id.* at 18-19.

[150] *Id.* at 19 (emphasis in original).

[151] ISP June 28, 2019 Response to Board at 1. ISP confirmed this position at oral argument. Tr. at 44.

[152] ISP June 3, 2019 Letter at 1 (citing Attach. 4 to ISP Letter E-54257 (Additional Changes Not Associated with the RAIs).

[153] *See Holtec,* LBP-19-4, 89 NRC at 376-77.

[154] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[155] *Holtec,* LBP-19-4, 89 NRC at 381.

market strategies of licensees or determining whether market strategies warrant commencing operations."[156]

At oral argument, Beyond Nuclear claimed, for the first time in this proceeding, that mere mention of the possibility of contracting with DOE renders ISP's license application unlawful.[157] The Board disagrees. ISP may hope that Congress changes the law to allow it the option of contracting directly with DOE. Meanwhile, we are confident that ISP — having acknowledged on the record that it would be unlawful to contract with DOE under the NWPA as currently in effect — will not try to do just that. Nor may we assume that DOE would be complicit in a violation of the NWPA.[158] On the contrary, DOE has also taken the position publicly that it may not take title to the vast majority of private plant companies' spent nuclear fuel without violating the NWPA as currently in effect.[159]

Moreover, regardless of who holds title, ISP's proposed license is limited to storage of spent nuclear fuel elements, associated components and radioactive materials "from commercial nuclear utilities."[160] That is the only material that may be stored at the proposed facility.

For its part, the NRC Staff's position on Beyond Nuclear's contention has also changed. Initially, the Staff would have had us admit it "to the extent this contention raises an issue of law regarding ISP's reliance on DOE for seeking an exemption from NRC's decommissioning financial assurance requirements."[161] However, the Staff initially deemed no other portion of Beyond Nuclear's contention admissible, concluding that "to the extent the Petitioner asserts that the application relies exclusively on potential DOE involvement, it fails to demonstrate a genuine dispute with the application."[162]

---

[156] *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-28, 62 NRC 721, 726 (2005) (quoting *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 48-49 (2001) (internal quotation marks omitted)).

[157] Tr. at 17.

[158] A presumption of regularity applies to federal agencies, which should be assumed to act properly in the absence of evidence to the contrary. *See, e.g., United States v. Armstrong,* 517 U.S. 456, 464 (1996); *United States v. Chem. Found., Inc.,* 272 U.S. 1, 14-15 (1926).

[159] *See, e.g.,* [DOE] Final Interpretation of Nuclear Waste Acceptance Issues, 60 Fed. Reg. 21,793, 21,793-94, 21,797 (May 3, 1995); *N. States Power Co. v. U.S. Dep't of Energy,* 128 F.3d 754, 756 (D.C. Cir. 1997) ("The Department also took the position that 'it lacks statutory authority under the [Nuclear Waste Policy] Act to provide interim storage.'") (quoting 60 Fed. Reg. at 21,794); *Ind. Mich. Power Co. v. U.S. Dep't of Energy,* 88 F.3d 1272, 1274 (D.C. Cir. 1996) ("The [DOE] also determined that it had no authority under the NWPA to provide interim storage in the absence of a facility that has been authorized, constructed and licensed in accordance with the NWPA.").

[160] ISP License Application, Attach. A, Proposed License Conditions at unnumbered A-2 to -4 (ISP Proposed License No. SNM-1050) at §§ 6.A, 21.

[161] NRC Staff Answer to Beyond Nuclear at 13.

[162] *Id.* at 12.

At oral argument, however, after ISP had withdrawn its exemption request and mooted the only part of Beyond Nuclear's contention that the NRC Staff initially deemed admissible, the Staff nonetheless continued to urge that Beyond Nuclear's contention should be admitted. According to its counsel, the NRC Staff now views Beyond Nuclear's contention admissible as to "whether it is legally permissible to include DOE as a potential customer."[163]

The Board disagrees. Beyond Nuclear, ISP, and the Board are all in agreement that, under current law, ISP may not contract for DOE to take title to private power companies' spent nuclear fuel. There is no credible possibility that such contracts will be made in violation of the law. There is no dispute that warrants devoting agency resources to further legal briefing or to an evidentiary hearing.

Additionally, unlike in *Holtec,*[164] here Beyond Nuclear has not sought to amend its original contention in response to the applicant's concession that, at present, it may not lawfully contract for DOE to take title. Contrary to the NRC's procedures,[165] the Staff apparently would have the Board admit a new version of Beyond Nuclear's contention that Beyond Nuclear advanced during oral argument, but never sought permission to submit in a written pleading. The Board declines to do so.

Beyond Nuclear's contention is not admitted.

## B. Sierra Club

### *1. Sierra Club Contention 1*

Sierra Club's Contention 1 states:

> The NRC has no authority to license the ISP [CISF] under the NWPA nor the AEA. ISP has said DOE must take title to the waste, but the NWPA does not authorize DOE to take title to spent fuel in an interim storage facility. The AEA has no provision for licensing a CIS facility.[166]

Sierra Club Contention 1 is similar in part to Beyond Nuclear's contention. It likewise encompasses three claims: First, as the law now stands, DOE cannot, consistent with the NWPA, presently take title to private power companies' spent nuclear fuel.[167] Second, Sierra Club alleges, ISP's application "assumes"

---

[163] Tr. at 53.

[164] *See Holtec,* LBP-19-4, 89 NRC at 377.

[165] 10 C.F.R. § 2.309(c).

[166] Sierra Club Pet. at 14.

[167] *Id.* at 16.

that DOE will take title to the spent fuel destined for the proposed facility.[168] According to Sierra Club, it "strains credulity to believe that a nuclear plant owner would want to retain title to the waste."[169] Third, Sierra Club claims, the AEA does not authorize the NRC to license interim storage away from the site of a reactor.[170]

We agree with both the NRC Staff[171] and ISP[172] that Sierra Club Contention 1 is not admissible. As explained in the Board's ruling on Beyond Nuclear's contention, *supra,* Sierra Club's first claim is now moot, as ISP has acknowledged on the record that, as the law now stands, it cannot lawfully contract with DOE to take title to spent fuel destined for its proposed facility.[173]

As also explained *supra,* in the Board's ruling on Beyond Nuclear's contention, Sierra Club's second claim does not raise a genuine dispute with ISP's application.[174] The application includes the option of ISP's contracting directly with nuclear plant owners that currently hold title to their spent fuel. As in *Holtec,*[175] whether ISP will find that alternative commercially viable is not an issue before the Board, because the business decision of whether to use a license has no bearing on a licensee's ability to safely conduct the activities the license authorizes.

Finally, insofar as Sierra Club Contention 1 asserts that any away-from-reactor interim storage facility is necessarily unlawful under the AEA and/or the NWPA, we conclude (as the board did in *Holtec*[176]) that the contention constitutes an impermissible challenge to NRC regulations that is precluded by 10 C.F.R. § 2.335. NRC regulations expressly allow licensing of such facilities.[177] Moreover, the United States Court of Appeals for the District of Columbia Circuit has confirmed that the NRC has such authority under the AEA, and that the NWPA did not repeal or supersede that authority.[178]

Sierra Club Contention 1 is not admitted.[179]

---

[168] *Id.* at 14.

[169] *Id.* at 15.

[170] *Id.* at 20.

[171] NRC Staff Consol. Answer at 79.

[172] ISP Answer to Sierra Club at 24.

[173] ISP June 28, 2019 Response to Board at 1; Tr. at 44.

[174] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[175] *Holtec,* LBP-19-4, 89 NRC at 381.

[176] *Id.* at 383.

[177] *See generally* 10 C.F.R. Part 72; *see also id.* §§ 72.32(a), 72.46(d) (concerning requirements pertaining to independent spent fuel storage facilities not co-located with an operating power reactor).

[178] *Bullcreek v. NRC,* 359 F.3d 536, 543 (D.C. Cir. 2004).

[179] Because we would reach the same decision even if we considered Sierra Club's reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply that concern Sierra Club Contention 1.

### 2. *Sierra Club Contention 2*

Sierra Club Contention 2 states:

> The ISP Environmental Report, in attempting to describe the purpose and need for this project, claims that [consolidated interim storage] is safer and more secure than storing the waste at the reactor site. However, the Environmental Report cites no evidence or data to support this assertion. An agency cannot rely on self-serving statements, especially ones with no supporting data, from the prime beneficiary of the project.[180]

Sierra Club Contention 2 claims that the Environmental Report contains unsupported self-serving statements about the safety and security of consolidated interim storage.[181] Sierra Club also claims that, to properly evaluate safety, ISP's Environmental Report and the NRC Staff's subsequent EIS must examine the safety of hardened onsite storage (HOSS) at reactor sites.[182]

As support, Sierra Club relies on a 2003 report by Dr. Gordon Thompson, a declared expert on technical and policy analyses in the fields of energy and environment.[183] According to Sierra Club, Dr. Thompson's report outlines the benefits of HOSS and claims that ISP's Environmental Report must evaluate the relative safety of HOSS.[184]

Although Sierra Club disputes one need for the facility, the purpose and need statement in ISP's Environmental Report lists multiple reasons to support licensing the proposed facility.[185] Examples include converting lands for more beneficial uses, returning areas to greenfield status, and lessening substantial costs for surveillance, maintenance, emergency preparedness, and physical security at spent fuel storage facilities.[186] Sierra Club only disputes ISP's safety and security reason, and does not explain how ISP's assertion of safety and security materially compromises the application. Sierra Club implies that ISP must show that the need for its project is "compelling" or grounded in "urgency." [187] However, Sierra Club does not identify any basis for this standard.

Sierra Club Contention 2 is not admitted.

---

[180] Sierra Club Pet. at 23.

[181] *Id.* at 23-24.

[182] *Id.* at 27.

[183] *See id.* at 26-28 (citing Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security* (Jan. 2003) [hereinafter 2003 Thompson Report]); *see also id.* Decl. of Dr. Gordon Thompson (Nov. 12, 2018) [hereinafter Sierra Club Thompson Decl.].

[184] Sierra Club Pet. at 26-28 (citing Sierra Club Thompson Decl. at 15-16, 64).

[185] ER at 1-5.

[186] *Id.* at 1-5 to -6.

[187] *See* Sierra Club Pet. at 27.

### *3. Sierra Club Contention 3*

Sierra Club Contention 3 states:

> The statement in the [Environmental Report] that [consolidated interim storage] is safer and more secure than storage at a reactor site contradicts the NRC's Continued Storage Rule, which concludes that spent radioactive fuel can be safely stored at a reactor site indefinitely. Therefore, there is no basis for accepting the statement in the [Environmental Report], and there is no purpose and need for the ISP project.[188]

Like Sierra Club Contention 2, Contention 3 challenges ISP's "safer and more secure" language in the purpose and need section of its Environmental Report. Sierra Club disputes that there is a purpose and need for the proposed storage project because, it claims, the Continued Storage Rule and Continued Storage GEIS have already determined that at-reactor storage "for an indefinite period would generally result in only small environmental impacts."[189] Sierra Club also claims that the proposed CISF would cause increased risks "due to the risks of transporting the waste to the [consolidated interim storage] site and the increased risk of so much waste being stored in one place."[190] Sierra Club relies on Continued Storage GEIS section 4.20 and incorporates the statement and facts from its Contention 2 to support its assertion.[191]

Sierra Club Contention 3 fails to raise a genuine dispute with ISP's application because it does not show any contradiction between ISP's Environmental Report and the Continued Storage Rule or GEIS.[192] ISP's Environmental Report does not say that the Continued Storage GEIS analyses are incorrect or inadequate, or that indefinite storage at at-reactor locations is unsafe. Rather, ISP's Environmental Report *agrees* with those analyses because the Environmental Report incorporates and relies upon the GEIS.[193] ISP's position is that its proposed interim storage facility would be even more secure in "consolidating and enhancing monitoring and security functions"[194] rather than storage at reactor sites across the nation.

As to Sierra Club's assertion that there is no purpose and need for the WCS facility "if spent fuel can be safely stored at the reactor site indefinitely,"[195]

---

[188] Sierra Club Pet. at 29.
[189] *Id.* at 30; *see* Continued Storage Rule; *see also* Continued Storage GEIS.
[190] Sierra Club Pet. at 30.
[191] *Id.* at 30-31.
[192] *See* 10 C.F.R. § 2.309(f)(1)(vi).
[193] *See, e.g.,* ER at 8-3 to -6.
[194] ISP Answer to Sierra Club at 42.
[195] Sierra Club Pet. at 30.

Sierra Club does not dispute (much less acknowledge) ISP's "purpose and need" section in the WCS Environmental Report. In that section, as discussed *supra,* ISP states various purposes and needs for the project, including that the facility could potentially allow for an unrestricted free release of those decommissioned sites (i.e., the sites could achieve greenfield status) and that spent fuel owners could reap economic savings by not having to pay the up-front costs for spent fuel storage system physical security, maintenance, and emergency preparedness.[196] Sierra Club only disputes the safety and security purpose, but does not explain how ISP's assertion that its proposed WCS CISF would be "more safe and secure" than the status quo is material to the findings the NRC must make.[197]

Sierra Club Contention 3 is not admitted.

#### *4. Sierra Club Contention 4*

Sierra Club Contention 4 states:

> Operation of the [consolidated interim storage] site as proposed by ISP would necessitate the transportation of the radioactive waste from reactor sites to the [CISF]. Transportation from the reactors to the [consolidated interim storage] site carries substantial risks. These risks must be evaluated in the [Environmental Report].[198]

On its face, Sierra Club Contention 4 appears to be a contention of omission claiming that ISP's Environmental Report does not evaluate transportation risks. In its stated basis for the contention, however, Sierra Club clarifies that its actual claim is that the Environmental Report "does not adequately address the risks and consequences of a transportation accident and sabotage event."[199] Specifically, Contention 4 asserts that the Environmental Report underestimates both (1) the consequences of severe rail accidents involving shipments of radioactive waste;[200] and (2) the likelihood of such accidents.[201] It also asserts that "the environmental report does not discuss the potential consequences of a sabotage event."[202]

Sierra Club Contention 4 relies on an August 2001 report prepared by Matthew Lamb and Marvin Resnikoff of Radioactive Waste Management Associates

---

[196] ER at 1-5 to -6.
[197] *See* 10 C.F.R. § 2.309(f)(1)(iv).
[198] Sierra Club Pet. at 31.
[199] *Id.* at 32.
[200] *Id.* at 33-38.
[201] *Id.* at 38-41.
[202] *Id.* at 41.

(the RWMA Report).[203] The RWMA Report — entitled "Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada" — was prepared for litigants opposing the Yucca Mountain repository.[204] Indeed, in this adjudication Contention 4 is supported by the accompanying declaration of the same Dr. Resnikoff, which adds no additional facts or opinions, but represents that Dr. Resnikoff assisted in preparation of Sierra Club Contention 4 and agrees with it.[205]

Rather than controverting pertinent portions of ISP's Environmental Report, Contention 4 merely presents an 18-year-old alternative analysis — the RWMA Report — that admittedly addresses a category of "worst case" assumptions. Sierra Club's challenge to ISP's estimates of potential radiation doses from an accident consists of pointing out that ISP's estimated doses are smaller than those in the RWMA Report.[206] Sierra Club does not discuss the analysis of estimated doses contained in section 4.2.8 of ISP's Environmental Report, and it does not attempt to explain why they are inadequate or unreasonable. Instead, Sierra Club *assumes* that ISP's analysis is inadequate solely because it produced estimated doses that are smaller than the "worst case" results in the RMWA Report prepared for litigants opposing the Yucca Mountain repository.

As the Commission instructs us, this is not enough to launch an evidentiary hearing: "[T]he proper question is not whether there are plausible alternative choices for use in the analysis, but whether the analysis that was done is reasonable under NEPA."[207] As the Commission has cautioned, "it may always be possible to conceive of alternative and more conservative inputs, whose use in the analysis could result in greater estimated accident consequences."[208]

To be admissible, therefore, a "contention proposing alternative inputs or methodologies must present some factual or expert basis for why the proposed changes in the analysis are warranted (e.g., why the inputs or methodology used is unreasonable, and the proposed changes or methodology would be more appropriate)."[209] Because Sierra Club has not done this, its challenge in Contention 4 to ISP's analysis of the consequences of severe rail accidents fails to meet its burden under 10 C.F.R. § 2.309(f)(1)(vi) to identify both specific portions

---

[203] *Id.* at 33 (citing Matthew Lamb, Marvin Resnikoff, & Richard Moore, *Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada* (Aug. 2001) [hereinafter RWMA Report]).

[204] RWMA Report at i.

[205] Decl. of Dr. Marvin Resnikoff [hereinafter Resnikoff Decl.].

[206] Sierra Club Pet. at 38-39.

[207] *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-5, 75 NRC 301, 323 (2012).

[208] *Id.*

[209] *Id.* at 323-24.

of ISP's Environmental Report that Sierra Club disputes and "the supporting reasons for each dispute."

In all other respects — that is, with respect to the monetary consequences of a severe transportation accident, the likelihood of rail accidents, and the claim that ISP should have addressed the potential consequences of sabotage — Sierra Club Contention 4 is not admissible.

With respect to the monetary consequences of a severe transportation accident, Contention 4 wants ISP to analyze the costs of cleaning up a hypothetical accident associated with offsite transportation. Sierra Club fails to explain how such an analysis could plausibly affect the ultimate decision whether to license the proposed storage facility, and therefore fails to justify why this additional analysis must be performed, consistent with NEPA's rule of reason.

With respect to the likelihood of transportation accidents, Sierra Club does not acknowledge that section 4.2.8 of ISP's Environmental Report contains such an analysis. Because Sierra Club fails to dispute the accident probability used by ISP, it fails to directly contradict the application and raise a genuine dispute as required by 10 C.F.R. § 2.309(f)(1)(vi).

With respect to Sierra Club's claim that ISP's Environmental Report fails to discuss potential sabotage events, the Commission has taken the position that the NRC is not required to consider terrorism in its NEPA analysis of licensing actions outside of those states encompassed by the United States Court of Appeals for the Ninth Circuit.[210] Therefore, this issue is outside the scope of this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iii).

Finally, we are not persuaded by Sierra Club's argument[211] that we should admit Contention 4 because one of the Yucca Mountain licensing boards admitted a contention entitled "Transportation Risk Assumptions" (NEV-NEPA-012).[212] NEV-NEPA-012 is not comparable to Sierra Club Contention 4.

On the contrary, NEV-NEPA-012 targeted an *internal* inconsistency in DOE's EIS. According to Nevada, "[t]o evaluate transportation accidents and sabotage events,[213] DOE used Pasquill Stability Class D and release fractions from 26 fuel assemblies in a rail cask."[214] On the other hand, Nevada pointed out, "to evaluate the maximum reasonably foreseeable transportation accident, DOE used

---

[210] *AmerGen Energy Co.* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124, 128-29 (2007).

[211] Sierra Club Reply at 19.

[212] *U.S. Department of Energy* (High-Level Waste Repository), LBP-09-6, 69 NRC 367, 492 (2009).

[213] Because Nevada falls within the Ninth Circuit (unlike Texas), DOE did evaluate the potential consequences of sabotage.

[214] State of Nevada's Petition to Intervene as a Full Party, U.S. Dep't of Energy (High Level Waste Repository), Docket No. 63-001 at 1093 (Dec. 19, 2008) (ADAMS Accession No. ML083540096).

Pasquill Stability Class F and release fractions from a rail cask containing 21 fuel assemblies."[215]

In NEV-NEPA-12, Nevada therefore argued that "[t]he use of different weather and release fractions between these evaluations is an inconsistent application of assumptions."[216] NEV-NEPA-12 said nothing about the RWMA Report. The decision to admit NEV-NEPA-12 has no bearing on whether we should admit Sierra Club Contention 4.[217]

Sierra Club Contention 4 is not admitted.[218]

### *5. Sierra Club Contention 5*

Sierra Club Contention 5 states:

> The [Environmental Report] states that waste would be stored at the [CISF] for 60-100 years until a permanent repository is found. The [Environmental Report] and the subsequent EIS must address the purpose and need and the environmental impacts if a permanent repository is not found, and the ISP facility becomes a de facto permanent repository.[219]

In support, Sierra Club cites *New York v. NRC,*[220] in which the United States Court of Appeals for the District of Columbia Circuit ruled that the NRC "must look at both the probabilities of potentially harmful events and the consequences if those events come to pass."[221] Sierra Club therefore asserts that ISP's Environmental Report must "discuss and analyze the impacts of indefinite storage at the ISP CIS facility."[222] Sierra Club relies on the declaration of Dr. Gordon

---

[215] *Id.*

[216] *Id.*

[217] Initially the NRC Staff would have had us admit Sierra Club Contention 4 in part: that is, solely insofar as it addresses the potential radiological consequences of severe transportation accidents. NRC Staff Consol. Answer at 85. At oral argument, however, the Staff announced that it no longer considers any portion of Sierra Club Contention 4 admissible in light of ISP's June 28, 2019 response to the NRC Staff's request for additional information, ISP June 28, 2019 Letter at 1-2 (citing ISP Letter E-54423 (June 28, 2019), which responded to the April 23, 2019 NRC Staff's First RAI, Part 3). Tr. at 111-12.

[218] Because we would reach the same decision even if we consider Sierra Club's reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply that concern Sierra Club Contention 4.

[219] Sierra Club Pet. at 44.

[220] 681 F.3d at 478.

[221] *Id.*

[222] Sierra Club Pet. at 45-46.

Thompson, who likewise asserts that ISP should evaluate the possibility of indefinite storage.[223]

As discussed *supra,* the Continued Storage GEIS, which the NRC prepared in response to *New York,* generically analyzes the environmental impacts of storing spent nuclear fuel for certain lengths of time, including the indefinite time scenario where no repository is ever constructed.[224] In its Environmental Report, ISP incorporates the Continued Storage GEIS and its analyses in Chapter 8.[225] Although Sierra Club attempts to characterize its arguments as site-specific challenges to the application, as opposed to challenges to the Continued Storage Rule,[226] Sierra Club's argument is without merit. Sierra Club's claims impermissibly challenge the Continued Storage Rule and are therefore outside the scope of this proceeding.[227]

The Rule, in section 51.23(b), expressly provides that license applicants' environmental reports "are not required to discuss the environmental impacts of spent nuclear fuel storage in . . . an ISFSI for the period following the term of the . . . ISFSI license."[228] Because ISP is applying for a 40-year license to store spent nuclear fuel and GTCC waste, ISP need only discuss the environmental impacts of storage for 40 years. And again, the Continued Storage GEIS does consider what Sierra Club wants ISP to do — that is, analyze the environmental impacts of spent fuel storage for an indefinite amount of time.[229]

Sierra Club Contention 5 is not admitted.

### *6. Sierra Club Contention 6*

Sierra Club Contention 6 states:

> The [Environmental Report] and the subsequent EIS must evaluate the potential for earthquakes at the ISP site and the environmental impact of earthquakes. Likewise, the Safety Analysis Report (SAR) must adequately evaluate the earthquake potential of the proposed site. Both the [Environmental Report] and SAR are inadequate in this respect.[230]

---

[223] *Id.* at 48.

[224] *New York,* 681 F.3d at 483; Final Rule, Continued Storage of Spent Nuclear Fuel, 79 Fed. Reg. 56,238, 56,241 (Sept. 19, 2014).

[225] ER at 8-3 to -6.

[226] Sierra Club Pet. at 46 ("The Continued Storage Rule does not preclude the site-specific review specified by this contention. . . . [t]hat is exactly the focus of this contention.").

[227] *See* 10 C.F.R. § 2.309(f)(1)(iii).

[228] 10 C.F.R. § 51.23(b).

[229] Continued Storage GEIS at 5-8.

[230] Sierra Club Pet. at 49.

Sierra Club Contention 6 contains two challenges related to the seismicity of the area: a contention of omission regarding ISP's Environmental Report, and a challenge to the adequacy of ISP's SAR.[231]

Sierra Club claims that "[t]he [Environmental Report] essentially dismisses the likelihood of earthquakes in the area and does not mention any environmental impacts from earthquakes,"[232] in violation of 10 C.F.R. § 51.45.[233] Specifically, Sierra Club asserts that increased drilling in the area "makes the underground area unstable and induces earthquakes."[234] In support of these assertions, Sierra Club proffers an internet hyperlink to a study by Stanford University researchers that purportedly shows "the existence of numerous faults in the area in and around the proposed ISP site,"[235] and also provides an internet hyperlink to a study by researchers at the University of Texas and Southern Methodist University that purportedly shows an increased incidence of earthquakes induced by fossil fuel extraction in the area of the ISP facility.[236]

The environmental portion of Sierra Club Contention 6 is inadmissible regardless. As a contention of omission, it fails to raise a genuine dispute with the application, as required by 10 C.F.R. § 2.309(f)(1)(vi), because ISP's Environmental Report does evaluate and analyze seismic activity in the CISF region.[237] Section 3.3.2 of the Environmental Report discusses "Basic Geologic and Seismic Information," including faulting in the region at subsection 3.3.4. Sierra Club's claim that ISP "does not even discuss the impact of earthquakes" is therefore incorrect.[238] As to Sierra Club's claim that ISP's Environmental Report ignores seismic impacts from the oil and gas industry, section 3.3.3 does discuss the seismic effects of drilling in the area and concludes that the "low

---

[231] WCS [CISF] System Safety Analysis Report, Docket No. 72-1050, Rev. 2 (ML18221A408 (package)) [hereinafter SAR].

[232] Sierra Club Pet. at 49.

[233] *Id.*

[234] *Id.* at 51; *see* Sierra Club Reply at 22.

[235] Sierra Club Pet. at 52.

[236] *Id.* at 51. Although we consider them in this instance, documents on which petitioners rely should be filed in their entirety on the Electronic Information Exchange — not by means of hyperlinks in pleadings. *See* Guidance for Electronic Submissions to the NRC (rev. 8 May 18, 2017) at 7 ("For adjudicatory documents (pleadings and exhibits), parties are *discouraged* from using hyperlinks because of concerns about the integrity of the hearing record.") (emphasis in original). Hyperlinks and internet sources can change over time, and can be edited (or even deleted); accordingly, licensing boards strongly discourage this practice. *See, e.g.,* Licensing Board Order, *Powertech USA, Inc.* (Dewey-Burdock In Situ Uranium Recovery Facility), (Providing Case Management Information) at 1 n.3 (May 2, 2019) (unpublished); Licensing Board Memorandum and Order, *Crow Butte Res., Inc.* (Marsland Expansion Area), (Providing Administrative Directives Associated with Evidentiary Hearing and Limited Appearance Session) at 3 n.4 (July 27, 2018) (unpublished).

[237] *See* ER at 3-3 to -16; *id.* at 4-28 to -29, -64, -70.

[238] Sierra Club Pet. at 50.

to moderate rate of background seismicity, even that associated with petroleum recovery activities, results in relatively low seismic hazard at the CISF site."[239]

Second, insofar as Sierra Club tries in its reply to transform Contention 6 into a contention of inadequacy,[240] it fails to point to specific portions of the application where alleged deficiencies exist and to provide reasons why they are deficient. Moreover, the studies Sierra Club purports to use as support do no more than review the historic seismic activity in the Permian Basin and recognize that there is petroleum drilling in the area — facts already addressed by ISP in its Environmental Report Chapter 3.

Sierra Club also claims that ISP's SAR does not comply with the requirements of 10 C.F.R. § 72.103(f)(1), which requires "an adequate analysis of the earthquake potential of the area in and around the proposed ISP site."[241] However, SAR section 2.6.2 refers the reader to ISP's seismic hazard evaluation, at SAR Attachment D.[242] Because Attachment D contains proprietary information and is not publicly available, Sierra Club asserts that ISP's SAR is inadequate.[243]

Sierra Club, along with other members of the public, were afforded the opportunity to access proprietary information in ISP's application by following the procedure in the *Federal Register* notice for this proceeding.[244] They chose not to. Sierra Club's complaints[245] about the procedure for accessing sensitive unclassified nonsafeguards information are not within the scope of this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iii).

Sierra Club Contention 6 is not admitted.

### *7. Sierra Club Contention 7*

Sierra Club Contention 7 states:

> An [Environmental Report] is required to discuss alternatives to the proposed action. Pursuant to NEPA, this includes an examination of the no-action alternative. The discussion of the no-action alternative in the ISP [Environmental Report] is deficient because it does not discuss safer storage methods at the reactor sites, such as HOSS, nor does it acknowledge the NRC's Continued Storage Rule that concludes that waste can be safely stored at the reactor site indefinitely.[246]

---

[239] ER at 3-12.
[240] Sierra Club Reply at 22.
[241] Sierra Club Pet. at 49.
[242] SAR at 2-28.
[243] Sierra Club Pet. at 52.
[244] 83 Fed. Reg. at 44,073-75.
[245] Tr. at 58-59.
[246] Sierra Club Pet. at 53.

Sierra Club asserts that ISP's discussion of the "no-action alternative" in its Environmental Report is lacking because ISP does not discuss HOSS or the Continued Storage Rule.[247] Framed as a contention of omission, Sierra Club challenges the no-action alternative analysis in section 2.1 of ISP's Environmental Report as deficient because allegedly it provides "absolutely no discussion about the safety aspects of keeping the waste at the reactor sites"[248] and does not perform the necessary cost-benefit analysis with respect to project alternatives.[249]

Sierra Club fails to show how a discussion of HOSS would be material to ISP's no-action alternative analysis. ISP's Environmental Report need only analyze the no-action alternative of maintaining the status quo. As ISP's Environmental Report explains, "[t]he no action alternative . . . would be to not construct and operate the CISF. Under the no action alternative, the NRC would not approve the license application that would allow ISP to construct and operate the proposed facility."[250] Therefore, Sierra Club's claim that ISP fails to discuss HOSS does not raise a genuine dispute with the application.

Sierra Club claims that discussion of the no-action alternative in ISP's Environmental Report does not acknowledge the NRC's Continued Storage Rule. This claim ignores section 8.4 of the Report, which summarizes the short-term and long-term impacts of at-reactor storage, as adopted from the Continued Storage GEIS.[251] Sierra Club not only overlooks this discussion, but appears to assert that ISP's Environmental Report must discuss "the safety aspects of keeping the waste at the reactor sites."[252] Safety considerations are analyzed within ISP's SAR, as they should be.

Sierra Club's claim that ISP does not perform a cost-benefit analysis with respect to project alternatives likewise reflects a failure to acknowledge, much less challenge, the contents of ISP's application. In sections 7.2 and 7.3, ISP's Environmental Report does discuss the relative benefits and costs of maintaining the status quo (leaving the spent fuel at the reactor site) compared to implementing the proposed action.[253] Moreover, Table 7.2-2 in ISP's Environmental Report examines the costs to a subset of plants that are no longer operating from the perspective of both the proposed action and the no-action alternative.[254] Sierra Club Contention 7 does not establish a genuine dispute with ISP's analysis.[255]

---

[247] *Id.*
[248] *Id.* at 54.
[249] *Id.* at 55.
[250] ER at 2-1.
[251] *Id.* at 8-3 to -6.
[252] Sierra Club Pet. at 54.
[253] ER at 7-4 to -28; *see* Tr. at 103-04.
[254] *Id.* at 7-7 to -8.
[255] *See* 10 C.F.R. § 2.309(f)(1)(vi).

Sierra Club Contention 7 is not admitted.

### *8. Sierra Club Contention 8*

Sierra Club Contention 8 states:

> ISP relies heavily on the assertion that the Blue Ribbon Commission on America's Nuclear Future (BRC) has recommended [consolidated interim storage] as the answer to the country's nuclear waste problem. On the contrary, the BRC report should not be viewed uncritically and does not necessarily deserve blind support in assessing the ISP application. ISP's [Environmental Report] therefore mischaracterizes both the BRC report's conclusions and the relative risks of [consolidated interim storage] versus onsite storage. The EIS must therefore independently and fully address the relative risks and benefits of both storage options.[256]

Sierra Club Contention 8 claims that ISP's proposed storage project "is dictated to a great extent by the BRC report."[257] Sierra Club also claims that ISP's Environmental Report "mischaracterizes both the BRC report's conclusions and the relative risks of [consolidated interim storage] versus onsite storage."[258] Sierra Club further claims that ISP's Environmental Report and the NRC's subsequent EIS must independently compare the risks and benefits of ISP's interim storage facility with the risks and benefits of storing spent fuel where it was generated, i.e., at-reactor storage.[259]

Sierra Club Contention 8 fails to raise a genuine dispute with ISP's application, as required by 10 C.F.R. § 2.309(f)(1)(vi). ISP's Environmental Report does contain the risk-benefit analysis that Sierra Club claims to be omitted,[260] and Sierra Club fails to challenge it.

Section 1 of ISP's Environmental Report discusses the history and background of the country's spent fuel quandary, including the NWPA, the status of the Yucca Mountain project, and the 2012 Blue Ribbon Commission (BRC) report.[261] And both sections 1 and 2 suggest that ISP's proposed facility would better advance the BRC report's preference for a consent-based approach to siting the proposed project. Whether or not that is correct, Sierra Club fails to show how ISP's discussion affects the adequacy of its analysis of options in the Environmental Report.

---

[256] Sierra Club Pet. at 56.
[257] *Id.*
[258] *Id.* at 59.
[259] *Id.*
[260] ER Chapter 7; *id.* at 2-64 (tbl. 2.5-1).
[261] *Id.* at 1-1 to -5.

Sierra Club Contention 8 is not admitted.

### *9. Sierra Club Contention 9*

Sierra Club Contention 9 states:

> 10 C.F.R. § 72.30 establishes requirements for decommissioning interim storage facilities. An application for licensing a CISF must contain a decommissioning plan explaining how the plan will satisfy the requirements in the regulation. The application for the ISP [CISF] does not comply with these requirements.[262]

Sierra Club Contention 9 is similar in part to Beyond Nuclear's Contention. It focuses primarily upon ISP's request for an exemption from the requirements in 10 C.F.R. § 72.30(e) regarding reasonable assurance that funds will be available to decommission the proposed storage facility.[263] As explained *supra,* in the Board's ruling on Beyond Nuclear's contention, ISP has withdrawn its exemption request.[264] This part of Sierra Club Contention 9 is therefore moot.

Insofar as Sierra Contention 9 also challenges ISP's estimate of decommissioning costs,[265] it does not explain why ISP's estimate is incorrect. Therefore, the contention fails to raise a genuine dispute with ISP's application, as required by 10 C.F.R. § 2.309(f)(1)(vi).

Initially the NRC Staff would have had us admit Sierra Club Contention 9 "[t]o the extent the contention challenges the requested exemption."[266] At oral argument, however, the Staff clarified that, in light of ISP's withdrawal of its exemption request, the Staff no longer considers any part of Sierra Club Contention 9 to be admissible.[267]

Sierra Club Contention 9 is not admitted.[268]

### *10. Sierra Club Contention 10*

Sierra Club Contention 10 states:

---

[262] Sierra Club Pet. at 60.

[263] *Id.* at 61-62.

[264] ISP June 3, 2019 Letter at 1.

[265] Sierra Club Pet. at 60.

[266] NRC Staff Consol. Answer at 102.

[267] Tr. at 109.

[268] Because we would reach the same decision even if we considered Sierra Club's reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply concerning Sierra Club Contention 9.

> The ISP [consolidated interim storage] site sits atop the Ogallala Aquifer. The [Environmental Report] and SAR submitted by ISP appear to claim that the site does not sit atop the aquifer. Therefore, the [Environmental Report] and SAR do not accurately and adequately evaluate and consider the impacts to the aquifer from the [CISF].[269]

Sierra Club claims that, because the ISP CISF site sits atop the Ogallala Aquifer, ISP's Environmental Report and SAR "must address the impact on groundwater from release of radioactive material."[270] Sierra Club asserts that a dispute exists with ISP on whether or not the Aquifer underlies the CISF, and relies upon a declaration by Dr. Patricia Bobeck, a geologist, and a 2012 report from George Rice, a professional hydrologist.[271] Sierra Club further disputes ISP's application concerning the water saturation point beneath the CIS site, alleging "[i]t is important to know how susceptible the groundwater is to contamination from a leak of radioactive material."[272] A leak of radioactive material, Sierra Club claims, would come from a ruptured cask from the storage of high burnup fuel,[273] a seismic event produced by hydraulic fracturing (i.e., fracking) in the area,[274] or a terrorist attack.[275] In sum, Sierra Club Contention 10 claims that ISP's Environmental Report "does not provide the basic information necessary to adequately and thoroughly address the impact of cask rupture and discharge of radioactive material to ground and groundwater at the ISP site."[276]

Any disagreement concerning the location of the Ogallala Aquifer or the water saturation point at the CISF site is only material to the findings the NRC must make if it is possible for groundwater to be contaminated from a cracked or ruptured cask. Regardless of the aquifer's location or the water saturation point, to demonstrate an admissible contention Sierra Club must proffer fact or expert opinion concerning: (1) how a cask would become ruptured in the first place, and (2) how radioactive material from that cask would get into the groundwater. Contention 10 is inadmissible because Sierra Club offers no expert opinion or plausible facts on either of these points.[277]

---

[269] Sierra Club Pet. at 63.

[270] *Id.*

[271] *Id.* at 63-64.

[272] *Id.* at 64.

[273] *Id.* at 66.

[274] *Id.* at 67 (citing *id.,* Attach., Patricia Bobeck, Ph.D., P.G., *Geologic Review of Interim Storage Partners LLC WCS Consolidated Interim Storage Facility Environmental Report* (Oct. 25, 2018) at 2 [hereinafter Bobeck Report]).

[275] Bobeck Report at 2-3.

[276] Sierra Club Pet. at 65.

[277] *See* 10 C.F.R. § 2.309(f)(1)(v).

In any event, Sierra Club's claim that storage of high burnup fuel[278] and seismic events from hydraulic fracturing in the area[279] would crack a canister is in essence a challenge to the NRC's cask certificate of compliance (CoC) program and is thus outside the scope of this proceeding. ISP's application states that it will only accept six types of cask systems that have already been individually certified and issued CoCs by the NRC to safely store spent fuel, including high burnup fuel. These canisters have also been analyzed to withstand credible seismic events. As these CoCs are designated by NRC rulemaking as approved storage systems, any challenge to them is an impermissible challenge to NRC regulations under 10 C.F.R. § 2.335.

Sierra Club's geologist also claims that a terrorist attack might rupture a cask, which ought to require further analysis by ISP under NEPA.[280] Whether or not this scenario is plausible, as explained *supra* the Commission takes the position that only facilities within the jurisdiction of the United States Court of Appeals for the Ninth Circuit must conduct a NEPA analysis for terrorist attacks.[281] As ISP's facility would be under the United States Court of Appeals for the Fifth Circuit's jurisdiction, ISP is not required to review the threat of a terrorist attack.

Sierra Club also does not demonstrate a genuine dispute with ISP's application concerning how radiation from a cracked spent fuel canister, containing fuel in solid, ceramic pellet form,[282] could reach groundwater. Likewise, the GTCC waste that would be stored at ISP's facility would be reactor-related and in solid form.[283] No liquid waste would be stored at the facility.[284] As the Commission explained in *Private Fuel Storage,* "[t]o show a genuine material dispute, [a petitioner's] contention would have to give the Board reason to believe that contamination from a defective canister could find its way outside of the cask."[285] Sierra Club has not done this.

Sierra Club Contention 10 is not admitted.

---

[278] Sierra Club Pet. at 65-67.

[279] *Id.* at 67.

[280] Bobeck Report at 3.

[281] *See Oyster Creek,* CLI-07-8, 65 NRC at 129. *Compare San Luis Obispo Mothers for Peace v. NRC,* 449 F.3d 1016, 1032 (9th Cir. 2006), *with N.J. Dep't of Envtl. Prot. v. NRC,* 561 F.3d 132, 142-43 (3d Cir. 2009); Continued Storage GEIS at 4-91.

[282] Tr. at 96-97.

[283] SAR App. H at H.1-1.

[284] *Id.*

[285] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125, 138-39 (2004).

### *11. Sierra Club Contention 11*

Sierra Club Contention 11 states:

> Section 2.3.3 of the [Environmental Report] discusses 15 criteria ISP used to evaluate the suitability of the Andrews County site. These criteria were created by ISP and bear little or no relationship to any criteria in the statutes or regulations. Even the criteria that are relevant have not been adequately addressed.[286]

Sierra Club takes issue with fifteen criteria ISP used to evaluate and select the proposed CISF site, allegedly in violation of the requirement in 10 C.F.R. § 51.45(c) to consider "the economic, technical, and other benefits and costs of the proposed action and its alternatives."[287] Sierra Club claims that only four of those fifteen criteria actually involve environmental impacts, and that those are not adequately addressed by ISP.[288] Within ISP's analysis of Criterion 11, which concerns Environmental Protection, Sierra Club disputes: (1) the discussion of contamination from the adjacent WCS low-level radioactive waste (LLRW) site; (2) whether the CISF would reside in a 100-year floodplain; (3) the discussion of the relevance of climate to environmental impacts; (4) the discussion of protected species in the area of the CISF; (5) discussion of socioeconomic data in the area of the proposed CISF; and (6) discussion of archaeological resources at the CISF site.[289]

ISP's Environmental Report states that, in identifying potential locations for its CISF site, "ISP began by identifying a Region-of-Interest (ROI) consisting of a set of states that have the basic characteristics appropriate for a CISF site."[290] After ISP narrowed down its options to four counties in two states, ISP subjected those locations to "a rigorous two-tier screening process evaluating 15 criteria from local political support and land availability to operational considerations and environmental impacts."[291]

As the NRC Staff correctly points out, "[t]here are no specific regulatory findings under 10 C.F.R. Part 51 for an applicant's site selection criteria; the criteria are examined for reasonableness."[292] Moreover, the site selection process is driven by the purpose and need specified in the application, and the NRC may accord "substantial weight to the preferences of the applicant and/or sponsor in

---

[286] Sierra Club Pet. at 68.

[287] *Id.* at 68, 75.

[288] *Id.* at 71.

[289] *Id.* at 71-75.

[290] ER at 2-9 to -10.

[291] *Id.* at 2-10.

[292] NRC Staff Consol. Answer at 110 (citing *Duke Energy Carolinas, LLC* (William States Lee III Nuclear Station, Units 1 and 2), CLI-16-19, 84 NRC 180, 210 (2016).

the siting and design of the project"[293] so long as the application is not artificially narrow as to circumvent the requirement that reasonable alternatives must be considered.[294]

Sierra Club does not show how ISP's analysis of alternative CISF locations contravenes 10 C.F.R. § 51.45 or other "statutes or regulations," as Sierra Club claims. As the Staff states, ISP's criteria are driven by ISP's own purpose and need statement, which is to develop a CISF "to serve a national strategic need by providing for an orderly transfer of [spent nuclear fuel] from twelve shut down reactors."[295]

Concerning Sierra Club's general assertions that ISP's Criterion 11 analyses are inadequate and "do not comply with NRC regulations,"[296] we agree with the NRC Staff that Sierra Club's complaints amount to impermissible flyspecking of the Environmental Report,[297] and thus generate no genuine material dispute with ISP's application under 10 C.F.R. § 2.309(f)(1)(vi).[298] ISP established its own site selection criteria sufficient to permit a "hard look" at alternative sites, and Sierra Club does not cite any authority that requires ISP to use any different criteria. Nor does Sierra Club specify how ISP's selection process violates NEPA. "If the [environmental report] on its face 'comes to grips with all important considerations' nothing more need be done."[299]

Sierra Club Contention 11 is not admitted.[300]

### *12. Sierra Club Contention 12*

Sierra Club Contention 12 states:

> The minimum cooling time for transportation of fuel from a boiling water reactor (BWR) in a NUHOMS MP-187 cask is greater than calculated by TN Americas,

---

[293] *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 55 (2001).

[294] *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-90-8, 32 NRC 201, 206 (1990).

[295] ER at 1-6.

[296] Sierra Club Pet. at 75.

[297] NRC Staff Consol. Answer at 112 (citing *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 13 (2005).

[298] Of these six claims, two are also proffered by Sierra Club as separate contentions: Sierra Club Contention 13 (protected species) and Sierra Club Contention 15 (environmental justice).

[299] *Grand Gulf ESP,* CLI-05-4, 61 NRC at 13 (quoting *Hydro Res., Inc.,* CLI-01-4, 53 NRC at 71 (2001)).

[300] Because we would reach the same decision even if we considered Sierra Club's reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply concerning Sierra Club Contention 11.

> the manufacturer of the cask. This implies that the cladding of BWR fuel will exceed allowable limits and will degrade. Cladding is an issue that must be adequately addressed.[301]

Sierra Club claims that "the storage and transportation of containers loaded with high heat output [will be] likely to leak radioactive material into the environment in a transportation accident."[302] Sierra Club Contention 12 relies on a 2013 DOE report that mentions the possibility of cladding embrittlement at burnup rates of 30 GWd/MTU (gigawatt days per metric ton of uranium).[303] Sierra Club also presents a table of calculations by Dr. Marvin Resnikoff, an asserted expert in radioactive waste,[304] to dispute the calculations from two exhibits "in the [NUHOMS] MP-187 SAR."[305] Dr. Resnikoff's calculations purport to prove that the adequate cooling time for a 7 × 7 boiling water reactor fuel assembly in a NUHOMS MP-187 cask is actually thirty-two years, not fifteen years.[306] Thus, Sierra Club challenges the design specifications of the cask.

Sierra Club Contention 12 is inadmissible because it fails to raise a genuine dispute with the application on a material issue of law or fact.[307] Sierra Club's exhibits do not correspond to the design of the NUHOMS MP-187 cask, but rather to the design of the NUHOMS MP-197 Transportation Cask, which is inapposite to ISP's application.[308] It is unclear what Sierra Club is trying to challenge, but regardless both designs have already been approved by the NRC and issued Certificates of Compliance.[309] Section 2.335 of 10 C.F.R. bars any contention challenging an NRC-approved storage cask design that has been incorporated by reference in a spent fuel storage facility application.[310]

The premise of Sierra Club Contention 12 is also fundamentally incorrect

---

[301] Sierra Club Pet. at 75.

[302] *Id.* at 75-76.

[303] *Id.* at 76 (citing U.S. Dep't of Energy, Fuel Cycle Research & Dev., *A Project Concept for Nuclear Fuels Storage and Transportation* (rev. 1 June 2013) [hereinafter DOE Fuel Concept Report]).

[304] *Id.,* Resnikoff Decl. ¶ 1.

[305] *Id.* at 76-77.

[306] *Id.* at 77.

[307] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[308] *Compare* 1 TN Americas LLC, NUHOMS®-MP197 Transportation Packaging Safety Analysis Report at 1-10 (rev. 19 Apr. 2019) (ADAMS Accession No. ML19112A252) (proprietary), *with* Sierra Club Pet., Ex. 6.

[309] [CoC] for Radioactive Materials Packages, Certificate No. 9255, Rev. 14, Docket No. 71-9255, NUHOMS® MP187 Multi-Purpose Cask (Nov. 28, 2018) (ADAMS Accession No. ML18330A248) [hereinafter CoC No. 9255]; [CoC] for Radioactive Materials Packages, Certificate No. 9302, Rev. 9, Docket No. 71-9302, NUHOMS®-MP197 Transportation Package (Apr. 18, 2019) (ADAMS Accession No. ML19112A169).

[310] 10 C.F.R. § 72.46(e).

because the Certificate of Compliance for NUHOMS MP-187 only authorizes pressurized water reactor fuel to be loaded into the cask, not boiling water reactor fuel.[311] Nor is ISP seeking approval to transport any fuel to the proposed facility.[312]

Sierra Club Contention 12 is not admitted.

### *13. Sierra Club Contention 13*

Sierra Club Contention 13 states:

> The [Environmental Report] states that two species of concern, the Texas horned lizard and the dunes sagebrush lizard, have been seen at the ISP site or may be present. But there is no discussion of any studies or surveys to determine if the species are present and the impact of the project on those species. Therefore, the [Environmental Report] is inadequate in describing the affected environment.[313]

Sierra Club Contention 13 challenges the adequacy of the discussion in ISP's Environmental Report regarding two species of concern: the Texas horned lizard and the dunes sagebrush lizard. The contention also claims that ISP's supporting references "are not described well enough to allow members of the public to access the sources."[314]

Although ISP correctly points out that Sierra Club's analysis of the Environmental Report is rather thin,[315] ISP does not dispute that all five sources cited in section 3.5.16 of its Environmental Report — the sources on which it relies in discussing the Texas horned lizard and the dunes sagebrush lizard — are not publicly available. As discussed at oral argument, no interested member of the public could access any of these studies, or learn how many people performed them, what their qualifications were, or how much time they spent.[316] The NRC Staff admitted that it could not find any of these five studies either.[317] Although the Staff criticized Sierra Club for challenging ISP's conclusions "[w]ithout ref-

---

[311] CoC No. 9255 at 4 (Condition 5(b)(1)(c)(i)-(ii)) (stating that the only fuel authorized for shipment is pressurized water fuel assemblies).

[312] ISP License Application at 1-3 ("Transportation of the spent nuclear fuel shipping casks from the originating nuclear reactor to the CISF will be performed in accordance with 10 CFR 71 and the originating reactor licenses and is not part of this License Application.").

[313] Sierra Club Pet. at 78.

[314] *Id.* at 79.

[315] ISP Answer to Sierra Club at 104-09.

[316] Tr. at 278-79.

[317] Tr. at 277.

erencing to surveys cited in section 3.5 of the [Environmental Report],"[318] these are the same studies that the Staff itself could not locate.

ISP's response is to claim that "Petitioner's assertion that the environmental studies relied upon in an [environmental report] must be publicly available is not supported by NRC precedent or guidance."[319] But that is not so. Although as an independent agency the NRC is not necessarily bound by the regulations of the Council on Environmental Quality (CEQ), the Commission instructs us to "look to CEQ regulations for guidance."[320]

As Sierra Club points out in its reply,[321] the CEQ regulations recognize that "[a]ccurate scientific analysis, expert agency comments, and *public scrutiny* are essential to implementing NEPA."[322] In furtherance of this directive, federal agencies must, in their environmental analyses, "identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions."[323] We need not decide whether all cited references in an applicant's Environmental Report must be publicly available, but — to facilitate the public scrutiny deemed "essential" to implementing NEPA — surely some of them must be, or must be appended to the Report. Otherwise, public scrutiny is not possible.

ISP moves to strike Sierra Club's references to the CEQ regulations as outside the permissible scope of a reply.[324] We deny the motion insofar as ISP wants to strike reference to the CEQ regulations. Sierra Club Contention 13 claims that ISP's sources are not described well enough for the public to access them. In opposition, ISP argues that "Petitioner cites no requirement that the ecological surveys referenced and summarized in the [environmental report] all must be publicly available."[325] In its reply, Sierra Club cites to just such a requirement.[326] This constitutes a legitimate amplification of the argument in its original petition.[327]

---

[318] NRC Staff Consol. Answer at 120.

[319] ISP Answer to Sierra Club at 109.

[320] *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-11-11, 74 NRC 427, 443-44 & n.95 (2011); *see also* 10 C.F.R. § 51.10 (describing the Commission's policy "to take account of" CEQ regulations "voluntarily, subject to certain conditions").

[321] Sierra Club Reply at 38-39.

[322] 40 C.F.R. § 1500.1(b) (emphasis added).

[323] *Id.* at § 1502.24.

[324] [ISP's] Motion to Strike Portions of the Reply Filed by Sierra Club (Dec. 27, 2018).

[325] ISP Answer to Sierra Club at 109.

[326] Sierra Club Reply at 38.

[327] *See Nuclear Management Co.* (Palisades Nuclear Plant), CLI-06-17, 63 NRC 727, 732 (2006). We deny as moot ISP's motion to strike insofar as it pertains to all other portions of the reply concerning Sierra Club Contention 13, because we would reach the same decision even if we considered Sierra Club's reply.

Sierra Club Contention 13 is admitted solely as a contention of omission, insofar as none of the five references in section 3.5.16 of ISP's Environmental Report is either sufficiently described to judge its technical adequacy or made publicly available.

Sierra Club Contention 13 is admitted in part.

### *14. Sierra Club Contention 14*

Sierra Club Contention 14 states:

> The containers in which the waste will be transported to and stored at the ISP site are licensed for a period of 20 years. ISP hopes to renew the license for an additional 40 years, and then apparently hoping for additional relicensing to the projected 100-year life of the [CISF]. However, many of the containers will already have been in service for years prior to being shipped to the ISP [CISF]. Furthermore, the Continued Storage Rule assumes that the spent fuel will be transferred to new containers after 100 years. ISP's proposal may present an unacceptable danger of radioactive release. Therefore, the [Environmental Report] must examine the environmental impact of the containers beyond their 20-year licensing period.[328]

In support of Contention 14, Sierra Club claims that "the most significant factor in the safety of the [CISF] is the safety of the containers that will be transported to and stored at the [CISF] site."[329] Sierra Club contends that ISP's SAR omits analyses of the safety of the canisters under 10 C.F.R. § 72.45(d),[330] and further claims that the Continued Storage GEIS does not "provide a basis for saying the containers are safe."[331] Sierra Club also claims that ISP's SAR lacks a plan for dealing with leaking and cracking containers,[332] and that the proposed interim storage facility lacks a dry transfer system for repackaging any leaking or cracked canister received at the site.[333] Finally, Sierra Club asserts that, because the canisters are only licensed for 20 years and because ISP's WCS facility has a projected life of 60 to 100 years, "the cask systems to be used at the ISP facility must be analyzed for the possibility of indefinite storage."[334]

Sierra Club Contention 14 is not admissible. First, the Commission's deci-

---

[328] Sierra Club Pet. at 79.
[329] *Id.* at 80.
[330] *Id.* at 81.
[331] *Id.*
[332] *Id.* at 82.
[333] *Id.* at 81.
[334] *Id.* at 80.

sion in *Private Fuel Storage* established that cracked and leaking canisters in storage, transport, or otherwise is not a credible scenario.[335] Second, the canisters that are proposed to be stored at the WCS facility have already been issued certificates of compliance and approved for storage by the NRC under Part 72.[336] These certificates of compliance have been codified in a rulemaking.[337] Because the NRC has already approved the canisters ISP plans to store at its proposed interim facility, Sierra Club's challenges to the safety of the canisters themselves (including the environmental impact of the containers beyond their own certificates of compliance terms) are outside the scope of this proceeding and do not raise a genuine dispute with the application.

Third, Sierra Club's challenge to the safety of transportation of spent fuel storage canisters is an impermissible challenge to Part 71 and is outside the scope of this proceeding. When a spent fuel cask owner (such as a utility) is issued a license to store fuel under Part 72, the owner is also issued a license for transportation under Part 71.[338] ISP's license application does not seek permission to transport canisters to its proposed CISF.[339]

Finally, Sierra Club's claim that further environmental analysis is needed beyond the proposed facility's 40-year licensing period and its challenge to the lack of a dry transfer system at the facility improperly challenge the Continued Storage Rule and Continued Storage GEIS. These claims are outside the scope of this proceeding and are an impermissible attack on the Commission's regulations under 10 C.F.R. § 2.335.

Sierra Club Contention 14 is not admitted.[340]

---

[335] *Private Fuel Storage,* CLI-04-22, 60 NRC at 136-37.

[336] *See* SAR at 1-22 (tbl. 1-1) (listing six various cask systems by three different vendors ISP proposes to store at the WCS facility, including NUHOMS® MP187 Cask System, Docket No. 72-11 (license SNM-2510); CoC 1004, Standardized NUHOMS® System, Docket No. 72-1004; CoC 1015, NAC-UMS, Docket No. 72-1015; CoC 1025, NAC-MPC, Docket No. 72-1025; CoC 1029, Advanced Standardized NUHOMS® System, Docket No. 72-1029; CoC 1031, MAGNASTOR, Docket No. 72-1031).

[337] 10 C.F.R. § 72.214 (listing among the certified casks NUHOMS® MP187 Cask System, Docket No. 72-11 (license SNM-2510); CoC 1004, Standardized NUHOMS® System, Docket No. 72-1004; CoC 1015, NAC-UMS, Docket No. 72-1015; CoC 1025, NAC-MPC, Docket No. 72-1025; CoC 1029, Advanced Standardized NUHOMS® System, Docket No. 72-1029; CoC 1031, MAGNASTOR, Docket No. 72-1031).

[338] "A general license is issued to any licensee of the Commission to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC." *Id.* § 71.17(a).

[339] ISP License Application at 1-1 to -3.

[340] Because we would reach the same decision even if we considered Sierra Club's reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply concerning Sierra Club Contention 14.

### *15. Sierra Club Contention 15*

Sierra Club Contention 15 states:

> The [Environmental Report] for the ISP [CISF] does not adequately investigate or analyze the impact of the [CISF] on minority and low income communities. Executive Order 12898 requires that the NEPA process include a discussion and analysis of the environmental justice impacts of the proposed action.[341]

Sierra Club Contention 15 objects to ISP's site selection process. Sierra Club cites Executive Order 12898[342] and a licensing board decision, *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center),[343] alleging that *Claiborne* is binding precedent because it "addressed in detail what a licensing applicant must do to ensure that the site selection process for storage of nuclear material does not have a disparate impact on a minority population."[344]

Environmental justice became a federally mandated NEPA consideration in 1994.[345] Executive Order 12898 directed federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."[346] The Commission's *Claiborne* decision clarified that NEPA requires the NRC to consider "social and economic impacts ancillary" to environmental impacts; that is, environmental justice concerns.[347]

In response to *Claiborne* and Executive Order 12898, the NRC promulgated its Environmental Justice Policy Statement[348] and revised guidance documents[349] to incorporate the guiding principles from those decisions. The policy statement directs the Staff to conduct a more thorough site selection analysis "if the percentage in the impacted area significantly exceeds that of the State or County

---

[341] Sierra Club Pet. at 83.

[342] *See* Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7629 (Feb. 11, 1994) [hereinafter Exec. Order 12898].

[343] *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), LBP-97-8, 45 NRC 367 (1997), *aff'd in part, rev'd in part,* CLI-98-3, 47 NRC 77 (1998).

[344] Sierra Club Pet. at 84.

[345] *See* Exec. Order 12898.

[346] *Id.*

[347] *Claiborne,* CLI-98-3, 47 NRC at 101.

[348] *See* Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions, 69 Fed. Reg. 52,040, 52,040-41, 52,048 (Aug. 24, 2004) [hereinafter NRC Environmental Justice Policy Statement]. Because the NRC is an independent agency, Executive Order 12898 did not automatically apply to the NRC.

[349] *See, e.g.,* NUREG-1748, Office of Nuclear Material Safety and Safeguards, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report (Aug. 2003) [hereinafter NUREG-1748].

percentage for either the minority or low-income population."[350] NRC guidance specifies that an applicant's environmental report should include "a discussion of the methods used to identify and quantify impacts on low-income and minority populations, the location and significance of any environmental impacts during construction on populations that are particularly sensitive, and any additional information pertaining to mitigation."[351]

Sierra Club Contention 15 makes three principal claims.

First, Sierra Club questions the adequacy of the Environmental Report's discussion of eleven site selection criteria, two of which pertain to environmental justice.[352] Specifically, Sierra Club asserts that Criterion 1 (evaluating community support) improperly considers only governmental support rather than the support of the entire community.[353] And, according to Sierra Club, Criterion 11 (evaluating environmental protection) "gives short shrift to environmental justice," only providing "summary consideration" to Lea County and Eddy County, New Mexico; no consideration to Loving County, Texas; and "arguably adequate" consideration to Andrews County, Texas.[354]

Second, Sierra Club raises concerns about the use of a four-mile radius in Environmental Report Appendix A to determine "the level of minority population."[355] Instead, Sierra Club advocates for a fifty-mile radius to include the cities of Hobbs, Eunice, and Jal in New Mexico.[356]

Third, Sierra Club claims that the Environmental Report allegedly contains "absolutely no discussion" about environmental justice impacts "from the transportation of the waste to the CIS facility."[357] Quoting from the *International Journal of Environmental Research and Public Health,* Sierra Club asserts that "legitimate concerns exist as to the environmental and human health consequences [of] a highway or rail accident [releasing] highly toxic radioactive material in a population center."[358]

As to its first claim, Sierra Club fails to provide facts or expert opinion to support its position, as required by 10 C.F.R. § 2.309(f)(1)(v). When citing *Claiborne,* Sierra Club comes close to advocating for a free-range inquiry into the site selection process under NEPA, the very position for which *Claiborne*

---

[350] NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,048.

[351] NUREG 1748 at 6-25; *see also id.* at 5-22.

[352] Sierra Club Pet. at 86-91.

[353] *Id.* at 87.

[354] *Id.* at 87-90.

[355] *Id.* at 89-90.

[356] *Id.* at 90.

[357] *Id.*

[358] *Id.* at 91 (quoting Dean Kyne & Bob Bolin, *Emerging Environmental Justice Issues in Nuclear Power and Radioactive Contamination,* Int'l J. Envtl. & Hum. Health Consequences (July 12, 2016).

was reversed by the Commission.[359] The board decision in *Claiborne* did not spell out a list of requirements to consider during a site selection process, nor is it binding precedent on this Board. Not only does Sierra Club fail to show what it contends ISP must consider beyond Criteria 1 and 11, but Sierra Club also fails to show legal support for why ISP is allegedly required to consider more than it already has.

As to its second claim in Contention 15, Sierra Club again fails to provide facts or expert opinion to support its position. The NRC's environmental justice guidance provides that an applicant's environmental report should include "a discussion of the methods used to identify and quantify impacts on low-income and minority populations, the location and significance of any environmental impacts during construction on populations that are particularly sensitive, and any additional information pertaining to mitigation."[360] If a facility is located outside the city limits or in a rural area, the environmental report should use a radius of approximately four miles.[361] This radius is used in ISP's Environmental Report.[362] Although Sierra Club contends that four miles is not the appropriate radius, it fails to show how ISP's compliance with NRC guidance violates NEPA or NRC regulations. Sierra Club prefers a larger radius like the one used for the Yucca Mountain EIS, but it does not provide support to explain why such a radius is required for environmental justice here.

As to its third claim, Sierra Club fails to show a genuine dispute with the application on a material issue of law or fact.[363] Although Sierra Club contends that "risks from transportation of the waste to the . . . facility" should be "another factor to be considered in the consideration of environmental justice impacts,"[364] Sierra Club does not provide any legal requirements or facts in support. On the contrary, the area for assessment of environmental justice impacts is based on the location of the facility itself and its proximity to certain populations, not on the facility's proximity to possible transportation routes. Sierra Club's quotation from the *International Journal of Environmental Research and Public Health* does not itself dispute ISP's application or the transportation analysis in Environmental Report section 4.2, and Sierra Club fails to explain how it does.

Sierra Club Contention 15 is not admitted.

---

[359] *Compare* Sierra Club Pet. at 84 (asserting that ISP's Environmental Report's analysis of site selection criteria related to environmental justice is not adequate), *with Claiborne,* CLI-98-3, 47 NRC at 103 (reversing the board's ruling that NEPA requires a "free-ranging inquiry into the site selection process" to resolve allegations of racial discrimination).

[360] NUREG-1748 at 6-25.

[361] *Id.* at C-4.

[362] ER App. A at 1-39 to -44.

[363] 10 C.F.R. § 2.309(f)(1)(vi).

[364] Sierra Club Pet. at 90.

### *16. Sierra Club Contention 16*

Sierra Club Contention 16 states:

> Since the 1990's almost all spent nuclear fuel being generated is high burnup fuel (HBF). HBF causes the cladding to become thinner, creating a higher risk of release of radioactive material. The cladding also becomes more brittle, with additional cracks. This situation causes risks for short-term and long-term dry storage. The SAR, 1.2.4, claims that the cask system to be used for the transportation and storage for the ISP [CISF] will not contain HBF. But the prevalence of HBF requires that the cask systems will need to contain HBF at some point. The SAR and [Environmental Report] must evaluate the risks of HBF.[365]

Sierra Club Contention 16 asserts that, because "[h]igh burnup fuel causes the cladding around the fuel to become thinner and more brittle, inducing cracking," high burnup fuel containers are "more likely to leak radioactive material."[366] Sierra Club insists that the "prevalence of [high burnup fuel] means that the ISP facility will have to immediately or in the near future transport and store [high burnup fuel]."[367] Sierra Club cites a DOE report to suggest that outstanding issues regarding cladding and high burnup fuel should be resolved before it can be safely loaded, transported, and stored.[368] Citing a study by the U.S. Nuclear Waste Technical Review Board,[369] Sierra Club claims that zirconium cladding experiences a twelve percent thinning due to the effects of high burnup, and "the likelihood of cladding defects increase" when storing high burnup fuel.[370] Finally, Sierra Club cites *New York v. NRC*[371] for the proposition that "an agency must look at both the probabilities of potentially harmful events and the consequences if those events come to pass."[372] In sum, Sierra Club argues the Environmental Report and SAR must "discuss and evaluate the risks of transporting and storing [high burnup fuel]."[373]

Insofar as Sierra Club seeks to challenge general safety concerns about transporting high burnup fuel, Contention 16 is outside the scope of this proceeding.

---

[365] *Id.* at 91.

[366] *Id.* at 91-92.

[367] *Id.* at 92.

[368] *Id.* at 93 (citing DOE Fuel Concept Report).

[369] *Id.* at 94 (citing U.S. Nuclear Waste Transp. Rev. Bd., *Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel* (Dec. 2010)); *id.* at 95.

[370] Sierra Club Pet. at 94-95.

[371] 681 F.3d at 478.

[372] Sierra Club Pet. at 95.

[373] *Id.*

U.S. Department of Transportation regulations and 10 C.F.R. Part 71 establish the standards for transporting spent nuclear fuel, not 10 C.F.R. Part 72.

Insofar as Sierra Club seeks to challenge the safety of storing high burnup fuel at the proposed ISP facility, Contention 16 is also outside the scope of this proceeding. First, Sierra Club misunderstands ISP's application. Contrary to Sierra Club's statement that "the SAR claims that [high burnup fuel] will not be transported or stored in the cask systems used," the SAR actually allows for storage of high burnup fuel with additional limitations — that is, the high burnup fuel must be canned within the canister.[374] Second, the application provides that only storage systems approved by the NRC will be received at the ISP facility, and incorporates those technical specifications by reference into the SAR.[375] NRC regulations bar any admitted contention that challenges an NRC-approved cask design incorporated by reference in an ISFSI application.[376]

To the extent Contention 16 raises environmental concerns about high burnup fuel, Sierra Club fails to raise a genuine dispute with the application.[377] Sierra Club proffers a contention of omission, stating that "the ER [does not] discuss at all the likelihood or the impacts of [high burnup fuel] being transported to and stored at the [proposed] facility."[378] However, ISP's Environmental Report does address the possibility of high burnup fuel being sent to the facility and analyzes the impacts of both transportation[379] and storage.[380] In its reply, Sierra Club disputes the Environmental Report's transportation impact analysis, arguing that the study is a "general modeling exercise that does not indicate . . . whether the model considered whether high-burnup fuel was modeled, and if so, if the model assumed that the fuel was canned."[381] However, the RADTRAN analysis performed by the applicant encompasses spent fuel of any burnup level, including high burnup fuel.[382] The information that Sierra Club claims to be lacking

---

[374] ISP License Application, Attach. A, Proposed License Conditions at unnumbered A-3 (Proposed License No. SNM-1050) § 9.

[375] SAR at 1-6 to -10.

[376] 10 C.F.R. § 72.46(e).

[377] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[378] Sierra Club Pet. at 95.

[379] ER at 4-12 to -16. This section provides the results of a RADTRAN analysis that evaluated the incident-free radiological transportation impacts assuming the maximum dose rate allowed for exclusive use shipments under 10 C.F.R. § 71.47(b)(3).

[380] ER at 4-55 to -59. Storage of high burnup fuel is subject to the same standards as other forms of spent fuel, and therefore is encompassed by the discussion of impacts to public and occupational health from facility operation. If Sierra Club objected to this analysis, it was not articulated.

[381] Sierra Club Reply at 44.

[382] ER at 4-13 ("Incident-free doses were calculated using the maximum dose rate allowed for exclusive use shipments under NRC regulations.").

is contained within the Environmental Report, and therefore Sierra Club does not raise a genuine dispute with the application.

Sierra Club Contention 16 is not admitted.

#### *17. Sierra Club Contention 17*

Sierra Club Contention 17 states:

> Sierra Club adopts all contentions presented by [Joint Petitioners], in their Petition to Intervene in this proceeding.[383]

To adopt a contention, a participant must (1) demonstrate standing; and (2) have proffered its own admissible contention.[384] Although Sierra Club has done this, the contention a petitioner seeks to adopt must also be admissible under 10 C.F.R. § 2.309(f)(1). Because Joint Petitioners have not proffered an admissible contention, as explained *infra,* Sierra Club cannot adopt any of Joint Petitioners' contentions.

Sierra Club Contention 17 is not admitted.

### C. Joint Petitioners[385]

#### *1. Joint Petitioners Contention 1: NEPA Analysis of Transportation of [Spent Nuclear Fuel] and GTCC Wastes Was Excluded from the Application and Comprises Unlawful Segmentation of the Project*

Joint Petitioners Contention 1 states:

> ISP states in the Application that "Transportation of the spent nuclear fuel shipping

---

[383] Sierra Club Pet. at 96.

[384] *See Consolidated Edison Co. of New York* (Indian Point, Units 1 and 2), CLI-01-19, 54 NRC 109, 132-33 (2001).

[385] In addition to proffering their individual contentions, Joint Petitioners "object and move for the dismissal and termination of this licensing proceeding." Joint Pet'rs Pet. at 40. They allege that there is no federal authorization for the ISP CISF to be licensed because "neither Part 72 nor the NWPA authorize an ISP CISF financed by means of having the DOE take title to the [fuel] and GTCC wastes and compensating the company for overseeing their management." *Id.* at 38. They also challenge the legality of the general licensing of a CISF under federal law and the NRC's subject matter jurisdiction over ISP's license application to the extent the DOE retains ownership of the spent fuel. *Id.* at 39-40.

The Board overrules Joint Petitioners' objection on procedural grounds. As explained in SECY's Order denying Beyond Nuclear and Fasken's threshold motions to dismiss, NRC regulations do not provide any avenue for Boards to rule on contested motions (or objections) to dismiss a proceeding at the proceeding's commencement. *See* Order Denying Motions to Dismiss.

> casks from the originating commercial nuclear reactor to the CISF . . . is not part of this License Application. The exclusion from the [Environmental Report] — and by implication, from the EIS — of details and environmental impacts of a planned 20-year shipping campaign involving at least 3,000 deliveries of [spent nuclear fuel] and GTCC waste to ISP violates NEPA requirements that the transportation and storage aspects of the ISP plan be evaluated as a single, integrated project.[386]

Joint Petitioners Contention 1 stems from statements in ISP's application that: (1) "[o]perations at the originating commercial nuclear reactors in preparation or support of spent nuclear fuel shipments to the CISF are performed under the individual reactor licenses . . . and are not part of this License Application;" and (2) "[t]ransportation of the spent nuclear fuel shipping casks from the originating commercial nuclear reactor to the CISF will be performed in accordance with 10 CFR 71 from the originating commercial nuclear reactor licensees and is not part of this License Application."[387]

Joint Petitioners contend that, in spite of what ISP says, transportation should be part of its Part 72 CISF application because "[t]he delivery of [spent nuclear fuel] and GTCC waste from nuclear reactors to ISP will be a major, complicated campaign, expected to last 20 years and to include at least 3,000 separate shipments transported, in the aggregate, hundreds of thousands of miles."[388] In sum, Joint Petitioners assert that transportation to the CISF is the *sine qua non* of the project itself,[389] and accordingly must be analyzed under 10 C.F.R. § 51.45(b).[390]

Joint Petitioners also argue that, if they are to "meaningfully participate in the NEPA process, and for state and local government officials and emergency response personnel to comprehend the scope of this vast [spent nuclear fuel] shipping campaign, there must be complete disclosure of all probable transportation routes, along with quantities of [spent nuclear fuel] and the likely radioisotopic contents."[391] Joint Petitioners assert a contention of omission concerning the lack of transportation plans in the Environmental Report,[392] and claim that the separation of the environmental impacts from spent fuel transportation and the storage itself "comprises unlawful segmentation of the project."[393]

Joint Petitioners do not address or dispute the transportation analyses that are

---

[386] Joint Pet'rs Pet. at 41.

[387] ISP License Application at 1-2 to -3; *see id.* at 3-1.

[388] Joint Pet'rs Pet. at 42.

[389] Tr. at 294.

[390] Joint Pet'rs Pet. at 48.

[391] *Id.* at 43.

[392] *Id.*

[393] *Id.* at 44 (citing *Stewart Park & Reserve Coal., Inc. (SPARC) v. Slater,* 352 F.3d 545, 559 (2d Cir. 2003)).

contained in the application, and Joint Petitioners Contention 1 therefore does not show that a genuine dispute exists on a material issue of law or fact with ISP's application. The issue presented by Joint Petitioners is also outside the scope of this proceeding. Joint Petitioners do not explain why, under NEPA, ISP is required to divulge all transportation routes of casks coming from customers, unknown at this time, for the 20-year transportation and loading campaign. As ISP points out,[394] ISP cannot know these details at this time, and relevant caselaw does not require ISP to hypothesize about who will be sending what fuel at this time.[395] Responsibility for transportation of spent nuclear fuel from commercial reactors to the proposed CISF lies with the title holders of the spent fuel, not with ISP.

Instead of disputing the sections of ISP's Environmental Report that discuss transportation issues,[396] Joint Petitioners challenge the adequacy of NRC regulations establishing the requirements for applicants' Environmental Reports under Part 72.[397] Joint Petitioners' "unlawful segmenting" argument is outside the scope of this proceeding because it challenges the NRC's Part 72 and NEPA-implementing regulations under Part 51 in violation of 10 C.F.R. § 2.335.

Joint Petitioners Contention 1 is not admitted.

### 2. *Joint Petitioners Contention 2: ISP's 'Start Clean/Stay Clean' Policy Cherry-Picks Waste for Storage and Contradicts the Project's Purpose and Need Statement*

Joint Petitioners Contention 2 states:

> Interim Storage Partners states in its "Purpose and Need" statement that: "A CISF is needed to ensure that the [spent nuclear fuel] at these commercial reactor sites can be safely removed so that the remaining lands can be returned to greenfield status." ER § 1.1, p. 1–5. But the implementation of ISP's plan contradicts its purpose and need statement.[398]

Joint Petitioners claim that ISP's policy of not accepting leaking or contaminated casks conflicts with ISP's own statement of the purpose and need for its proposed facility: that is, to help ensure decommissioned reactor sites can be returned to greenfield status.[399] Joint Petitioners hypothesize that, if ISP rejects

---

[394] ISP Answer to Joint Pet'rs at 31-32.
[395] *See Morton,* 458 F.2d at 837.
[396] ER at 3-5 to -7, 4-3 to -28.
[397] *See* 10 C.F.R. §§ 51.61, 72.34, 72.108.
[398] Joint Pet'rs Pet. at 49-50.
[399] *Id.* at 53.

damaged or leaky canisters, then after they are returned to their place of origin, they "may be subjected to less oversight, maintenance, and security" and "[t]heir deteriorated or damaged conditions may not be noted nor remedied," which will create "greater dangers than would have earlier been present."[400]

Joint Petitioners Contention 2 is inadmissible for lack of a sufficient factual basis.[401] Their claim that a rejected cask will lead to a cascade of stranded and neglected spent fuel across the country is speculative. It is not supported by any factual basis, especially in light of the NRC's transportation regulations under Part 71, the NRC's security regulations under Part 73, and its spent fuel storage rules in Part 72. Joint Petitioners Contention 2 also ignores the Commission's decision in *Private Fuel Storage,* in which the Commission determined that a leaky or damaged canister in transit to a CISF is not credible.[402] A contention cannot be admitted on bare assertions and speculation alone.[403]

Joint Petitioners Contention 2 is not admitted.

### *3. Joint Petitioners Contention 3: The Project Has Inadequate Assurances of Financing*

Joint Petitioners Contention 3 states:

> ISP as a matter of fact and law has not provided reasonable assurance that it can or will obtain the necessary funds to cover the costs of construction, operation, maintenance and decommissioning of the CISF.[404]

As explained in its stated basis, Joint Petitioners Contention 3 encompasses four interrelated claims: First, Joint Petitioners claim that ISP's application is "dependent" on DOE's taking title to the spent fuel to be stored at the proposed facility.[405] Second, such an arrangement is not currently legal.[406] Third, if DOE were to hold title, that would jeopardize the liability protection afforded by the Price-Anderson Act.[407] Fourth, because DOE may not lawfully hold title to the spent fuel, the NRC must deny ISP's request for an exemption from providing financial assurance for decommissioning, as required by 10 C.F.R.

---

[400] *Id.* at 53-54.
[401] *See* 10 C.F.R. § 2.309(f)(1)(v).
[402] *Private Fuel Storage,* CLI-04-22, 60 NRC at 136-37, 138.
[403] *Fansteel,* CLI-03-13, 58 NRC at 203.
[404] Joint Pet'rs Pet. at 55.
[405] *Id.* at 56.
[406] *Id.*
[407] *Id.* at 58.

§ 72.30, insofar as ISP's request is based on a contract with DOE guaranteeing decommissioning funds.[408]

As explained in the Board's ruling on Beyond Nuclear's contention, *supra,* Joint Petitioners' first claim does not raise a genuine dispute with ISP's application, which includes the option of contracting directly with nuclear plant owners that currently hold title to their spent fuel. As in *Holtec,*[409] whether ISP will find that alternative commercially viable is not an issue before the Board, because the business decision of whether to use a license has no bearing on a licensee's ability to safely conduct the activities the license authorizes.

As also explained *supra,* in the Board's ruling on Beyond Nuclear's contention, intervening developments have mooted the other claims that Joint Petitioners assert in Contention 3. ISP has withdrawn its request for a regulatory exemption,[410] and has acknowledged on the record that, as the law now stands, it cannot lawfully contract for DOE to take title to spent fuel destined for its proposed facility.[411] So that option is off the table. Additionally, Joint Petitioners' concerns about Price-Anderson coverage are in any event misplaced. Section 72.22(e) of 10 C.F.R. requires reasonable assurance of obtaining necessary funds to cover construction, operating, and estimated decommissioning costs, but says nothing about liability coverage.

Although initially the NRC Staff would have had us admit Joint Petitioners Contention 3 solely as to the lawfulness of ISP's exemption request,[412] at oral argument the Staff announced that its position has changed. Recognizing that ISP has withdrawn its exemption request, the NRC Staff now takes the position that no portion of Joint Petitioners Contention 3 is admissible.[413] We agree.

Joint Petitioners Contention 3 is not admitted.

#### *4. Joint Petitioners Contention 4: Low-Level Radioactive Waste Volumes and Repackaging Requirements Are Considerably Underestimated*

Joint Petitioners Contention 4 states:

> The ISP Environmental Report significantly underestimates the volume of low-level radioactive waste ("LLRW") that will be generated by the interim storage project. ISP fails to count irradiated concrete and other materials toward the gross

[408] *Id.* at 61.

[409] *Holtec,* LBP-19-4, 89 NRC at 381.

[410] ISP June 3, 2019 Letter at 1.

[411] ISP June 28, 2019 Response to Board at 1; Tr. at 44 ("DOE may not, absent statutory change, make use of our facility.").

[412] NRC Staff Consol. Answer at 27.

[413] Tr. at 159.

> total volumes of LLRW. ISP further fails to acknowledge and properly quantify LLRW volumes resulting from mandatory repackaging of [spent nuclear fuel] and GTCC waste, at least some of which will occur at the WCS site to meet likely DOE requirements for transportation, aging and disposal ("TAD") canisters to be delivered to the final geological repository. ISP provides an incomplete perspective of the waste management obligations at the CISF as well as the financial burdens arising from creation, oversight and disposition of thousands of additional tons of LLRW. This truncated perspective in turn has caused a seriously inaccurate picture of the true costs of constructing, operating and decommissioning the WCS CISF.[414]

Joint Petitioners Contention 4 asserts three claims concerning LLRW at the proposed storage facility: (1) the repackaging of spent nuclear fuel poses "unconsidered management difficulties, increased waste generation, and unforeseen and undisclosed costs;"[415] (2) allegedly, ISP grossly underestimates the concrete LLRW at the CISF site;[416] and (3) ISP allegedly fails to conduct an acceptable life cycle estimate of LLRW volumes and associated expenses.[417] For its second and third claims, Joint Petitioners rely on a report by Robert Alvarez, an asserted expert on spent fuel storage.[418]

As to Joint Petitioners' claim that the repackaging of spent fuel poses management difficulties, increased waste generation, and unforeseen and undisclosed costs, ISP's application is for a 40-year license. Its Environmental Report relies on the Continued Storage Rule and Continued Storage GEIS. ISP's application does not set forth any intent to repackage spent fuel or any analysis of the costs of repackaging the fuel, and the Continued Storage Rule does not require a spent fuel storage facility applicant under Part 72 to include such an analysis beyond the license term.[419] Thus, this claim is outside the scope of this proceeding. And, to the extent Joint Petitioners assert that ISP must discuss waste generated by repackaging fuel canisters into DOE transportation, aging and disposal casks, this claim is necessarily outside the scope of this proceeding as well.

Joint Petitioners' claim that ISP grossly underestimates the concrete LLRW in its Environmental Report also challenges the Continued Storage Rule and Continued Storage GEIS and is inadmissible for challenging an NRC rule in violation of section 2.335. The Continued Storage GEIS, deemed incorporated by the Continued Storage Rule, concludes that

---

[414] Joint Pet'rs Pet. at 64.

[415] *Id.* at 66-71.

[416] *Id.* at 72-74.

[417] *Id.* at 74-76.

[418] *Id.* at 69; *see id.,* Decl. of Robert Alvarez (Oct. 23, 2018).

[419] 10 C.F.R. § 51.23(b).

> [a]lthough the exact amount of [low level waste (LLW)] and nonradioactive waste depends on the level of contamination, the quantity of waste generated from the replacement of the canisters, storage casks, concrete storage pads, [dry transfer system], and canister transfer building is still expected to be [ ] comparable to the LLW generated during reactor decommissioning, which was previously determined to have a SMALL impact in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NRC 2013a).[420]

Finally, Joint Petitioners' claim that "ISP's tabulation in the [Environmental Report] of the quantities of canister LLRW and concrete LLRW do not adequately answer cost or quantitative questions"[421] is based solely on the Environmental Report's omission of repackaging spent fuel canisters[422] — an analysis ISP is not required to include in its initial 40-year application under the Continued Storage Rule. Therefore, this claim is also outside the scope of this proceeding and impermissibly challenges the Continued Storage Rule in violation of 10 C.F.R. § 2.335.

Joint Petitioners Contention 4 is not admitted.[423]

### 5. *Joint Petitioners Contention 5: ISP Has Not Performed an Environmental Justice Investigation of Transportation Communities; the ISP CISF Will Cause Disparate Impacts from Routine and Non-Routine Transportation-Related Radiation Exposures upon Minority and Low-Income Populations Along Hundreds of Miles of Transportation Corridors*

Joint Petitioners Contention 5 states:

> ISP states in its License Application (ML 18206A483) that "Transportation of the spent nuclear fuel shipping casks from the originating commercial nuclear reactor to the CISF will be performed in accordance with 10 CFR 71, and the originating reactor licenses *and is not part of this License Application.*" Id. § 1.1, p. 1-3 (Emphasis added). With that, WCS severed — and "segmented" — the transportation part of the CISF proposal from the storage component. Segmentation is impermissible for legal as well as practical reasons. One consequence of the segmentation is that Environmental Justice ("EJ") compliance in the form of identification and analysis of potentially affected populations along the anticipated

[420] Continued Storage GEIS at 5-48.

[421] Joint Pet'rs Pet. at 75.

[422] *Id.* at 75-76.

[423] Because we would reach the same decision even if we considered Joint Petitioners' reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply concerning Joint Petitioners Contention 4.

> rail, truck and barge routes will be improperly excluded from disclosure in the NEPA document.[424]

Framed as a contention of omission, Joint Petitioners claim that ISP's Environmental Report improperly excludes an environmental justice analysis of potentially affected people who live near probable spent fuel and GTCC waste transportation routes to the ISP CISF. For support, Joint Petitioners purport to rely on *Claiborne,*[425] Executive Order 12898, CEQ guidance, and U.S. Environmental Protection Agency guidance.

Joint Petitioners Contention 5 fails to raise a material dispute. ISP is applying to construct a CISF under 10 C.F.R. Part 72. In its license application, ISP emphasizes "[t]ransportation of the spent nuclear fuel shipping casks from the originating commercial nuclear reactor to the CISF will be performed in accordance with 10 CFR 71 and the originating reactor licenses and is not part of this License Application."[426]

Joint Petitioners are correct that transportation routes will eventually need to be established, and impacts from those routes will need to be analyzed, should ISP's proposed facility be licensed and become operational. Joint Petitioners are also correct that the U.S. Department of Transportation will need to be involved in that analysis.

However, Joint Petitioners' claim that an environmental justice investigation must extend to the "populations in the shipping corridors covering thousands of miles of rail, truck and barge routes" has no bearing on this proceeding.[427] The authorities cited by Joint Petitioners (including Executive Order 12898 and the NRC's Environmental Justice Policy Statement) were promulgated to implement NEPA. And, under NEPA, an environmental justice assessment need only assess the "disproportionately high and adverse human health or environmental" impacts of the proposed action and its reasonable alternatives.[428] The area for assessment of environmental justice impacts is based on the location of the proposed facility itself, not proximity to possible transportation routes. Accordingly, Joint Petitioners have not raised an issue that is material to the findings the NRC must make in this proceeding.[429]

Joint Petitioners Contention 5 is not admitted.

---

[424] Joint Pet'rs Pet. at 76-77. Although characterized as the basis for Joint Petitioners Contention 5, this statement appears to be what Joint Petitioners intend to litigate as their contention.

[425] *Claiborne,* LBP-97-8, 45 NRC at 367, *aff'd in part, rev'd in part,* CLI-98-3, 47 NRC at 77.

[426] ISP License Application at 1-3.

[427] Joint Pet'rs Pet. at 81.

[428] Exec. Order 12898 § 1-101; *see* NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,047; *Claiborne,* CLI-98-3, 47 NRC at 103-04.

[429] *See* 10 C.F.R. § 2.309(f)(1)(iv).

### *6. Joint Petitioners Contention 6: Inadequate Disclosure of Oil and Gas Drilling Activity Beneath the WCS CISF Site*

Joint Petitioners Contention 6 states:

> Horizontal hydraulic fracturing ("fracking") activity is taking place in close proximity to the ISP/WCS site. It is technologically and legally possible that fracking will be undertaken directly beneath the waste storage areas of the site. Fracking has seismic, groundwater flow and water consumption implications, which become cumulative if extraction wells and/or waste injection disposal wells are developed near and/or underneath WCS. There is no indication in the Environmental Report or Safety Analysis Report of legal controls over present or potential oil and gas drilling directly beneath the site. The presence, overall, of mineral interests beneath or proximate to the waste storage portion of the ISP site is inadequately disclosed. Consequently, the realistic prospects for mineral development immediately surrounding and underneath the WCS site, and the implications for inducing or expediting geological problems including seismicity and groundwater movement, are unknown.[430]

Joint Petitioners Contention 6 claims that analyses have been omitted from ISP's application with regard to ISP's property and mineral rights and the CISF area's seismology and hydrology. Joint Petitioners claim that ISP's Environmental Report and SAR are deficient because, they allege, both are devoid of the "land ownership and legal control of the mineral rights interests of the site where the waste storage will occur"[431] and they "fail to connect the considerable history of oil and gas development" in the CISF area.[432] Joint Petitioners allege that the Environmental Report omits "investigation . . . into the chemical status of water from the Ogallala Aquifer," its connected smaller aquifers, the area soils and the soils' possible corrosive effects on the casks, the concrete bunkers and pads, and the artificial substrate materials.[433] Joint Petitioners further contend that ISP's Environmental Report violates 10 C.F.R. § 72.120(d), because allegedly ISP "has ignored and failed to integrate evidence of groundwater at the site" as related to induced faults from fracking, associated seismic activity, and waste water injection wells from area petroleum exploration.[434] Finally, Joint Petitioners claim that ISP's Environmental Report violates multiple Part 72 regulations because it allegedly omits analysis of seismic activity in the area

---

[430] Joint Pet'rs Pet. at 97-98.
[431] *Id.* at 99.
[432] *Id.* at 99-100.
[433] *Id.* at 100.
[434] *Id.*

(including fracking-induced seismic activity analyses) and groundwater analysis that would affect the design and operation of the proposed CISF.[435]

Joint Petitioners fail to acknowledge (much less dispute) relevant portions of ISP's application that address their concerns, and thus do not raise a genuine dispute with the application, as required by 10 C.F.R. § 2.309(f)(1)(vi).

For example, most of the seismic analyses Joint Petitioners seek are in SAR Chapter 2, Attachment D. Although this portion of the application contains proprietary information, as explained *supra* Joint Petitioners had the opportunity to gain access to this information but chose not to.[436] Moreover, the analyses that ISP employs to demonstrate compliance with Part 72 are appropriately located in the SAR (as they relate to safety),[437] not in ISP's Environmental Report.

In their reply, Joint Petitioners attempt to transform their contention of omission into one of inadequacy. They concede that "induced seismicity is discussed in the [Environmental Report]," but claim the discussion is inadequate because "there must be an accounting of prospective drilling trends and density in the immediate region of the CISF."[438] But Joint Petitioners do not explain what authority requires this analysis.

Petitioners have a duty to "read the pertinent portions of the license application, . . . state the applicant's position," and explain their disagreement with the applicant — i.e., identify what section is allegedly devoid of a required analysis.[439] Joint Petitioners clearly failed to do this. Joint Petitioners Contention 6 does not raise a genuine dispute with the application as required under 10 C.F.R. § 2.309(f)(1)(vi).

Joint Petitioners Contention 6 is not admitted.

### *7. Joint Petitioners Contention 7: Disqualifying Foreign Ownership of Interim Storage Partners*

Joint Petitioners Contention 7 states:

> Interim Storage Partners is majority controlled by a foreign corporation and is barred by statute and regulation from seeking or receiving a license from the Nuclear Regulatory Commission.[440]

---

[435] *Id.* at 100-02 (alleging that ISP's ER violates 10 C.F.R. §§ 72.103(f), 72.103(e), 72.103(f)(2)(iv), 72.90, and 72.94).

[436] 83 Fed. Reg. at 44,073-75.

[437] *See, e.g.,* SAR sections 11.5, 15.1.4 (information required under 10 C.F.R. § 72.120).

[438] Joint Pet'rs Reply at 38.

[439] *Millstone,* CLI-01-24, 54 NRC at 358.

[440] Joint Pet'rs Pet. at 102.

Joint Petitioners correctly point out that ISP's application states that ISP "is majority owned and controlled by Orano CIS,"[441] which in turn is wholly owned by Orano USA LLC.[442] Orano USA LLC is "ultimately majority owned and controlled by FAE AEC, an entity of the French Government."[443] Joint Petitioners claim that, because ISP is ultimately controlled by the French government, AEA sections 103 and 104 (and the NRC regulations implementing these provisions) forbid the NRC from issuing ISP a license to store spent nuclear fuel.[444]

Although this contention would be admissible if ISP sought to obtain a license for a production or utilization facility,[445] AEA sections 103 and 104 apply, by their terms, only to production and utilization facilities. An independent spent fuel storage facility under Part 72 is neither a production nor a utilization facility.[446] Thus, ISP's CISF is not subject to AEA sections 103 or 104.

Joint Petitioners Contention 7 is not admitted.

### *8. Joint Petitioners Contention 8: The Discussion of Alternatives to the Proposed Project Is Inadequate Under NEPA*

Joint Petitioners Contention 8 states:

> The no-action alternative in the [ISP Environmental Report] is incomplete because it does not acknowledge safer storage methods at reactor sites, such as hardened on-site storage ("HOSS"), nor does it acknowledge the NRC's Continued Storage Rule that concludes that waste can be safely stored at reactor sites indefinitely.

---

[441] ISP License Application at 1-4.

[442] *Id.*

[443] *Id.*

[444] Joint Pet'rs Pet. at 102-03.

[445] *See Calvert Cliffs 3 Nuclear Project, LLC, and UniStar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), LBP-12-19, 76 NRC 184 (2012) (finding a violation of AEA sections 103 and 104 where a power reactor license applicant's parent company was foreign owned).

[446] AEA section 11 defines a "production facility" as "(1) any equipment or device determined by rule of the Commission to be capable of the production of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission." AEA section 11 defines a "utilization facility" as "(1) any equipment or device, except an atomic weapon, determined by rule of the Commission to be capable of making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission." 42 U.S.C. § 2014.

> There are at least four alternatives to the proposed CISF project which are neither recognized nor addressed in the Environmental Report, contrary to NEPA requirements.[447]

Joint Petitioners claim that ISP's discussion of the "no-action alternative" in its Environmental Report is deficient because it does not discuss potential alternatives to the proposed project, such as HOSS, and conflicts with the NRC's Continued Storage Rule.[448] Additionally, Joint Petitioners claim that ISP did not conduct an appropriate analysis of the costs and benefits associated with the proposed project.

Joint Petitioners' claim that ISP's Environmental Report fails to consider other alternatives does not demonstrate a genuine dispute on a material issue.[449] Joint Petitioners identify five separate alternatives that ISP's Environmental Report allegedly fails to consider: (1) establishment of a dry transfer system; (2) modification of ISP's emergency response plan to include preparations for emissions mitigation; (3) modification of the CISF design to prevent "malevolent" acts; (4) federal government control of the ISP facility; and (5) implementation of HOSS at reactor sites.[450] However, Joint Petitioners do not explain why these five alternatives must be evaluated by ISP in its Environmental Report.

Indeed, Joint Petitioners' first four "alternatives" do not appear to be alternatives to constructing ISP's proposed facility at all, but rather suggestions for how to improve it. As to Joint Petitioners' claim that ISP's Environmental Report must discuss using "safer storage methods . . . such as HOSS" at reactor sites as an alternative to constructing a central storage facility, Joint Petitioners fail to demonstrate how such a discussion would be material to the no-action alternative either. HOSS is a method of storage that has not been licensed, much less implemented, at any reactor site. ISP's Environmental Report is only required to analyze a no-action alternative of maintaining the status quo. Joint Petitioners do not explain why analyzing the unused HOSS method is necessary to analyzing the status quo.

Joint Petitioners' claims concerning the Continued Storage Rule are based on a fundamental misunderstanding of the Rule, which petitioners incorrectly assert "concludes that waste can be stored at the reactor site indefinitely."[451] It does no such thing. Rather, the Continued Storage Rule incorporates the impact determinations made in the continued storage GEIS, which merely analyzes the environmental impacts of storing waste at reactor sites after the end of their

---

[447] Joint Pet'rs Pet. at 107.

[448] *Id.*

[449] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[450] Joint Pet'rs Pet. at 107-08.

[451] *Id.* at 107.

licenses. It did not include an analysis of safety benefits or advocate for a particular method of storage.

Joint Petitioners claim that ISP's Environmental Report does not provide a cost-benefit analysis ignores Chapter 7 of the Report, which contains the analysis that Joint Petitioners claim is omitted.[452] A petitioner has a duty to "read the pertinent portions of the license application."[453] This portion of Joint Petitioners contention does not demonstrate a genuine dispute because the alleged missing information is contained within the license application.

Joint Petitioners Contention 8 is not admitted.

### *9. Joint Petitioners Contention 9: ISP Misrepresents the Financial Benefits to the Federal Government from Opening and Operating a CISF*

Joint Petitioners Contention 9 states:

> ISP maintains that establishment of the proposed ISP facility would financially benefit the US federal government. There is considerable dispute over whether the proposed action of opening a CISF at Interim Storage Partners' site in west Texas will provide over $5 billion of net economic benefit to the U.S. government.[454]

In Contention 9, Joint Petitioners claim that ISP's Environmental Report provides no benefit-cost analysis.[455] They assert that Table 7.4-1 depicts only purported benefits of the proposed storage facility, but fails to set forth its costs.[456] Joint Petitioners conclude: "NEPA does not require a cost-benefit analysis; but an agency choosing to 'trumpet' an action's benefits has a duty to disclose its costs."[457]

Despite Joint Petitioners' claim, ISP's Environmental Report does contain an entire chapter entitled "Benefit-Cost Analysis."[458] Joint Petitioners correctly point out that Table 7.4-1 only summarizes purported benefits, but they ignore the fact that on the next page Table 7.4-2 summarizes estimated costs.

The Commission expects petitioners to "read the pertinent portions of the

---

[452] *See* ER Chapter 7.

[453] Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *see also Millstone,* CLI-01-24, 54 NRC at 358.

[454] Joint Pet'rs Pet. at 112.

[455] *Id.*

[456] *Id.* at 113.

[457] *Id.* at 114 (citing *Sierra Club v. Sigler,* 695 F.2d 957, 979 (5th Cir. 1983)).

[458] ER Chapter 7.

license application."[459] Because the information Joint Petitioners claim is missing from ISP's Environmental Report in fact appears there, Contention 9 fails to demonstrate a genuine dispute with the application, as required by 10 C.F.R. § 2.309(f)(1)(vi).

In their reply, Joint Petitioners try for the first time to challenge the sufficiency of ISP's benefit-cost analysis and its alleged reliance on "flawed assumptions."[460] The Board grants ISP's motion to strike these new arguments, which could have been timely raised in Joint Petitioners original petition, but were not.

There is a world of difference between claiming a benefit-cost analysis is missing and claiming it is insufficient. "The Commission will not permit, in a reply, the filing of new arguments or new legal theories that opposing parties have not had an opportunity to address."[461] Rather, NRC regulations "demand a level of discipline and preparedness on the part of petitioners," who are required by our contention admissibility requirements to set forth their claims in detail at the outset of a proceeding.[462]

Joint Petitioners Contention 9 is not admitted.

### *10. Joint Petitioners Contention 10: The Predicted Length of the Period of Operation of the CISF Warrants Scrutiny Under NEPA of Storage Exceeding 100 Years*

Joint Petitioners Contention 10 states:

> WCS plans to provide long-term [spent nuclear fuel] storage for up to either 40, 60 or 100 years, depending on which statement one wishes to rely on or until a geological repository is developed. The indefinite length of the interim storage scheme requires NEPA evaluation beyond 60 years of operations.[463]

Joint Petitioners claim that, notwithstanding ISP is applying for only a 40-year license,[464] it is not clear how long the ISP CISF will actually store spent nuclear fuel. Joint Petitioners cite different parts of ISP's license application where ISP hypothesizes how long the interim storage facility might store fuel: in one place, ISP estimates 60 years "or until a final geologic repository is licensed and operating;" in two other portions of the Environmental Report, ISP

---

[459] Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170.

[460] Joint Pet'rs Reply at 47.

[461] *USEC Inc.* (American Centrifuge Plant), CLI-06-9, 63 NRC 433, 439 (2006).

[462] *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-04-25, 60 NRC 223, 225, *reconsideration denied,* CLI-04-35, 60 NRC 619 (2004).

[463] Joint Pet'rs Pet. at 114.

[464] ISP License Application at 1-5.

estimates 60 to 100 years (or until a permanent repository is operational).[465] Because of these statements, Joint Petitioners contend that ISP must conduct a NEPA review beyond 60 years of the facility's licensing (at a minimum); beyond 100 years as a NEPA "cumulative impact;"[466] and for a period of "hundreds, or even thousands of years, or forever," because the facility might become a *de facto* repository.[467]

This proceeding concerns an application for a license to store spent fuel for up to 40 years. As NEPA requires a federal agency to "take a hard look at the environmental consequences of its proposed action,"[468] ISP's Environmental Report (and the NRC's subsequent EIS) must only take its hard look at the environmental impacts for a 40-year term. As to the *de facto* repository argument, it impermissibly challenges the Continued Storage Rule. The Continued Storage GEIS has evaluated environmental impacts of long-term spent fuel storage, analyzing three scenarios: (1) 60 years beyond the cessation of reactor operations, (2) 100 years after that period, and (3) indefinite storage where no repository is opened (i.e., the *de facto* repository scenario).[469] Therefore, Joint Petitioners Contention 10 asserts an impermissible challenge to the Continued Storage Rule, in violation of 10 C.F.R. § 2.335, and fails to raise a genuine, material dispute with ISP's application.

Joint Petitioners Contention 10 is not admitted.

### *11. Joint Petitioners Contention 11: Having No Dry Transfer System and No Radioactive Emissions Mitigation Plan for ISP's CISF Are Impermissible Omissions Under the AEA and Must Be Addressed Under NEPA*

Joint Petitioners Contention 11 states:

> ISP's plan to not have a dry transfer system ("DTS") or other technological means of handling problems with damaged, leaking or externally contaminated [spent nuclear fuel] canisters or damaged fuel in the canisters at the WCS site, from the date of commencement of operations, contradicts the expectations of the Continued Storage GEIS, and the unanalyzed risks, and increased possibilities of minor to severe radiological accidents must be addressed in the Environmental Impact Statement. There is no plan for radiation emissions mitigation or radioactive re-

[465] Joint Pet'rs Pet. at 114-15.

[466] *Id.* at 117.

[467] *Id.* at 115.

[468] *Friends of Capital Crescent Trail v. Fed. Transit Admin.,* 877 F.3d 1051, 1055 (D.C. Cir. 2017) (citing *Robertson,* 490 U.S. at 350).

[469] *See* Continued Storage GEIS at 1-13 to -15; 10 C.F.R. § 51.23(b).

> leases at the CISF site. These refusals to contingently prepare for radiological problems at the site are a byproduct of ISP's "start clean/stay clean" policy, are unrealistic and must be addressed in the EIS as well as in licensing conditions.[470]

In Contention 11, Joint Petitioners claim that the lack of a dry transfer facility at ISP's proposed storage facility presents an impermissible risk under the AEA and is inadequately addressed in ISP's Environmental Report. Contention 11 asserts that a dry transfer facility is needed because canisters could become damaged through transportation,[471] damage to cladding during long-term storage of high burnup fuel,[472] gradual degradation of fuel assemblies and canisters, canister accidents, or attack.[473] Contention 11 also asserts that "[t]here is no plan for radiation emissions mitigation or radioactive releases at the CISF site."[474]

Contention 11 is not admissible for three reasons.

First, Joint Petitioners fail to address the relevant contents of ISP's application. Although Contention 11 suggests various ways in which canisters might be damaged, neither the contention nor the referenced portions of the Alvarez report and the Thompson declaration cite, much less dispute, any portions of ISP's application that concern the proposed facility's safety analyses, aging management plans, or quality assurance programs. Nor do Contention 11 or its supporting references directly dispute how ISP proposes to address the special challenges posed by high burnup fuel.[475] Therefore, Contention 11 fails to raise a genuine dispute with ISP's application, as required by 10 C.F.R. § 2.309(f)(1)(vi).

Second, Contention 11 fails to raise a plausible scenario. NRC regulations require spent nuclear fuel to be "packaged in a manner that allows handling and retrievability without the release of radioactive materials to the environment."[476] In Contention 11, Joint Petitioners speculate that, nonetheless, damaged containers might arrive at the site of the proposed storage facility in violation of NRC regulations and, in the absence of repackaging capability, create various dangers.[477]

The Commission affirmed a licensing board's decision not to admit a similar contention in *Private Fuel Storage*.[478] The State of Utah had proffered a con-

---

[470] Joint Pet'rs Pet. at 118.

[471] *Id.* at 124.

[472] *Id.* at 120-21.

[473] *Id.* at 125.

[474] *Id.* at 118; *see also id.,* Decl. of Dr. Gordon Thompson (Nov. 12, 2018); *id.,* Decl. of Robert Alvarez (Oct. 23, 2018).

[475] *See, e.g.,* ISP License Application, Chapter 13 at Attach. A, Proposed License Conditions.

[476] 10 C.F.R. § 72.122(h)(5).

[477] Joint Pet'rs Pet. at 124-25.

[478] *Private Fuel Storage,* CLI-04-22, 60 NRC at 136-37.

tention claiming that a canister "improperly constructed or improperly sealed" could be shipped to the proposed storage facility and cause harm.[479] Because the NRC had generically determined that an accidental canister breach is not credible,[480] the Commission upheld the board's rejection of the contention.[481] Moreover, the Commission ruled that Utah (like Joint Petitioners here) had improperly failed to focus on and challenge implementation of NRC-approved quality assurance programs — those very programs that ensure a transportation accident or canister breach is not credible.[482] Because *Private Fuel Storage* is so closely analogous to this proceeding, we must reject Joint Petitioners Contention 11 for the same reasons.[483]

Third, insofar as Contention 11 criticizes the lack of a dry transfer system because, allegedly, its absence may complicate eventual shipment of spent fuel to a permanent repository, it is an impermissible challenge to the NRC's Continued Storage Rule[484] in violation of 10 C.F.R. § 2.335. Contention 11 raises concerns about canister compatibility with future transport and repository requirements for disposal.[485] However, although the Continued Storage GEIS does assume that a dry storage system would be built during long-term storage (that is, within 160 years after the licensed operating life of a reactor),[486] neither the GEIS nor NRC regulations require ISP to construct a dry storage system during the initial 40-year license for its proposed facility. Moreover, the Continued Storage Rule makes clear that ISP's Environmental Report is not required to evaluate the impacts of storage beyond the term of the license it is requesting.[487]

Joint Petitioners Contention 11 is not admitted.

---

[479] *Id.*

[480] *See* Final Rule, Emergency Planning Licensing Requirements for Independent Spent Fuel Storage Facilities (ISFSI) and Monitored Retrievable Storage Facilities (MRS), 60 Fed. Reg. 32,430, 32,438 (June 22, 1995).

[481] *Private Fuel Storage,* CLI-04-22, 60 NRC at 137.

[482] *Id.* at 138.

[483] Insofar as Joint Petitioners Contention 11 addresses the impacts of a terrorist attack outside the United States Court of Appeals for the Ninth Circuit's jurisdiction, the Commission has also made clear that NEPA consideration of impacts from terrorism is necessarily outside the scope of this proceeding. *See Oyster Creek,* CLI-07-8, 65 NRC at 124, 128-29.

[484] 10 C.F.R. § 51.23.

[485] Joint Pet'rs Pet. at 121.

[486] Continued Storage GEIS at 5-4 & n.2.

[487] 10 C.F.R. § 51.23(b).

### *12. Joint Petitioners Contention 12: IS[P]/WCS Is Disqualified from and/or Has Waived Applicability of the Continued Storage Generic Environmental Impact Statement to the Licensing Review*

Joint Petitioners Contention 12 states:

> The proposed WCS CISF does not qualify for the exclusions from NEPA scrutiny conferred by the Waste Storage GEIS. Consideration of severe accidents, Environmental Justice, terrorism and sabotage and related mitigation in the transportation and operations elements of the ISP/WCS CISF plan may not be treated as generic issues and excused from consideration under NEPA.[488]

Joint Petitioners assert five separate arguments allegedly in support of Contention 12: (1) the proposed facility is not legally authorized;[489] (2) because the proposed facility differs significantly from the assumptions in the Continued Storage GEIS, ISP is disqualified from relying on the Continued Storage Rule;[490] (3) the Texas Commission on Environmental Quality (TCEQ) concedes that the proposed project is site-specific;[491] (4) the NRC's Continued Storage Rule does not apply to ISFSIs;[492] and (5) ISP's financing mechanism for its proposed interim storage facility "diverges sharply from the [Private Fuel Storage Facility] Prototype of the GEIS."[493] None supports an admissible contention.

First, as explained *supra,* both the Commission and the United States Court of Appeals for the District of Columbia Circuit have already determined that the NRC has statutory authority under the AEA to issue away-from-reactor spent fuel storage installation licenses.[494]

Joint Petitioners' second, third, and fourth assertions all wrongly claim that ISP's application may not rely on the Continued Storage Rule and Continued Storage GEIS because of design differences between ISP's proposed facility and the Continued Storage GEIS's model. The Continued Storage GEIS acknowledges that not all facilities will be a replica of the "assumed generic facility" on which its analyses are based. Where there are differences, the GEIS mandates an independent evaluation of the environmental impacts of the proposed facility — especially as to "size, operational characteristics, and location of the facility."[495] Where there are differences between the GEIS analyses and the proposed WCS

---

[488] Joint Pet'rs Pet. at 127.
[489] *Id.* at 127-28.
[490] *Id.* at 128-31.
[491] *Id.* at 131-33.
[492] *Id.* at 133.
[493] *Id.* at 133-34.
[494] *See Private Fuel Storage,* CLI-02-25, 56 NRC at 392; *Bullcreek,* 359 F.3d at 543.
[495] Continued Storage GEIS at 5-2.

storage facility, those analyses are addressed in ISP's Environmental Report's Chapter 4 and in its emergency response mitigation measures in Chapter 5. Joint Petitioners do not dispute any of these chapters, and therefore raise no genuine dispute with the application, contrary to 10 C.F.R. § 2.309(f)(1)(vi).

Finally, insofar as Joint Petitioners claims concerning financing are all rooted in a belief that "ISP's proposal involves a funding stream from DOE for which there is no federal statutory authorization,"[496] those concerns have been mooted. As explained *supra,* ISP has expressly acknowledged that, as the law now stands, it cannot contract with DOE to store private utilities' spent fuel,[497] and likewise ISP has withdrawn its request for an exemption from the NRC's regulations regarding financing.

Joint Petitioners Contention 12 is not admitted.[498]

### *13. Joint Petitioners Contention 13: Any Anticipated Nuclear Reprocessing Activity Must Be Disclosed in the EIS and Included in Cumulative Effects Analysis*

Joint Petitioners Contention 13 states:

> The WCS CISF, by aggregating [spent nuclear fuel] in west Texas, would provide a stockpile of spent fuel for purposes of reprocessing. The return of spent fuel reprocessing is supported by the Texas Commission on Environmental Quality. The radioactively dangerous industrial activity of reprocessing must be addressed, analyzed and disclosed in a discussion of cumulative environmental impacts of the [spent nuclear fuel] waste storage project.[499]

Joint Petitioners assert that nuclear reprocessing is a "strong possibility" that must be discussed under NEPA as a cumulative impact of ISP's proposed project.[500] As evidence, Joint Petitioners rely on "a 2015 slide show given by a Holtec representative to the New Mexico State Legislature;"[501] a 2017 *Los Angeles Times* article;[502] a 2008 "Draft Global Nuclear Energy Partnership Pro-

---

[496] Joint Pet'rs Pet. at 134.

[497] ISP June 28, 2019 Response to Board; Tr. at 44.

[498] Because we would reach the same decision even if we consider Joint Petitioners' reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply that concern Joint Petitioners Contention 12.

[499] Joint Pet'rs Pet. at 134-35.

[500] Tr. at 129.

[501] Joint Petr's Pet. at 135.

[502] *Id.* (quoting an Eddy-Lea Energy Alliance member saying "[w]e believe if we have an interim storage site, we will be the center for future nuclear fuel reprocessing").

grammatic Environmental Impact Statement [GNEP]" published by DOE;[503] a 2014 report by the TCEQ;[504] and a 2018 DOE request for public comment on DOE's interpretation of the definition of high-level waste as set forth in the AEA and NWPA.[505]

Joint Petitioners claim that NEPA requires a cumulative impacts analysis of reprocessing spent nuclear fuel at the proposed facility because such action "falls within the realm of 'cumulative actions' delineated in the CEQ regulations."[506] Joint Petitioners contend that reprocessing activities have "business community support" and backing from the TCEQ,[507] which characterized these activities as "a fine idea."[508] Joint Petitioners allege that, once the proposed project begins operation, reprocessing activities will create cumulative environmental impacts that should be discussed under NEPA.[509]

Although Joint Petitioners correctly state that "[u]nder NEPA, an EIS 'must analyze not only the direct impacts of a proposed action, but also the indirect and cumulative impacts of 'past, present, and reasonably foreseeable future actions,'"[510] this requirement has limits. An EIS must include other related actions only when those actions have been formally proposed and are pending before an agency.[511] Consistent with NEPA's "rule of reason," the Commission has held that projects that are merely contemplated and not concrete or reasonably certain do not warrant consideration in a cumulative impact analysis.[512]

---

[503] *Id.* at 136.

[504] *Id.* at 137 (citing ER Attach. 1-2, [TCEQ], "Assessment of Texas's High Level Radioactive Waste Storage Options" (Mar. 2014)).

[505] *Id.* at 137-38 (citing Request for Public Comment on the U.S. Department of Energy Interpretation of High-Level Radioactive Waste, 83 Fed. Reg. 50,909, 50,909-10 (Oct. 10, 2018) (soliciting public input on a reinterpretation of the AEA so that wastes generated from nuclear reprocessing activities would no longer be considered high-level waste if the waste does not exceed concentration limits for Class C LLRW as set out in 10 C.F.R. § 61.55; or does not require disposal in a deep geologic repository and meets the performance objectives of a disposal facility as demonstrated through a performance assessment conducted in accordance with applicable regulatory requirements)).

[506] *Id.* at 140 (citing 40 C.F.R. § 1508.7).

[507] Joint Petr's Pet. at 135, 137-38.

[508] Tr. at 127.

[509] Joint Petr's Pet. at 138.

[510] *Id.* (quoting *Colo. Envtl. Coal. v. Dombeck,* 185 F.3d 1162, 1176 (10th Cir. 1999).

[511] *Kleppe,* 427 U.S. at 410 & n.20 (indicating that while NEPA addresses proposed actions, it does not mandate that an agency contemplate the possible environmental impacts of less imminent activities).

[512] *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-14, 55 NRC 278, 295 (2002). The Commission reiterated that a possible future action must "be in a sufficiently advanced stage to be considered a 'proposal' for action that 'bring[s] NEPA into play." *Strata Energy, Inc.* (Ross In Situ Uranium Recovery Project), CLI-16-13, 83 NRC 566, 577 (2016) (quoting *McGuire/Catawba,* CLI-02-14, 55 NRC at 295).

Joint Petitioners Contention 13 does not create a genuine dispute with the application because ISP is not asking to conduct reprocessing activities in this licensing action. We agree with the NRC Staff that, at most, the evidence proffered by Joint Petitioners "reflects speculation about the potential for (or benefits of) future reprocessing activities."[513] Joint Petitioners' contention relies on mere conjecture and does not identify a pending proposal for a reprocessing facility that would meet the Commission's standard for materiality. For these reasons, Joint Petitioners have failed to demonstrate a genuine dispute with ISP's application.[514]

Joint Petitioners Contention 13 is not admitted.[515]

### *14. Joint Petitioners Contention 14: NEPA Requires Significant Security Risk Analyses for the Spent Nuclear Fuel and Greater-Than-Class-C Wastes Proposed for Interim Storage, and Associated Transportation Component, at ISP/WCS's Texas Facility*

Joint Petitioners Contention 14 states:

> The NRC should, under NEPA, consider the risks, impacts and safety/security arrangements for the ISP/WCS CISF [spent nuclear fuel] transportation effort, given the long historical record and experience derived from research and litigation over the proposed Yucca Mountain geologic facility. There is a constantly-changing threat environment that radiological shipments to waste storage facilities such as ISP/WCS and a consequent need to plan for an evolving variety of design-basis threats (DBTs) and beyond-design-basis-events (BDBE). In-transit risks are a central part of the equation and need to be addressed. To "stock" the ISP CISF with [spent nuclear fuel] and GTCC wastes, the materials must be transported there, and the lack of details on waste conveyance in the WCS Environmental Report belies the centrality of transportation to the implementation of the project.[516]

Joint Petitioners claim that ISP's Environmental Report should contain an analysis for terrorist attacks as a "not so remote and highly speculative" envi-

[513] NRC Consol. Answer at 69.

[514] 10 C.F.R. § 2.309(f)(1)(vi).

[515] Because we would reach the same decision even if we considered Joint Petitioners' reply, we deny as moot ISP's motion to strike insofar as it pertains to portions of the reply concerning Joint Petitioners Contention 13.

[516] Joint Pet'rs Pet. at 142. Although characterized as the basis for Contention 14, this statement appears to be what Joint Petitioners intend to litigate as their contention.

ronmental impact, consistent with the United States Court of Appeals for the Ninth Circuit's decision in *San Luis Obispo Mothers for Peace v. NRC*.[517]

In *San Luis Obispo Mothers for Peace,* the Ninth Circuit held "that it was unreasonable for the NRC to categorically dismiss the possibility of terrorist attack on the Storage Installation . . . as too remote and highly speculative to warrant consideration under NEPA."[518] And, although Joint Petitioners acknowledge that Texas is not within the Ninth Circuit,[519] they claim that because "hundreds of [spent nuclear fuel] transport trips" will come through "the Ninth Circuit's geographical area" en route to Texas, Ninth Circuit law must be applied and thus ISP must conduct a terrorism analysis in its Environmental Report.[520]

As explained *supra,* the Commission takes the position (as upheld by the United States Court of Appeals for the Third Circuit[521]) that for all licensing actions outside the Ninth Circuit, "NEPA does not require the NRC to consider the environmental consequences of hypothetical terrorist attacks on NRC-licensed facilities."[522] Unless the proposed facility would be located in one of the nine states in the Ninth Circuit, no terrorism analysis under NEPA is required. ISP's facility would be constructed in Texas, which is in the Fifth Circuit. ISP's Environmental Report accordingly need not conduct an analysis concerning terrorism under NEPA. Contention 14 is therefore outside the scope of this proceeding.[523]

Joint Petitioners Contention 14 is not admitted.

### *15. Joint Petitioners Contention 15: Adoption of Sierra Club Contentions by Joint Petitioners*

Joint Petitioners Contention 15 states:

> Pursuant to 10 C.F.R. § 2.309(f)(3), Joint Petitioners move to adopt all contentions filed by Sierra Club in this proceeding and to re-allege them as their own as if written herein.[524]

To adopt a contention, a participant must (1) demonstrate standing and (2)

---

[517] *Id.* at 150 (quoting *San Luis Obispo Mothers for Peace v. NRC,* 449 F.3d 1016, 1032 (9th Cir. 2006)).

[518] *San Luis Obispo Mothers for Peace,* 449 F.3d at 1030 (internal quotations omitted).

[519] Joint Pet'rs Reply at 56.

[520] *Id.*

[521] *N.J. Dep't of Envtl. Prot.,* 561 F.3d at 142-43.

[522] *Oyster Creek,* CLI-07-8, 65 NRC at 129.

[523] 10 C.F.R. § 2.309(f)(1)(iii).

[524] Joint Pet'rs Pet. at 159.

have proffered its own admissible contention.[525] Because Joint Petitioners have not proffered an admissible contention, they cannot adopt Sierra Club's admissible contention.

Joint Petitioners Contention 15 is not admitted.

## D. Fasken

### *1. Fasken's Referred Contention*

Before it submitted contentions in response to this proceeding's *Federal Register* notice, Fasken also filed a motion with the Commission to dismiss both this proceeding and the *Holtec* proceeding.[526] SECY denied Fasken's motion to dismiss, and referred it for review under the NRC's contention admissibility standards.[527]

Fasken's Referred Contention states:

> The NRC lacks jurisdiction over the [application] because [it is] premised on the proposition that the U.S. Department of Energy ("DOE") will be responsible for the spent fuel that would be transported to and stored at the proposed [facility]. This premise is prohibited under the NWPA because the DOE is precluded from taking title to spent fuel until a permanent repository is available. 42 U.S.C. §§ 10222(a)(5)(A), 10143.
>
> The NRC's acceptance and processing of the [application] conflicts with the essential predicate that a permanent repository be available before licensure of a CISF. Further, processing the subject applications implies that the NRC disregards the NWPA's unambiguous requirement that spent fuel remain owned by and is the responsibility of reactor licensees until a permanent repository is available. The logic that underpins the plain language of the NWPA's requirement for a functioning permanent repository is effectively vitiated by processing [this application]. Movants contend the CISF [applicant] should be required to show cause why [its application does] not constitute a violation of the NWPA since no permanent repository for spent nuclear fuel exists in the United States. Processing [the application] to licensure under the present circumstances invites the situation Congress was attempting to avoid because licensure of a CISF without an available permanent repository contradicts the NWPA's objective to establish a permanent repository. The prospect that any CISF will become a *de facto* permanent repository is precisely what the NWPA intends to avoid.[528]

---

[525] *See Indian Point,* CLI-01-19, 54 NRC at 132-33.

[526] Fasken Motion to Dismiss at 1-8.

[527] Order Denying Motions to Dismiss at 2-3.

[528] Fasken Motion to Dismiss at 1-2.

Fasken's contention is similar to Beyond Nuclear's contention. However, it relies solely upon Beyond Nuclear's filings and incorporates by reference "the arguments and authorities in the Beyond Nuclear Inc. motion to dismiss at sections IV, V and VI."[529]

The Commission has approved the incorporation of contentions of other petitioners by reference, but only for those who have demonstrated standing and have submitted an admissible contention themselves.[530] The Commission also cautioned: "Nor will we permit wholesale incorporation by reference by a petitioner who, in a written submission, merely establishes standing and attempts, without more, to incorporate the issues of other petitioners."[531]

Although Fasken demonstrates standing, Fasken merely relies upon the arguments made in Beyond Nuclear's lone contention, which does not comport with the Commission's caveat in *Indian Point.* For this reason (and for the reasons we do not admit Beyond Nuclear's contention *supra*), Fasken's referred contention is rejected.

Fasken's referred contention is not admitted.

### *2. Fasken Contention 1*

Fasken Contention 1 states:

> The applicant's proposed CISF is not needed to ensure safe storage of [spent nuclear fuel], even for indefinite durations.[532]

Fasken challenges the purpose and need statement in section 1.1 of ISP's Environmental Report.[533] Fasken claims that ISP's statement that its proposed facility will be a "safer and more secure centralized storage location" conflicts with the Continued Storage GEIS.[534] Fasken also claims that ISP's application does not comply with three alleged requirements: (1) ISP has not shown that its CISF will further the cause of establishing a permanent repository;[535] (2) ISP "has not addressed the statutory requirement that construction of a CISF may not commence before a license for a permanent repository has been issued;"[536]

---

[529] *Id.* at 7.
[530] *Indian Point,* CLI-01-19, 54 NRC at 132.
[531] *Id.* at 133.
[532] Fasken Pet. at 9.
[533] *Id.*
[534] *Id.*
[535] *Id.* at 13.
[536] *Id.* at 14.

and (3) ISP fails to demonstrate that its WCS CISF will not become a *de facto* repository.[537]

None of Fasken's claims supports an admissible contention.

First, as explained *supra,* ISP's assertion of enhanced safety is not in conflict with the Continued Storage GEIS, which concludes that spent fuel may be stored safely, but does not favor one method of storage over another. Moreover, the purpose and need section of ISP's Environmental Report sets forth potential benefits that are unrelated to enhanced safety, such as freeing up decommissioned sites for other uses and avoiding the costs of maintaining spent fuel at multiple sites throughout the country.[538]

Second, Fasken does not identify any requirement for ISP to demonstrate that its proposed facility will further the cause of eventually establishing a permanent repository.

Third, Fasken is mistaken in claiming that construction of a CISF may not commence before the NRC licenses a permanent repository. The NWPA bars DOE from constructing a monitored retrieval storage facility before the NRC licenses construction of a repository,[539] but does not prohibit a private company from seeking a license to construct a CISF at any time.

Finally, we reject Fasken's claim that ISP must demonstrate that the WCS site will not become a *de facto* repository for the same reasons we have rejected similar claims in Sierra Club Contention 5 and Joint Petitioners Contention 10, discussed *supra.*

Fasken's Contention 1 is not admitted.[540]

### *3. Fasken Contention 2*

Fasken Contention 2 states:

> ISP's SAR fails to provide adequate data regarding active and abandoned oil and gas wells and borings on and near the WCS site, contrary to the requirements of 10 C.F.R. § 72.103.[541]

Supported by the declaration of Aaron Pachlhofer, a geologist employed by Fasken, Fasken Contention 2 claims that ISP's SAR fails to address a total

---

[537] *Id.* at 13.

[538] ER at 1-5 to -6.

[539] 42 U.S.C. § 10168(d)(1).

[540] Because we would reach the same decision even if we consider Fasken's replies, we deny as moot ISP's motion to strike insofar as it pertains to portions of the replies that concern Fasken Contention 1.

[541] Fasken Pet. at 15.

of 4,579 well bores in Texas and New Mexico within a 10-mile radius of the WCS site,[542] as allegedly required by 10 C.F.R. § 72.103.[543] However, Fasken Contention 2 ignores portions of ISP's application that concern compliance with section 72.103, and does not identify a requirement for additional discussion of the well bores within a 10-mile radius of the proposed site.

Fasken Contention 2 is premised on an alleged violation of 10 C.F.R. § 72.103(a)(1), which states:

> East of the Rocky Mountain Front (east of approximately 104° west longitude), except in areas of known seismic activity including but not limited to the regions around New Madrid, MO; Charleston, SC; and Attica, NY; sites will be acceptable if the results from onsite foundation and geological investigation, literature review, and regional geological reconnaissance show no unstable geological characteristics, soil stability problems, or potential for vibratory ground motion at the site in excess of an appropriate response spectrum anchored at 0.2 g.

The investigation ISP performed to satisfy this provision is described in numerous sections of its SAR and related attachments.[544] Fasken fails to challenge these portions of ISP's application, which evaluate and reach the conclusions required by section 72.103(a)(1).

For example, although Fasken claims that "ISP's SAR fails to admit the presence of nearly 5,000 wells located within 10 miles of the site,"[545] SAR section 2.1 reflects ISP's consideration of local land uses, including "drilling for and production from oil and gas wells." It cannot be said that ISP ignored oil and gas wells. Absent some demonstration that such wells would affect the consideration of "unstable geological characteristics, soil stability problems, or potential for vibratory ground motion at the site" that is required by section 72.103(a)(1) — and Fasken has provided none — we are not aware of any requirement to further enumerate or list wells within any specific radius of the site.

Fasken ignores other relevant discussion in ISP's application. For example, ISP's application states:

> Subsurface petroleum product exploration and production have been conducted in

---

[542] At oral argument, Fasken's counsel corrected the claimed number to be 4,579. Tr. at 324.

[543] Fasken Pet. at 16.

[544] *See, e.g.,* SAR section 2.1 (describing the geography and demography of the site); section 2.6, which is entitled "Geology and Seismology," and includes subsections 2.6.1 (Basic Geologic and Seismic Information), 2.6.2 (Vibratory Ground Motion), 2.6.3 (Surface Faulting), 2.6.4 (Stability of Subsurface Materials), 2.6.5 (Slope Stability), and 2.6.6 (Volcanism); and SAR Attachments D (Seismic Hazard Evaluation for WCS CISF) and E (Geotechnical Investigation for WCS CISF).

[545] Fasken Pet. at 17.

> the area of the Central Basin Platform for over 75 years. The local area has been heavily explored for oil and gas reserves over the last 35 years. Most of the oil wells in the vicinity of the CISF site have been abandoned or are in the process of secondary or tertiary recovery. The *absence of oil wells on the site* supports the absence of favorable conditions for oil production. Oil and gas wells are also located to the west in New Mexico.[546]

Most importantly, insofar as Fasken claims that oil and gas wells are inducing seismic activity, Fasken ignores ISP's conclusion that any such effects pose little risk. SAR section 2.6.2 states: "The absence of late-Quaternary faulting and the low to moderate rate of background seismicity, even that associated with petroleum recovery activities, results in relatively low seismic hazard at the WCS CISF." Fasken likewise fails to acknowledge or challenge the extensive evaluation of induced seismicity from oil and gas activities in section 4.3 of Attachment D to the SAR. Although Attachment D is proprietary, as explained *supra* all petitioners had the opportunity to seek access, but Fasken failed to do so.

Nor has Fasken identified any plausible impact from oil and gas wells that might affect ISP's proposed facility. As ISP points out, the proposed site boundary includes but a single dry hole, and all but a handful of the 4,579 well bores Fasken claims are within a 10-mile radius are miles away.[547]

Additionally, insofar as Fasken claims that "these abandoned wells should be analyzed as potential pathways to groundwater,"[548] it likewise ignores — and therefore fails to address — the multiple explanations in ISP's application as to why groundwater contamination is not an issue. For example, SAR section 2.7 states: "The method of storage (dry cask), the nature of the storage casks, the extremely low permeability of the red bed clay and the depth to groundwater beneath the WCS CISF preclude the possibility of groundwater contamination from the operation of the WCS CISF."

Because Fasken fails to acknowledge or address the relevant portions of ISP's application, and because it also fails to provide factual or legal support for its claims, Fasken Contention 2 does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and (vi).[549]

---

[546] ISP License Application at 12-2 (emphasis added).

[547] ISP Answer to Fasken at 38.

[548] Fasken Pet. at 17.

[549] For its part, initially the NRC Staff would have had us admit Fasken Contention 2 insofar as it challenges the impact of wells on site stability, but not as to potential groundwater contamination. NRC Staff Answer to Fasken at 16-17. At oral argument, however, the Staff announced that its position has changed. Tr. at 198. In light of ISP's response to RAI-2.2-2, which expanded ISP's discussion of gas and oilfield operations in the vicinity of the proposed facility, the Staff now considers Fasken Contention 2 to be moot and inadmissible in its entirety. Tr. at 198.

Fasken Contention 2 is not admitted.[550]

#### *4. Fasken Contention 3*

Fasken Contention 3 states:

> The Applicant's Emergency Response Plan (ERP) fails to address how licensee will protect the facility from credible fire and explosion effects including those that are caused by aircraft crashes.[551]

Contention 3 claims that ISP's emergency response plan fails to establish that its proposed storage facility will effectively perform its safety functions under all credible fire and explosion conditions, as required by 10 C.F.R. § 72.122(c).[552] The contention is not admissible, primarily because Fasken misunderstands the regulatory requirements for emergency response plans, and therefore fails to address, much less dispute, the sections of ISP's application that actually concern the matters Fasken raises.

Specifically, Fasken claims that ISP does not satisfy 10 C.F.R. § 72.122(c), which states that "[s]tructures, systems and components important to safety must be *designed and located* so that they can continue to perform their safety functions effectively under credible fire and explosion exposure conditions."[553] Section 72.122(c) is a facility *design* requirement. In contrast, an applicant's emergency response plan must address the requirements of 10 C.F.R. § 72.32, which concerns the applicant's response to onsite emergencies.

Apparently rooted in this fundamental confusion, Fasken repeatedly fails to acknowledge where ISP's application does address the matters Fasken is concerned about, and therefore Fasken Contention 3 fails to raise a genuine dispute with the application as required by 10 C.F.R. § 2.309(f)(1)(vi).

First, ISP's grounds for complying with 10 C.F.R. § 72.122(c) are set forth in Chapter 12, "Accident Analysis,"[554] which Fasken does not cite or address.

Second, citing 10 C.F.R. § 72.44(c)(1)(i), which requires that a *license* include technical specifications to guard against the uncontrolled release of radioactive materials, Fasken appears to wrongly assume that such specifications should

---

[550] Because we would reach the same decision even if we consider Fasken's replies, we deny as moot ISP's motion to strike insofar as it pertains to portions of the replies that concern Fasken Contention 2.

[551] Fasken Pet. at 18.

[552] *Id.*

[553] Emphasis added.

[554] SAR at 12-1 to -9.

appear in ISP's emergency response plan.[555] In fact, they appear — as they should — in ISP's Proposed License, Appendix A,[556] which Fasken does not cite or address.

Third, Fasken does not cite or address ISP's description of its fire protection system for the proposed facility, which appears in section 4.3.8 of the SAR.

Fourth, although Fasken claims that ISP's emergency response plan fails to demonstrate compliance with "as low as reasonably achievable" (ALARA) dose rate principles, Fasken does not cite or address ISP's actual discussion of ALARA, which is found in Chapter 11 of the SAR.

In addition to Fasken's failure to address or dispute the relevant portions of ISP's application, Fasken Contention 3 also appears to be premised on a misreading of whether ISP has determined that an aircraft crash is a credible event for purposes of the design requirements of 10 C.F.R. § 72.122(c). Fasken appears to assume that all events that could trigger an emergency alert are necessarily credible events for which the facility must be designed to survive with its safety functions intact.[557] They are not. For purposes of 10 C.F.R. § 72.122(c), ISP sets forth in section 12.2.2 of the SAR the credible events that could lead to such an accident from an offsite event, and they do not include aircraft crashes. Fasken does not reference or dispute this section.

Finally, separate and apart from failing to acknowledge or challenge the relevant portions of ISP's application, Fasken makes various generalized claims about the inadequacy of ISP's equipment and its inability to cope with a fire or explosion in a timely fashion. As Fasken does not support these claims with specific fact or with expert opinion, Fasken Contention 3 also fails to satisfy 10 C.F.R. § 2.309(f)(1)(v).

Fasken Contention 3 is not admitted.[558]

### *5. Fasken Contention 4*

Fasken Contention 4 states:

> ISP has failed to adequately discuss and evaluate the impact the proposed site will have on the environment and has also failed to include adverse information specifically relating to potential of waste-contaminated groundwater traveling to

[555] Fasken Pet. at 19.

[556] *See* ISP License Application at App. A, Proposed Technical Specifications.

[557] Fasken Pet. at 19.

[558] Because we would reach the same decision even if we consider Fasken's replies, we deny as moot ISP's motion to strike insofar as it pertains to portions of the replies that concern Fasken Contention 3.

aquifers and other groundwater formations located below and around the proposed site.[559]

Fasken Contention 4 appears to assume that operation of the proposed facility could contaminate aquifers and other groundwater formations that underlie or surround it. In its SAR, ISP describes four independent reasons why that should not happen: "[t]he method of storage (dry casks), the nature of the canisters, the extremely low permeability of the red clay and the depth to groundwater."[560]

Fasken cites, but does not challenge, ISP's assessment that both the dry cask storage method and the nature of the canisters preclude any credible pathway for groundwater contamination.[561] Indeed, Fasken does not even cite, much less challenge, other portions of ISP's SAR and Environmental Report in which ISP asserts that a leak of contaminants is not credible.[562]

Fasken appears to rely on the premise that a pathway to groundwater contamination could be established in the event of an impact from "large, fully-fueled aircrafts," which Fasken claims is a credible event.[563] However, as explained in our ruling on Fasken Contention 3 *supra,* Fasken fails to support its assertion that an aircraft crash is a credible event. Therefore, contrary to 10 C.F.R. § 2.309(f)(1)(v), Fasken likewise fails to provide a factual basis for this same premise to Fasken Contention 4.

Because Fasken has not challenged ISP's determination that the facility's design precludes a pathway to groundwater contamination, Fasken's claims about ISP's characterization and evaluation of groundwater formation do not raise a genuine dispute on a material issue, as required by 10 C.F.R. § 2.309(f)(1)(vi). Absent a pathway to groundwater contamination, Fasken's claims are not material because their resolution would make no difference in the outcome of the licensing proceeding.

Finally, although Fasken purports to challenge ISP's compliance with the NRC's NEPA-implementing regulations in 10 C.F.R. Part 51, it addresses only ISP's SAR. Fasken does not cite to or mention, much less controvert, any portion of ISP's Environmental Report, including sections that specifically evaluate potential groundwater impacts.[564]

---

[559] Fasken Pet. at 26.

[560] SAR at 2-21.

[561] Fasken Pet. at 27-28 (citing SAR at 2-21).

[562] *See, e.g.,* SAR at 11-1 to -2, App. A.11; ER at 4-29 to -32, 6-1 to -2.

[563] Fasken Pet. at 27-28.

[564] *See, e.g.,* ER at 3-24 to -29, 4-29 to -32.

Fasken Contention 4 is not admitted.[565]

### *6. Fasken Contention 5*

Fasken Contention 5 states:

> The Applicant's Environmental Report (ER) discusses its assessment of the presence of threatened and endangered species. ER, sections 3.5.4–3.5.8[.] However, the ER does not adequately characterize the threatened and endangered species in the area of the proposed CISF.[566]

Fasken asserts that ISP's Environmental Report violates 10 C.F.R. § 51.45 because it "fail[s] to adequately evaluate the potential for the presence of threatened and endangered species and relevant conservation efforts that may be undermined by the proposed CISF," specifically concerning the dunes sagebrush lizard and lesser prairie chicken.[567] Fasken claims that the Environmental Report should include the dunes sagebrush lizard's threatened status, and "discuss the efforts of the regional oil and gas community to protect the lesser prairie chicken."[568] In support, Contention 5 relies on declarations from Mr. Pachlhofer, Fasken's geologist, and Mr. Taylor, president of Fasken Land and Minerals.[569]

At oral argument, Fasken's counsel clarified that the crux of its Contention 5 is that "there's an omission of material information rather than contradicting that which has actually been presented" in ISP's Environmental Report as to the collective efforts of the oil and gas industry protecting the dunes sagebrush lizard's and lesser prairie chicken's habitats.[570]

As to Fasken's claim that the Environmental Report must reflect the dunes sagebrush lizard's threatened status, there is no genuine dispute with the application. As ISP points out, neither the U.S. Fish and Wildlife Service nor the State of Texas lists the dunes sagebrush lizard as an animal requiring increased protections,[571] and Fasken does not proffer any legal requirement for ISP to do so.

---

[565] Because we would reach the same decision even if we consider Fasken's replies, we deny as moot ISP's motion to strike insofar as it pertains to portions of the replies that concern Fasken Contention 4.

[566] Fasken Pet. at 31.

[567] *Id.* at 31-32.

[568] *Id.* at 32.

[569] Fasken Pet. Ex. 3, Decl. of Aaron Pachlhofer; *id.* Ex. 1, Decl. of Tommy Taylor.

[570] Tr. at 321-22, 336.

[571] ISP Answer to Fasken at 70. *See also* Tr. at 338-39 (Fasken counsel agreeing with ISP counsel that the lesser prairie chicken is currently delisted).

Regarding Fasken's claim that the Environmental Report must discuss the efforts of the oil and gas companies to save and conserve the dunes sagebrush lizard, the lesser prairie chicken, and their respective habitats, Fasken Contention 5 is inadmissible for lack of the factual support required by 10 C.F.R. § 2.309(f)(1)(v). Although 10 C.F.R. § 51.45(b) does require a discussion of the affected environment and impacts to that environment by the project, including animal habitats in the area and those likely impacts upon them by the proposed action, NEPA and Part 51 do not require a discussion concerning ongoing animal conservation efforts by area oil, gas, and ranching companies.

Fasken Contention 5 is not admitted.[572]

## V. RULING ON PETITIONS

As set forth above, Beyond Nuclear, Sierra Club, SEED (of Joint Petitioners), and Fasken have demonstrated standing in accordance with 10 C.F.R. § 2.309(d). Only Sierra Club has proffered an admissible contention meeting the requirements of 10 C.F.R. § 2.309(f)(1). Therefore, in accordance with 10 C.F.R. § 2.309(a), the Board denies Beyond Nuclear's, Joint Petitioners' and Fasken's respective petitions, and grants the request for hearing and petition for leave to intervene by Sierra Club. Sierra Club is admitted as a party to this proceeding.

## VI. ORDER

For the foregoing reasons:

A. Beyond Nuclear's petition is *denied.* Beyond Nuclear's contention is *not admitted.*

B. Sierra Club's petition is *granted.* Sierra Club Contention 13 is *admitted in part.* Sierra Club's other contentions are *not admitted.*

C. Joint Petitioners' petition is *denied.* Joint Petitioners' contentions are *not admitted.*

D. Fasken's petition is *denied.* Fasken's contentions are *not admitted.*

E. ISP's motion to strike a portion of Sierra Club's reply on Sierra Club Contention 13 is *denied in part* and *denied in part* as moot. ISP's motion to

[572] Although we would reach the same decision even if we consider Fasken's replies, we recognize new arguments in Fasken's replies, including a new allegation that ISP must consult with the U.S. Fish and Wildlife Service, that improperly "expand the scope of the arguments set forth" in ISP's initial petition. *Palisades,* CLI-06-17, 63 NRC at 732. Accordingly, we grant ISP's motion to strike insofar as it pertains to portions of the replies that concern Fasken Contention 5.

strike portions of Sierra Club's reply on Sierra Club Contentions 1, 4, 9, 11, and 14 is *denied* as moot.[573]

F. ISP's motion to strike a portion of Joint Petitioners' reply on Joint Petitioners Contention 9 is *granted.*[574] ISP's motion to strike portions of Joint Petitioners' reply on Joint Petitioners Contentions 4, 12, and 13 is *denied* as moot.[575]

G. ISP's motion to strike a portion of Fasken's replies on Fasken Contention 5 is *granted.*[576] ISP's motion to strike portions of Fasken's replies on Fasken's standing and Fasken Contentions 1, 2, 3, and 4 is *denied* as moot.[577]

H. The admitted contention will be adjudicated under the procedures set forth at 10 C.F.R. Part 2, Subpart L.

Any appeal of this decision to the Commission shall be filed in conformity with 10 C.F.R. § 2.311.

It is so ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Paul S. Ryerson, Chairman
ADMINISTRATIVE JUDGE

Nicholas G. Trikouros
ADMINISTRATIVE JUDGE

Dr. Gary S. Arnold
ADMINISTRATIVE JUDGE

Rockville, Maryland
August 23, 2019

---

[573] [ISP's] Motion to Strike Portions of the Reply Filed by Sierra Club (Dec. 27, 2018).

[574] [ISP's] Motion to Strike Portions of the Reply Filed by [Joint Petitioners] (Dec. 27, 2018) at 5-7.

[575] *Id.* at 4-5, 7.

[576] [ISP's] Motion to Strike Portions of the Replies Filed by [Fasken] (Dec. 10, 2018) at 5, 10.

[577] *Id.* at 5-10.

# Tab 15

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

| | | |
|---|---|---|
| IN THE MATTER OF | ) | |
| | ) | Docket No. 72-1050 |
| INTERIM STORAGE PARTNERS LLC | ) | |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | September 13, 2019 |
| | ) | |

AMENDED CONTENTION 13

The ER states that two species of concern, the Texas horned lizard and the dune sagebrush lizard, have been seen at the ISP site or may be present. The ER then makes the unsupported statement that the CIS project will have no impact on the species. The sources on which the discussion of the species were initially unavailable to the public. They have now been made available, but do not support the allegation in the ER that the CIS project will have no impact on the species, and in fact, they confirm the opposite conclusion. Furthermore, the sources are 11-22 years out of date. The ER does not reference any current studies or surveys. Therefore, the ER is inadequate in describing the affected environment.

Basis for Contention

10 C.F.R. § 51.45 requires that an environmental report must contain a discussion of the environment affected by the proposed project and the environmental impacts of the project. This includes a discussion of the various species present and their habitat. The NRC's *Environmental Review Guidance for Licensing Actions Associated With NMSS Programs* (NUREG-1748)(Accession No. ML032450279), 5.3.5, also directs that the ER must discuss the affected environment and the impacts on the environment, including impacts to important species and their habitats.

Two species of concern, the Texas horned lizard and the dune sagebrush lizard, are in the area of the ISP site. ER, 3.5.2. With no factual support, the ER, 4.5.10, claims that the CIS project will have no impact on the species. The sources that have now been made

available to the public in response to the ASLB ruling issued in this case on August 23, 2019, confirm that the ER had no basis for declaring that the CIS project would have no impact on the species.

Facts Upon Which Petitioner Intends to Rely In Support of This Contention

The ER, 3.5.2, states that the Texas horned lizard and the dune sagebrush lizard are present in an area within a 3.1 mile radius of the CIS site. More specifically, the ER, 3.5.4, states that the Texas horned lizard has been reported as being present at the CIS site and the dune sagebrush lizard might occur there. The ER, 3.4.16, cites four Texas-specific sources upon which the information on the two species is purportedly based. Those sources were initially not made available to the public, but in response to the ASLB ruling issued in this case on August 23, 2019, those sources have now been made available.

The four documents are an ecological assessment from 1997, a species survey from 2004, a supplemental survey from 2007, and an environmental assessment from 2008. These documents were submitted with a cover letter from ISP, at ADAMS Accession No. ML19248C910. It is significant that all four documents relate to the existing WCS low-level radioactive waste storage facility site, not the site of the proposed CIS project. Also, as shown by the dates, these documents are 11-22 years old.

The 1997 document, at page 3, states that it only considered species within one mile of the core area of the LLRW site. The CIS site at issue in this case is beyond that one mile radius. Page 4 of that document states that reptiles and amphibians were observed, but this appears to refer to just casual observations, not a scientific survey. So,

this document supports Contention 13, that the two species are or likely are present at the CIS site and more current scientifically supported surveys should be conducted.

The 2004 document, at page 6, states that the sand dune lizard was observed in the area of the LLRW site. Further, the document, at page 7, states that there is no suitable habitat for the sand dune lizard within 1.5 km (1 mi) of the LLRW site. The document goes on to state, however, that suitable sand dune lizard habitat exists west, north, northeast, south, and southeast of the LLRW site. Significantly, the proposed CIS site is just northeast of the LLRW site. In fact, the document states, at page 7, that the study area was a 3.1 mile radius of the LLRW site and that the two lizard species occur within that area, and that the area around the LLRW site (which would include the CIS site) should be protected to preserve the habitat for both species.

The 2007 document, at page 59, as in the previous documents, states that the sand dune lizard does not occur on the site of the LLRW project, but suitable habitat does occur in the area around the site. The area around the LLRW site would include the CIS site. A table on page 60 of the 2007 document lists the Texas horned lizard as being observed on the LLRW site, but there is no discussion of the horned lizard in the document.

The 2008 document is an environmental assessment relating to the relicensing of the WCS LLRW facility. The assessment was apparently limited to a vary narrow set of issues regarding the LLRW operation and impacts on the site itself. There is no indication that any review was made of the area surrounding the site. Pages 11-12 of the document

mention the horned lizard and dunes sagebrush lizard but it simply says that the horned lizard is in the area and there is no dunes sagebrush lizard habitat on the site.

Taking all of these sources into consideration, the important conclusion is that the statements in Chapter 4 of the ER that there will be no adverse impact on the two lizard species or their habitat are demonstrably false. Section 4.5.8 of the ER says, "No communities or habitats that have been defined as rare or unique or that support threatened and endangered species have been identified on the CISF." However, the sources described above were focused on the LLRW site adjacent to the CIS site. Therefore, the statement in Section 4.5.8 of the ER, that "[s]urveys were conducted at the WCS CISF sit in 2004" is not correct. The CIS site was not even identified at that time. Even so, the 2004 document states that suitable sand dune lizard habitat exists northeast of the LLRW site, and that that area should be protected. That is exactly where the CIS facility is to be located. Likewise, the 2007 document states that suitable habitat for the dune sagebrush lizard occurs in the area around the LLRW site, i.e., the area of the CIS site. The foregoing also puts the lie to the statement in the ER, 4.5.8, that "[a]reas to the west, south, and east of the site do not appear to have suitable habitat for the sand dune lizard within 16 to 32 km (10 to 20 mi.)."

Therefore, the statement in the ER, 4.5.10 that "the Texas horned lizard and the sand dune lizard either do not occur on the CISF or are highly adaptable" is not supported by the very sources upon which ISP contends that it relied in preparing the ER. The new information provides further proof and clarification that the statement in the ER alleging no impact to the two lizard species was false.

The documents allegedly relied upon by ISP in preparing the ER are 11 to 22 years out of date; were prepared to focus on the LLRW site, not the CIS site; there was apparently no credible species survey conducted, just random observations; and even so, the documents clearly confirm the main point of this contention, that the two lizard species and their habitat are present at the CIS site, so the conclusion in the ER that there will be no impact to the species is not supported by the evidence and is false. Therefore, it is no surprise that ISP did not make these documents public. These documents show an issue material to the findings the NRC must make to issue the requested license and in showing the existence of a genuine dispute with the ER on a material issue.

In order for the ER to comply with NEPA and NRC regulations and guidance, ISP must conduct current scientifically based species surveys for the actual CIS site, not haphazard random "observations."

/s/ *Wallace L. Taylor*

WALLACE L. TAYLOR
Law Offices of Wallace L. Taylor
4403 1st Ave. S.E., Suite 402
Cedar Rapids, Iowa 52402
319-366-2428;(Fax)319-366-3886
e-mail: wtaylorlaw@aol.com

ATTORNEY FOR SIERRA CLUB

# Tab 16

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**Before the Atomic Safety and Licensing Board**

| | | |
|---|---|---|
| In the Matter of | ) | Docket No. 72-1050<br>NRC-2016-0231 |
| WCS Consolidated Interim Spent Fuel Storage Facility | ) | October 23, 2019 |
| | ) | |

* * * * *

**MOTION OF INTERVENOR SUSTAINABLE ENERGY AND ECONOMIC DEVELOPMENT COALITION FOR LEAVE TO FILE LATE-FILED CONTENTION, AND CONTENTION 17**

Now comes Sustainable Energy and Economic Development Coalition ("SEED Coalition"), by and through counsel, and moves the Atomic Safety and Licensing Board (ASLB) for leave to file a late-filed contention. SEED Coalition supports its motion below.

## I. INTRODUCTION

Pursuant to 10 C.F.R. §§ 2.309(f)(1) and 2.309(f)(2), SEED Coalition ("Intervenor") seeks leave to file a new Contention 17 which alleges unaddressed technical and integration issues that the U.S. Department of Energy ("DOE") must resolve to ensure that spent nuclear fuel ("SNF") can be transported to the Interim Storage Partners/Waste Control Specialists' proposed ("ISP/WCS") consolidated interim storage facility ("CISF"). These unresolved issues must be noticed, analyzed and disclosed in the Environmental Impact Statement ("EIS") for the CISF, and the resolutions delineated and implemented within the Safety Analysis Report ("SAR") for the CISF proposal.

SEED Coalition states that the new information which forms the basis for proposed Contention 17 is contained in a report published September 23, 2019 by the U.S. Nuclear Waste

# Tab 17

Cite as 90 NRC 181 (2019) **LBP-19-9**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**ATOMIC SAFETY AND LICENSING BOARD**

**Before Administrative Judges:**

**Paul S. Ryerson,** Chairman
**Nicholas G. Trikouros**
**Dr. Gary S. Arnold**

**In the Matter of** **Docket No. 72-1050-ISFSI**
**(ASLBP No. 19-959-01-ISFSI-BD01)**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **November 18, 2019**

This proceeding concerns the application of Interim Storage Partners LLC (ISP) to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in Andrews County, Texas. The Board considered a motion by ISP to dismiss Sierra Club Contention 13 and a motion by Sierra Club to amend Contention 13. The Board grants ISP's motion to dismiss and denies Sierra Club's motion to amend.

## RULES OF PRACTICE: MOOTNESS

A contention of omission is cured when the applicant supplies the missing information. At that time, the contention is moot and should be dismissed.

## RULES OF PRACTICE: CONTENTIONS (GOOD CAUSE)

Any petitioner that proffers a new or amended contention after the initial deadline for hearing requests must demonstrate good cause for doing so. Otherwise, such a contention will not be entertained.

**RULES OF PRACTICE: CONTENTIONS (GOOD CAUSE)**

To establish good cause, a petitioner must show that (1) the information upon which the new or amended contention is based was not previously available; (2) the information upon which the contention is based is materially different from information previously available; and (3) the contention has been submitted in a timely fashion after the new information on which it is based becomes available. "Materially different" simply means significantly different from information that was previously available.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

An admissible contention must, among other things (1) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes; and (2) state the alleged facts or expert opinions that support the petitioner's position.

## MEMORANDUM AND ORDER
**(Ruling on Motion to Dismiss and Motion to Amend Contention 13)**

Before the Board are (1) a motion by Interim Storage Partners LLC (ISP) to dismiss Sierra Club Contention 13;[1] and (2) a motion by Sierra Club to amend the same contention.[2] Because Contention 13, as admitted by the Board, is now moot, we grant ISP's motion to dismiss it. Because Sierra Club proffers an amended Contention 13 that is not admissible, we deny its motion to amend.[3]

### I. BACKGROUND

The background of this proceeding is set forth in detail in the Board's August 23, 2019 Memorandum and Order,[4] but is summarized below.

---

[1] Interim Storage Partners LLC's Motion to Dismiss Sierra Club's Contention 13 as Moot and Terminate This Proceeding (Sept. 9, 2019) [hereinafter ISP Motion to Dismiss].

[2] Sierra Club's Motion to Amend Contention 13 (Sept. 13, 2019) [hereinafter Sierra Club Motion to Amend].

[3] We do not terminate this proceeding, however, because one other proffered contention is pending. On November 13, 2019, the Office of the Secretary referred a motion for leave to file a late-filed contention that was submitted on October 23, 2019 by the Sustainable Energy and Economic Development Coalition (SEED). The time for briefing SEED's motion has not yet expired.

[4] LBP-19-7, 90 NRC 31, 42-47 (2019).

In April 2016, Waste Control Specialists LLC (WCS) submitted an application to the Nuclear Regulatory Commission (NRC) for a license to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in Andrews County, Texas.[5] A year later, WCS asked the NRC to suspend consideration of its application.[6] Thereafter, WCS merged with Orano CIS LLC to form ISP.[7]

In June 2018, ISP submitted a revised license application,[8] and the NRC issued a *Federal Register* notice that permitted the public to request a hearing and petition to intervene.[9] Sierra Club filed a timely hearing request[10] (as did others). After briefing, the Board heard oral argument in Midland, Texas concerning petitioners' standing and the admissibility of their contentions.[11]

In LBP-19-7, we denied the hearing requests of all other petitioners, but granted Sierra Club's hearing request and admitted one contention (Sierra Club Contention 13) that challenged the adequacy of ISP's discussion, in its Environmental Report, of the Texas horned lizard and the dunes sagebrush lizard (also known as the sand dune lizard). Sierra Club Contention 13 asserted in part that "there is no discussion of any studies or surveys to determine if the species are present and the impact of the project on those species."[12]

We observed (and ISP did not dispute[13]) that none of the studies cited in section 3.5.16 of ISP's Environmental Report — the studies on which ISP relied in discussing both species — was publicly available.[14] As a result, we concluded,

---

[5] Waste Control Specialists LLC, Application for a License for a Consolidated Interim Spent Fuel Storage Facility (Apr. 28, 2016) (ADAMS Accession No. ML16133A100).

[6] Joint Request to Withdraw the Federal Register Notice Providing an Opportunity to Submit Hearing Requests (Apr. 19, 2017), Attach. 1, Letter from Rod Baltzer, WCS President and CEO, to NRC Document Control Desk (Apr. 18, 2017) (ADAMS Accession No. ML17109A480).

[7] Interim Storage Partners LLC License Application, Docket 72-1050, Andrews County, Texas, (rev. 2 July 2018) at 1-1, 1-4 (ADAMS Accession No. ML18206A483).

[8] Letter from Jeffery D. Isakson, ISP, to NRC Document Control Desk (June 8, 2018) (ADAMS Accession No. ML18166A003).

[9] Interim Storage Partners Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44,070, 44,070-75 (Aug. 29, 2018), corrected, 83 Fed. Reg. 44,680 (Aug. 31, 2018) (correcting the deadline date for petitioners to request a hearing to October 29, 2018). The Secretary of the Commission later extended this deadline to November 13, 2018. Order of the Secretary (Oct. 25, 2018) at 2.

[10] Petition to Intervene and Request for Adjudicatory Hearing by Sierra Club (Nov. 13, 2018) [hereinafter Sierra Club Hearing Petition].

[11] Licensing Board Notice and Order (Establishing Dates and Location of Oral Argument) (May 24, 2019) at 1 (unpublished).

[12] Sierra Club Hearing Petition at 78.

[13] *See* Interim Storage Partners LLC's Answer Opposing Hearing Request and Petition to Intervene Filed by Sierra Club (Dec. 10, 2018) at 109.

[14] LBP-19-7, 90 NRC at 78.

"no interested member of the public could access any of these studies, or learn how many people performed them, what their qualifications were, or how much time they spent."[15] Accordingly, we admitted Sierra Club Contention 13 in part, "solely as a contention of omission," because none of the studies listed in section 3.5.16 of ISP's Environmental Report was "either sufficiently described to judge its technical adequacy or made publicly available."[16]

Thereafter, ISP supplemented its Environmental Report with copies of (or the applicable ADAMS accession numbers for) each of the studies referenced in section 3.5.16.[17] With the concurrence of the NRC Staff,[18] ISP then moved to dismiss Sierra Club's Contention 13 as moot and to terminate this proceeding.[19] Sierra Club opposed,[20] and moved to amend Contention 13.[21] Both ISP and the NRC Staff oppose Sierra Club's motion to amend.[22]

## II. ANALYSIS

### A. Motion to Dismiss Contention 13 as Moot

As explained above, we admitted Sierra Club Contention 13 "solely as a contention of omission."[23] Such a contention is cured when the applicant supplies

---

[15] *Id.*

[16] *Id.* at 80.

[17] Letter from Jack Boshoven, Chief Engineer, ISP, to Document Control Desk, Division of Spent Fuel Management, NRC (Sept. 4, 2019) (ADAMS Accession No. ML19248C915) [hereinafter ISP Letter Providing Supplemental References].

[18] Pursuant to 10 C.F.R. § 2.323(b), ISP certified with its motion that "[t]he NRC staff agrees that the documents and references provided cure the omission identified in the Board's order" and therefore "supports the proposed motion." *See* ISP Motion to Dismiss.

[19] ISP Motion to Dismiss at 1.

[20] Sierra Club's Resistance to ISP's Motion to Dismiss Sierra Club's Contention 13 at 2-5 (Sept. 12, 2019).

[21] Sierra Club Motion to Amend; *see also* Amended Contention 13 (Sept. 13, 2019) [hereinafter Amended Contention 13].

[22] Interim Storage Partners LLC's Answer Opposing Sierra Club's Motion to Amend Contention 13 (Oct. 1, 2019) [hereinafter ISP Answer]; NRC Staff Answer in Opposition to Sierra Club's Amended Contention 13 (Oct. 7, 2019) [hereinafter NRC Staff Answer]. Sierra Club replied to each answer. *See* Sierra Club's Reply to ISP's Answer to Sierra Club's Motion to Amend Contention 13 (Oct. 7, 2019) [hereinafter Sierra Club Reply to ISP]; Sierra Club's Reply to NRC Staff's Answer to Sierra Club's Motion to Amend Contention 13 (Oct. 14, 2019) [hereinafter Sierra Club Reply to NRC Staff].

[23] LBP-19-7, 90 NRC at 80.

the missing information.[24] When the missing information "is later supplied by the applicant . . . the contention is 'moot'" and should be dismissed.[25]

Because ISP made available all the studies listed in section 3.5.16 of its Environmental Report, it cured the omission. Sierra Club Contention 13, as initially admitted by the Board, is dismissed as moot.

### B. Motion to Amend Contention 13

The remaining question is whether Sierra Club's motion to amend Contention 13 should be granted. Sierra Club's amended Contention 13 claims that the previously unavailable studies listed in section 3.5.16 of ISP's Environmental Report do not, in fact, adequately support the content of the Report. Specifically, the contention states:

> The [Environmental Report] states that two species of concern, the Texas horned lizard and the dune sagebrush lizard, have been seen at the ISP site or may be present. The [Environmental Report] then makes the unsupported statement that the [consolidated interim storage] project will have no impact on the species. The sources on which the discussion of the species [sic] were initially unavailable to the public. They have now been made available, but do not support the allegation in the [Environmental Report] that the [consolidated interim storage] project will have no impact on the species, and in fact, they confirm the opposite conclusion. Furthermore, the sources are 11-22 years out of date. The [Environmental Report] does not reference any current studies or surveys. Therefore, the [Environmental Report] is inadequate in describing the affected environment.[26]

#### *1. Good Cause*

Any petitioner that proffers a new or amended contention after the initial deadline for hearing requests must demonstrate good cause for doing so.[27] Otherwise, the NRC's rules provide, such a contention "will not be entertained."[28]

To establish good cause, a petitioner must show that (1) the information upon which the new or amended contention is based was not previously available; (2) the information upon which the contention is based is materially different from information previously available; and (3) the contention has been submitted

---

[24] *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 383 (2002).

[25] *See id.*; *accord USEC Inc.* (American Centrifuge Plant), CLI-06-9, 63 NRC 433, 444 (2006).

[26] Amended Contention 13 at 1.

[27] *See* 10 C.F.R. § 2.309(c)(1).

[28] *Id.*

in a timely fashion after the new information on which it is based becomes available.[29]

It is not disputed that Sierra Club has satisfied the first and third requirements. In accordance with the Board's order,[30] Sierra Club proffered its amended contention on September 13, 2019 — well within thirty days of ISP's first making the studies available. As ISP concedes: "ISP recognizes that Sierra Club did not have access to the four reports referenced in Amended Contention 13 until September 5, 2019, and that it filed its amended contention just over a week later."[31]

Both ISP and the NRC Staff argue, however, that we should not even "entertain" Sierra Club's motion because, they claim, statements in ISP's Environmental Report are not "materially different" from information in the supporting studies that ISP has now made available.[32] Opining that "[t]he Commission does not look favorably upon amended or new environmental contentions made after the initial filing deadline,"[33] ISP cites caselaw to the effect that premising a newly proffered contention on previously available information renders the contention "impermissibly late."[34]

A majority of the Board declines to apply the NRC's screening test for late submissions to prevent our even considering the admissibility of Sierra Club's amended Contention 13. There are material differences between the unsupported assertions in ISP's Environmental Report and the recently available, more detailed studies on which those assertions were based.[35] ISP's own pleadings demonstrate as much. For example, although initially the Board was troubled by our (or anyone's) inability to know how the studies cited by ISP were conducted, ISP now points out that the 1997 "surveys were conducted by a team of five doctoral-level research scientists whose credentials are summarized in the 1997 Report."[36] Therefore, ISP now argues, "there is zero basis for Sierra Club's

---

[29] *See id.* § 2.309(c)(1)(i)-(iii).

[30] Licensing Board Order (Scheduling Initial Scheduling Conference) (Sept. 5, 2019) at 1 (unpublished).

[31] ISP Answer at 7 (footnotes omitted).

[32] *Id.* at 6-15; NRC Staff Answer at 6-10.

[33] ISP Answer at 6.

[34] *Id.* at 7 (citing *DTE Electric Co.* (Fermi Nuclear Power Plant, Unit 3), CLI-15-1, 81 NRC 1, 7 (2015)).

[35] As used in 10 C.F.R. § 2.309(c)(1)(ii), "materially different" simply means significantly different from information that was previously available. *See Florida Power & Light Co.* (Turkey Point Units 6 and 7), LBP-17-6, 86 NRC 37, 48 (2017).

[36] ISP Answer at 10.

suggestion that the surveys lacked scientific validity or rigor."[37] This may not be helpful to Sierra Club, but surely it is material and new information.[38]

In the view of the Board's majority, therefore, the dispositive issue is not whether Sierra Club's amended contention was filed out of time without "good cause," as ISP and the NRC Staff would have us conclude.[39] Rather, it is whether Sierra Club has identified information in the recently available studies that raises a genuine dispute with ISP's Environmental Report. As explained below (and as ISP and the NRC Staff argue in the alternative[40]), Sierra Club has failed to do so.

### *2. Contention Admissibility*

Although Sierra Club may have good cause for proffering its amended contention after the initial deadline, its contention must also satisfy the usual requirements for contention admissibility.[41] While we do not adjudicate disputed facts at this stage, an admissible contention must, among other things (1) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes; and (2) state the alleged facts or expert opinions that support the petitioner's position.[42]

In accordance with 10 C.F.R. § 51.45,[43] we therefore consider two separate but related questions: First, has Sierra Club raised a genuine dispute as to

---

[37] *Id.*

[38] Our concurring colleague undertakes a careful analysis of Sierra Club's amended Contention 13 and concludes that, contrary to what it purports to be, the contention is not actually based on any of the recently available, materially different information. Although we ultimately reach the same result, a majority of the Board determines such an analysis to be more appropriately conducted under the contention admissibility criteria (10 C.F.R. § 2.309(f)(1)) than under 10 C.F.R. § 2.309(c)(1). As a unanimous Board cautioned in *Holtec,* we should not conflate the screening test for merely filing a contention out of time with the requirements for admitting it. *See Holtec International* (HI-STORE Consolidated Interim Storage Facility), LBP-19-4, 89 NRC 353, 419-20 (2019). "We do not demand that a petitioner establish the admissibility . . . of a contention before allowing it to be filed." *Id.* at 420.

[39] However, we do agree with ISP (*see* ISP Answer at 8) that Sierra Club's amended Contention 13 is untimely to the extent it claims the studies cited in section 3.5.16 of ISP's Environmental Report are "11-22 years out of date." The dates of the studies were disclosed in section 3.5.16 from the outset, and Sierra Club failed to challenge their age in its initial petition. Moreover, we are not aware of any factual or legal requirement to necessarily use newer studies, and Sierra Club cites none.

[40] ISP Answer at 17-20; NRC Staff Answer at 10-14.

[41] *See* 10 C.F.R. § 2.309(f)(1).

[42] *Id.* § 2.309(f)(1)(v)-(vi).

[43] Section 51.45 of 10 C.F.R. requires that an applicant's environmental report contain a discussion of the affected environment and of the environmental impact of the proposed project.

whether the recently available studies adequately support the factual description of the affected environment in ISP's Environmental Report? Second, based on the same studies, has Sierra Club raised a genuine dispute as to whether ISP's characterization of the environmental impact is reasonable?[44]

Concerning the first question, amended Contention 13 alleges discrepancies between ISP's Environmental Report and four of the recently available studies.[45] On close examination, however, no significant discrepancies exist. Therefore, Sierra Club fails to raise a genuine dispute as to whether the studies adequately support ISP's description of the affected environment for the dunes sagebrush lizard and the Texas horned lizard.[46]

For example, Sierra Club claims that the 1997 Report only considered species within one mile of the core area of the existing low-level radioactive waste (LLRW) site, and that ISP's proposed facility is "beyond that one mile radius."[47] It further claims that the 1997 Report reflects only "casual observations" of reptiles and amphibians rather than a "scientific survey."[48]

But, as ISP explains in detail,[49] these statements are incorrect. Although ISP's Environmental Report does not specify the exact areal extent of the wildlife surveys described in the 1997 Report, the Environmental Report clearly shows that ISP's proposed facility would be located within a mile of the LLRW site and, therefore, within the survey area described in the 1997 Report.[50] Sierra Club's claim that the 1997 Report (and hence ISP's Environmental Report) contains

---

[44] Similar to the proffered amended contention, the original Sierra Club Contention 13 challenged both the adequacy of ISP's description of the affected environment and ISP's conclusions concerning the impact of its proposed facility on the dunes sagebrush lizard and the Texas horned lizard. *See* Sierra Club Hearing Petition at 78. Although we did not initially admit these issues (pending the availability of ISP's supporting references), Sierra Club has not waived the right to address them.

[45] "Ecological Assessment of the Low Level Waste Depository, Andrew County, Texas," Final Report, Ecology Group (May 1997) [hereinafter 1997 Report]; "Habitat Characterization and Rare Species Survey for the Low Level Waste Repository, Andrews County, Texas," Final Report, Doug Reagan & Associates (Oct. 25, 2004) [hereinafter 2004 Report]; "Supplemental Survey to Ecological Assessment of the Low Level Waste Depository, Andrews County, Texas," Final Report — Revision 1, URS Corporation and Doug Reagan (Mar. 2007) [hereinafter 2007 Report]; "Environmental Assessment Report Prepared for Application for Renewal of Radioactive Material License R04971, Waste Control Specialists LLC, Andrews County, Texas," Revision 0, Waste Control Specialists ("WCS") (July 3, 2008) [hereinafter 2008 Report].

[46] *See* 10 C.F.R. § 2.309(f)(1)(vi).

[47] Amended Contention 13 at 2.

[48] *Id.*

[49] ISP Answer at 8-10.

[50] *See* WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050 (rev. 2 July 2018) at 3-87 (Fig. 3.1-3) [hereinafter Environmental Report] (ADAMS Accession No. ML18221A405 (package)).

only "casual observations"[51] is refuted by a review of the 1997 Report itself. Not only were "environmental and ecological *surveys* conducted . . . to provide an unbiased assessment of the native flora and fauna immediately surrounding the core area,"[52] but five sites in the region were surveyed.[53] Moreover, as noted *supra,* the surveys were conducted by a team of five doctoral-level research scientists whose credentials were summarized,[54] and whose expertise Sierra Club does not dispute.

Likewise, Sierra Club purports to rely on statements in the 2004 Report regarding the locations of suitable habitat.[55] As ISP points out,[56] however, Sierra Club merely summarizes statements in the 2004 Report that are repeated, nearly word for word, in ISP's Environmental Report.[57] There is no conflict between the 2004 Report and ISP's Environmental Report.

Similarly, Sierra Club's claims concerning the 2007 Report demonstrate no such conflict. Sierra Club focuses on a statement in the 2007 Report that suitable habitat for the dunes sagebrush lizard does occur "in the area around the site"[58] and on the fact that the 2007 Report lists the Texas horned lizard as being observed at the LLRW site.[59]

However, ISP's Environmental Report addresses habitat in detail.[60] It concludes that, "although the area has some components of sand dune lizard habitat, various factors make it unsuitable."[61] As discussed in ISP's Environmental Report, these adverse factors include a high frequency of mesquite and grassland vegetation associations (which do not support dunes sagebrush lizard communities) and a low frequency of shinnery oak dunes and large blowouts (which provide the habitat and microhabitat necessary for the dunes sagebrush lizard's

---

[51] Amended Contention 13 at 2.

[52] 1997 Report at 3 (emphasis added).

[53] *Id.* at 7.

[54] *See id.* at 4, 108-09.

[55] Amended Contention 13 at 3.

[56] ISP Answer at 10-12.

[57] *Compare* 2004 Report at 6-7, *with* Environmental Report at 3-29 to -35.

[58] Amended Contention 13 at 3.

[59] *Id.*

[60] Sierra Club challenges ISP's drawing upon (in addition to the studies of its own property) studies that were conducted at the nearby National Enrichment Facility site (NEF) in New Mexico. Sierra Club Reply to ISP at 3-4; Sierra Club Reply to NRC Staff at 4-5. Sierra Club claims that "[a]ny reference to the New Mexico survey is completely irrelevant to the ISP facility." Sierra Club Reply to ISP at 4. As ISP explains, however, due to their close geographic proximity and comparable ecological resources, the ecology of ISP's proposed site is "highly comparable to that of the URENCO NEF." Environmental Report at 4-34. Moreover, "[t]he NEF was extensively studied during [the] NRC licensing process." *Id.*

[61] Environmental Report at 4-37.

survival).[62] Thus, ISP's Environmental Report directly addresses the potential for suitable habitat conditions in the area, but explains that such habitat areas are small and isolated from each other, and that field surveys have not identified any dunes sagebrush lizards on the site of ISP's proposed storage facility.[63] In contrast (and fully consistent with the 2007 Report), ISP's Environmental Report readily acknowledges that "[t]he Texas horned lizard has been reported as present on the property" (albeit not necessarily at the specific location of the proposed facility).[64]

Lastly, Sierra Club's discussion of the 2008 Report identifies no conflict with either the earlier studies or statements in ISP's Environmental Report. As disclosed in the Environmental Report, the 2008 Report was an environmental assessment prepared to support relicensing of the LLRW facility.[65] Although Sierra Club appears to challenge the scope of the 2008 Report,[66] it was never intended as a survey itself, but rather as a summary of the surveys described in the 1997, 2004, and 2007 Reports. In sum, no significant differences exist between the description of the affected environment in ISP's Environmental Report and the picture presented by the recently available studies.

Nor has Sierra Club demonstrated a genuine dispute as to the second question: that is, whether ISP's conclusions concerning the impact of its proposed facility are reasonable.

First, it is simply not the case, as Sierra Club alleges, that ISP's Environmental Report says the proposed storage facility would have "no impact" on the dunes sagebrush lizard or the Texas horned lizard. Rather, at most ISP claims that the impact would be "small."[67] And, in other respects, ISP candidly acknowledges potential adverse consequences, such as the fact that "[t]he Texas horned lizard is vulnerable to construction activities that could result in a direct loss of breeding habitat."[68]

Second, the affected property would constitute a small percentage of ISP's holdings and a small percentage of the suitable habitat throughout the region. As ISP's Environmental Report observes, in the general region of the proposed facility "there are several thousand acres of sand dune formation that would not be impacted by the project."[69] Moreover, neither the dunes sagebrush lizard nor

---

[62] *Id.* at 3-35.

[63] *Id.* at 3-34 to -37.

[64] *Id.* at 3-34. The NRC Staff reminds us that the site of the proposed storage facility comprises only 2.37 percent of the 14,000-acre WCS property. NRC Staff Answer at 12 n.67.

[65] Environmental Report at 3-40.

[66] *See* Amended Contention 13 at 3.

[67] Environmental Report at 4-38.

[68] *Id.* at 4-37.

[69] *Id.*

the Texas horned lizard is a threatened or endangered species under federal law, and only the Texas horned lizard is considered threatened under Texas state law.[70]

Finally, ISP's characterization of a "small" impact is further premised on two factual assumptions: "the Texas horned lizard and the sand dune lizard either do not occur on the [proposed facility site] or are highly adaptable."[71]

The likelihood that the dunes sagebrush lizard is not even present at the site of the proposed facility is consistent with ISP's recently available studies, as is the possibility that the Texas horned lizard is not present either. Neither species was specifically identified at the site in any survey, although the Texas horned lizard is considered widespread in the region.[72] That both species are "highly adaptable" is supported by the determination that these are "highly mobile species and may not be as susceptible to localized physical and chemical pollutants as other less mobile species such as invertebrates and aquatic species."[73] Plainly put, ISP posits that the species are "highly adaptable" because lizards have legs.

ISP's last conclusion — that, at the first sight of construction equipment, any resident lizards would likely scurry away to other nearby habitat — may find less support in any of ISP's cited studies than in common sense. But it is not unreasonable on its face. And, most importantly, Sierra Club fails to cite any facts or expert opinions — either its own or from ISP's recently available studies — to suggest that ISP's conclusion is not a reasonable one.[74] Accordingly, Sierra Club fails to raise a genuine dispute, as required by 10 C.F.R. § 2.309(f)(1)(vi).

Given unlimited time and resources, no doubt any environmental report could be improved. As directed by the Commission, however, we do not "flyspeck" applicants' environmental reports.[75] Provided its Environmental Report "comes to grips with all important considerations," ISP need do nothing more.[76]

Sierra Club's amended Contention 13 is not admissible.

---

[70] *Id.* at 3-34.

[71] *Id.* at 4-38.

[72] As summarized in ISP's Environmental Report, the Texas horned lizard was reported as present on the property controlled by WCS in previous surveys, and suitable habitat is present throughout much of the area. *Id.* at 3-34. The dunes sagebrush lizard was previously reported in the area northwest of the proposed facility, and areas to the west, north, northeast, south, and southeast have the potential to be suitable habitat. One juvenile lizard, presumed to be a dunes sagebrush lizard, was captured and released approximately 2.5 miles southeast of the proposed facility. *Id.* at 3-34 to -35.

[73] *Id.* at 4-38.

[74] *See* 10 C.F.R. § 2.309(f)(1)(v).

[75] *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 13 (2005).

[76] *Id.*

## III. ORDER

For the foregoing reasons:

A. ISP's motion to dismiss Contention 13 as moot is *granted.* Contention 13, as admitted by the Board, is *dismissed.*

B. Sierra Club's motion for leave to amend Contention 13 is *denied.*

Any appeal of this decision to the Commission shall be filed in conformity with 10 C.F.R. § 2.311.

It is so ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Paul S. Ryerson, Chairman
ADMINISTRATIVE JUDGE

Nicholas G. Trikouros
ADMINISTRATIVE JUDGE

Dr. Gary S. Arnold
ADMINISTRATIVE JUDGE

Rockville, Maryland
November 18, 2019

**Concurring Opinion of Judge Arnold**

I fully agree with the Board majority that Sierra Club's original Contention 13 is moot and that amended Contention 13 is not admissible. However, I respectfully disagree with the majority regarding one aspect of this order. The majority believes that Sierra Club's amended Contention 13 is based on new information that is materially different from previously available information. I disagree.

To establish good cause for filing a contention after the initial deadline for submitting contentions, an intervenor must, among other things, show that the new information upon which the amended contention is based is materially different from previously available information.[1] The majority does not find the information on which the amended contention is based to be both new and materially different. Rather, the majority finds that the previously available information has acquired the quality of credibility it previously did not, and that this credibility renders it materially different. That is, certain information in the Environmental Report consisted of unsupported statements, whereas the "new" (yet same) information is supported by study descriptions that were provided in the recently available documents. The majority considers this change in quality a material difference. I will not disagree. However, this difference is not identified by Sierra Club, and its amended contention does not depend on this change in information quality.

Sierra Club's motion to amend clearly discusses good cause for filing this motion after the initial contention deadline. Discussion of materially different information commences with the sentence, "(ii) [t]he information upon which the filing is based is materially different than information previously available."[2] This is followed by a two-page discussion in which Sierra Club cites the specific information it considers new and material. Specifically, this information states:

1) "The 1997 document, at page 3, states that it only considered species within one mile of the core area of the LLRW site."[3]

2) "Page 4 of [the 1997] document states that reptiles and amphibians were observed."[4]

3) "The 2004 document, at page 6, states that the sand dune lizard was observed in the area of the LLRW site."[5]

---

[1] *See* 10 C.F.R. § 2.309(c)(1)(ii).
[2] Sierra Club Motion to Amend at 2.
[3] *Id.*
[4] *Id.*
[5] *Id.*

4) "[T]he [2004] document, at page 7, states that there is no suitable habitat for the sand dune lizard within 1.5 km (1 mi) of the LLRW site."[6]

5) "The [2004] document goes on to state, however, that suitable sand dune lizard habitat exists west, north, northeast, south, and southeast of the LLRW site."[7]

6) "[T]he [2004] document states, at page 7, that the study area was a 3.1 mile radius of the LLRW site and that the two lizard species occur within that area."[8]

7) "The 2007 document, at page 59, as in the previous documents, states that the sand dune lizard does not occur on the site of the LLRW project, but suitable habitat does occur in the area around the site."[9]

8) "A table on page 60 of the 2007 document lists the Texas horned lizard as being observed on the LLRW site."[10]

9) "Pages 11-12 of the [2008] document mention the horned lizard and dunes sagebrush lizard but it simply says that the horned lizard is in the area and there is no dunes sagebrush lizard habitat on the site."[11]

Sierra Club concludes the list of differences, summarizing, "[t]his is the very information that the ASLB said was missing and to which Sierra Club was entitled in order to adequately evaluate the information in the [Environmental Report]. Therefore, this is material information that was not previously available."[12]

In response, ISP's answer to this motion details how each of these statements was previously available in the Environmental Report, either in words nearly identical to the recently provided document or in a paraphrased form.[13]

The Board considers the information materially different because it is now information supported by documented surveys and does not just consist of unsupported statements in the Environmental Report. However, Sierra Club has not advanced this concept of materially different. Sierra Club simply states that

---

[6] *Id.*
[7] *Id.*
[8] *Id.* at 3.
[9] *Id.*
[10] *Id.*
[11] *Id.*
[12] *Id.*
[13] ISP Answer at 10-14.

this information was provided following Board action, so it is thus new and material.

The facts concerning the lizards are the same in both the Environmental Report and the new supporting documents. The amended contention is based on information and facts that ISP has shown to be the same in the Environmental Report and the supporting survey documents. The contention is not *based* on the material difference discerned by the Board.

When ISP supplemented its Environmental Report with copies of (or ADAMS accession numbers for) the studies referenced in section 3.5.16 of the Environmental Report, new and materially different information was provided.[14] However, this new and material information consists of the description of the studies, which provides support for certain conclusory statements previously made in the Environmental Report. Further, this information did indeed alter the quality of the conclusory statements in the Environmental Report as agreed by the majority. However, it is the survey information that is new and material, not the conclusory statements. Sierra Club's argument concerning new and material information focuses on conclusory statements and neglects the real new and material information provided by the surveys. Every alleged fact used by Sierra Club to support the amended contention was available from the Environmental Report. Therefore, I cannot conclude that Sierra Club has established that its amended Contention 13 is based on new information that is materially different from previously available information. Thus, Sierra Club has not established good cause for its motion.

[14] *See* ISP Letter Providing Supplemental References.

# Tab 18

Cite as 90 NRC 358 (2019) **LBP-19-11**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**ATOMIC SAFETY AND LICENSING BOARD**

**Before Administrative Judges:**

**Paul S. Ryerson,** Chairman
**Nicholas G. Trikouros**
**Dr. Gary S. Arnold**

**In the Matter of** **Docket No. 72-1050-ISFSI**
**(ASLBP No. 19-959-01-ISFSI-BD01)**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **December 13, 2019**

This proceeding concerns the application of Interim Storage Partners LLC to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in Andrews County, Texas. The Board considered a motion by Sustainable Energy and Economic Development Coalition (SEED) for leave to late-file SEED Contention 17. The Board denies SEED's motion and terminates this proceeding.

**RULES OF PRACTICE: CONTENTIONS (GOOD CAUSE)**

Any petitioner that proffers a new or amended contention after the initial deadline for hearing requests must demonstrate good cause for doing so.

**RULES OF PRACTICE: CONTENTIONS (GOOD CAUSE)**

To establish good cause, a petitioner must show that (1) the information upon which the new or amended contention is based was not previously available; (2) the information upon which the contention is based is materially different from

information previously available; and (3) the contention has been submitted in a timely fashion after the new information on which it is based becomes available.

**RULES OF PRACTICE: CONTENTIONS (NEW INFORMATION)**

Previously available information that has merely been collected, summarized, and placed into context does not qualify as "new information."

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

An admissible contention must, among other things, (1) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes; and (2) state the alleged facts or expert opinions that support the petitioner's position.

**RULES OF PRACTICE: CONTENTIONS (SCOPE)**

A contention must raise an issue that is within the scope of the proceeding.

## MEMORANDUM AND ORDER
**(Ruling on Motion for Leave to File Late-Filed Contention and Terminating Proceeding)**

Before the Board is a motion by Sustainable Energy and Economic Development Coalition (SEED) for leave to file a late-filed contention (SEED Contention 17).[1] We deny SEED's motion because it fails to meet the requirements of 10 C.F.R. §§ 2.309(c)(1) and 2.309(f)(1). There being no other contention pending, this proceeding is terminated.

### I. BACKGROUND

The background of this proceeding is set forth in detail in the Board's August 23, 2019 Memorandum and Order,[2] but is summarized below.

In April 2016, Waste Control Specialists LLC (WCS) submitted an application to the Nuclear Regulatory Commission (NRC) for a license to construct and

[1] Motion of Intervenor Sustainable Energy and Economic Development Coalition for Leave to File Late-Filed Contention, and Contention 17 (Oct. 23, 2019) [hereinafter SEED Motion to File].

[2] LBP-19-7, 90 NRC 31, 42-47 (2019), *appeal pending*; *see also* LBP-19-9, 90 NRC 181 (2019).

operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in Andrews County, Texas.[3] A year later, WCS asked the NRC to suspend consideration of its application.[4] Thereafter, WCS merged with Orano CIS LLC to form Interim Storage Partners LLC (ISP).[5]

In June 2018, ISP submitted a revised license application,[6] and the NRC published a *Federal Register* notice that permitted the public to request a hearing and petition to intervene.[7] SEED jointly submitted a timely hearing request,[8] as did several other petitioners. After briefing, the Board heard oral argument in Midland, Texas concerning petitioners' standing and the admissibility of their contentions.[9]

In LBP-19-7, we denied SEED's hearing request and the hearing requests of all other petitioners except Sierra Club.[10] Although we concluded that SEED had not proffered an admissible contention, we found that SEED had established standing.[11]

---

[3] Waste Control Specialists LLC, Application for a License for a Consolidated Interim Spent Fuel Storage Facility (Apr. 28, 2016) (ADAMS Accession No. ML16133A100).

[4] Joint Request to Withdraw the *Federal Register* Notice Providing an Opportunity to Submit Hearing Requests (Apr. 19, 2017), Attach. 1, Letter from Rod Baltzer, WCS President and CEO, to NRC Document Control Desk (Apr. 18, 2017) (ADAMS Accession No. ML17109A480).

[5] Interim Storage Partners LLC License Application, Docket 72-1050, Andrews County, Texas, (rev. 2 July 2018) at 1-1, 1-4 (ADAMS Accession No. ML18206A483) [hereinafter ISP License Application].

[6] Letter from Jeffery D. Isakson, ISP, to NRC Document Control Desk (June 8, 2018) (ADAMS Accession No. ML18166A003).

[7] Interim Storage Partners Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44,070, 44,070-75 (Aug. 29, 2018), *corrected,* 83 Fed. Reg. 44,680 (Aug. 31, 2018) (correcting the deadline date for petitioners to request a hearing to October 29, 2018). The Secretary of the Commission later extended this deadline to November 13, 2018. Order of the Secretary (Oct. 25, 2018) at 2.

[8] Petition of Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition and Leona Morgan, Individually, to Intervene, and Request for an Adjudicatory Hearing (Nov. 13, 2018).

[9] Licensing Board Notice and Order (Establishing Dates and Location of Oral Argument) (May 24, 2019) at 1 (unpublished).

[10] LBP-19-7, 90 NRC at 39.

[11] *Id.* The NRC Staff argues (in a footnote) that "SEED should have submitted affidavits to demonstrate that it continues to meet the criteria for standing in this proceeding." NRC Staff Answer in Opposition to Sustainable Energy and Economic Development Coalition's New Contention 17 (Nov. 18, 2019) at 10 n.45 [hereafter NRC Staff Answer]. ISP concedes (subject to its pending appeal of LBP-19-7) that it "does not challenge [SEED's Motion to File] on standing grounds." Interim Storage Partners LLC's Answer Opposing Petitioner Sustainable Energy and Economic Development Coalition's Motion for Leave to Submit Late-Filed Contention 17 (Nov. 18, 2019)

*(Continued)*

Thereafter, the Board dismissed Sierra Club's sole admitted contention.[12] Before we did so, however, SEED submitted the motion now before us. SEED asks permission to file out of time Contention 17, which states:

> The Environmental Report for the ISP/WCS [consolidated interim storage facility] fails to satisfy NEPA in light of findings in a 2019 report published by the U.S. Nuclear Waste Technical Review Board. The NWTRB, as principal scientific and engineering governmental advisory panel for [spent nuclear fuel] disposition, has concluded that 50 to 80 years will be necessary for DOE to prepare for and accomplish the transportation of spent nuclear fuel to the ISP/WCS facility in west Texas. The NWTRB also found that the lead time needed for resolution for associated technical issues related to transport of the vast majority of the [spent nuclear fuel] is 10 years or more; that the NRC lacks data to establish a technical basis for the long-term storage of high-burnup [spent nuclear fuel] and reliability of its fuel cladding under high burnup conditions and will not have results of a DOE study presently under way for about 7 more years; and that there is inadequate data as yet to determine whether high burnup [spent nuclear fuel] can withstand the rigors of long-distance transportation. Mitigation plans and the discussion of alternatives to shipment of all [spent nuclear fuel] within a 20-year period consequently have not been sufficiently addressed and disclosed as required by NEPA.[13]

According to SEED, the findings in a September 23, 2019 report of the U.S. Nuclear Waste Technical Review Board[14] "vindicate and go beyond the problems raised in SEED Coalition's earlier contentions,"[15] which the Board ruled inadmissible in LBP-19-7.[16]

---

at 6 n.24 [hereafter ISP Answer]. But, in a second footnote, ISP points out that "to the extent SEED (which was previously denied party status) is required to reestablish (or affirm continued) standing under 10 C.F.R. § 2.309(c), it has not done so." *Id.* at 12 n.52. The Board has examined the cases cited by the Staff and by ISP and concludes that none involved similar circumstances. *See, e.g., Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), CLI-93-4, 37 NRC 156, 162-63 (1993) (explaining that petitioner sought to re-intervene in a proceeding in which its most recent filing had been submitted "well over 4 years ago"). Because SEED submitted its Motion to File just two months after the Board's initial ruling on standing, we do not require SEED to demonstrate standing all over again.

[12] LBP-19-9, 90 NRC at 182, 185.

[13] SEED Motion to File at 5.

[14] "Preparing for Nuclear Waste Transportation: Technical Issues That Need to Be Addressed in Preparing for a Nationwide Effort to Transport Spent Nuclear Fuel and High-Level Radioactive Waste," 23 *U.S. Nuclear Waste Technical Review Board* (Sept. 23, 2019) (ADAMS Accession No. ML19297D146) [hereinafter NWTRB Report].

[15] Seed Motion to File at 5.

[16] SEED Contention 17 revisits issues that were initially raised (and ruled inadmissible) in Joint Petitioners Contentions 1, 4, and 11. *See* LBP-19-7, 90 NRC at 87-89, 91-93, 101-03.

Both ISP and the NRC Staff oppose SEED's motion.[17]

## II. ANALYSIS

### A. Good Cause

Any petitioner that proffers a new or amended contention after the initial deadline for hearing requests must demonstrate good cause for doing so.[18] To establish good cause, a petitioner must show that (1) the information upon which the new or amended contention is based was not previously available; (2) the information upon which the contention is based is materially different from information previously available; and (3) the contention has been submitted in a timely fashion after the new information on which it is based becomes available.[19]

It is not disputed that SEED has satisfied the third requirement. In accordance with the Board's Initial Scheduling Order,[20] SEED proffered Contention 17 within 30 days of publication of the NWTRB Report on which Contention 17 relies.

Both ISP and the NRC Staff argue, however, that the information in the NWTRB Report on which SEED relies was either previously available or not materially different from information that was previously available.[21] We agree.

The NWTRB Report does not purport to document any new scientific or engineering research. Rather, as required by the Nuclear Waste Policy Amendments Act of 1987,[22] the purpose of the NWTRB Report is to review the Department of Energy's (DOE's) preparedness to transport spent nuclear fuel and high-level radioactive waste.[23]

In undertaking this review, the NWTRB Report relies on and cites approximately 150 earlier references.[24] Indeed, the Report explicitly acknowledges that, in identifying the issues that its recommendations address, the NWTRB drew upon such earlier sources. These included both issues that the NWTRB itself had

---

[17] ISP Answer; NRC Staff Answer. SEED filed a timely reply. *See* Reply of Intervenor Sustainable Energy and Economic Development Coalition in Support of Litigation of Proposed Contention 17 (Nov. 25, 2019) [hereinafter SEED Reply].

[18] *See* 10 C.F.R. § 2.309(c)(1).

[19] *See id.* § 2.309(c)(1)(i)-(iii).

[20] Licensing Board Order (Initial Scheduling Order) (Oct. 16, 2019) at 4 (unpublished).

[21] ISP Answer at 8-12; NRC Staff Answer at 6-9.

[22] Nuclear Waste Policy Amendments Act of 1987, Pub. L. No. 100-203, § 5051, 101 Stat. 1330-248 (1987) or 2 U.S.C. §§ 10261-10270.

[23] NWTRB Report at 1.

[24] *Id.* at 107-17.

previously identified "during past Board public meetings, technical workshops, and Board reports" (spanning 2012-2018) and "[a]dditional relevant technical issues" that had been previously "identified and documented" in reports and presentations by DOE, the United States nuclear industry, and researchers in other countries.[25] All or virtually all of these original sources were publicly available before September 2019.[26]

For example, SEED Contention 17 claims that, according to the NWTRB Report, some nuclear waste could not be removed from all commercial reactor sites within the 20-year timeframe contemplated by ISP's Environmental Report or even within the 40-year term of the license ISP is requesting.[27] According to SEED, the NWTRB Report makes the "critical determination" that, because of increased use of high burnup fuel and storage of spent fuel in large canisters, DOE could not remove spent fuel from "all nuclear power plants" for some period of time.[28] Specifically, the NWTRB Report states that, even if the spent fuel were repackaged into smaller canisters, DOE likely could not remove all such fuel until approximately 2070.[29] And, as SEED quotes from the Report, without repackaging "some of the largest [spent nuclear fuel] canisters, storing the hottest [spent nuclear fuel] would not be cool enough to meet the transportation requirements until approximately 2100."[30]

As the NWTRB Report acknowledges, however, these same conclusions were first presented at an NWTRB public workshop in 2013.[31] Because this information was publicly available years ago, SEED fails to show good cause for failing to raise this aspect of Contention 17 earlier.

Likewise, SEED's claim that ISP's Environmental Report fails to address what it calls "the DOE mandate of standardized transportation, aging and disposal (TAD) canisters"[32] most clearly is not based on new information. This is essentially the same claim SEED initially proffered in Joint Petitioners Contention 4, which we previously rejected as being outside the scope of this proceeding.[33] Moreover, in supporting this claim, SEED primarily relies on a 2006

---

[25] *Id.* at 23.

[26] *See id.* at 107-17.

[27] SEED Motion to File at 8.

[28] *Id.* at 7-8.

[29] NWTRB Report at 77.

[30] SEED Motion to File at 8.

[31] NWTRB Report at 77. The Report cites as authority a November 2013 presentation at a public NWTRB technical workshop by Jeffrey Williams, the director of DOE's Nuclear Fuels Storage and Transportation Planning Project. Mr. Williams' discussion of the timeframe for transporting all spent nuclear fuel from reactor sites appears at page 54 of the workshop transcript, which is publicly available at https://www.nwtrb.gov/docs/default-source/meetings/2013/november/13nov18.pdf?sfvrsn=9.

[32] SEED Motion to File at 6.

[33] *See* LBP-19-7, 90 NRC 91-93.

DOE *Federal Register* notice and DOE's 2008 Supplemental Environmental Impact Statement for Yucca Mountain[34] — documents that were available more than a decade ago.

In its reply, SEED argues that it was free to ignore an analysis presented at a public NWTRB workshop in 2013 by "a sole member of the NWTRB."[35] Rather, SEED claims, only when that analysis became the "official" position of the NWTRB was SEED required to pay attention and submit a contention based on it.[36] The NRC recognizes no such distinction.[37] Moreover, ironically, the Declaration of SEED's own supporting expert cites and relies on the very same 2013 NWTRB workshop presentation that SEED now claims was of no consequence.[38]

For the most part, the Declaration of SEED's expert, Robert Alvarez, merely repeats conclusions in the NWTRB Report. But his Declaration also demonstrates that SEED Contention 17 is based on facts and theories that were available long before the contention was filed. For example, Mr. Alvarez states that the NWTRB "concluded in 2016 that the Nuclear Regulatory Commission and the Energy Department lack a technical basis in support of the safe transport of high burnup [spent nuclear fuel]."[39] Indeed, Mr. Alvarez cites his own work in 2013 for the proposition that "[h]igh burnup fuel temperatures make the used fuel more vulnerable to damage from handling."[40]

Mr. Alvarez's Declaration similarly confirms that SEED's claims regarding repacking spent fuel for eventual transmission to a DOE permanent repository merely repeat concerns that were expressed years ago. Mr. Alvarez quotes from a 2013 DOE study cautioning that "[d]irect disposal of the large canisters currently used by the commercial nuclear power industry is beyond the current experience base globally" and "represents significant engineering and scientific challenges."[41] He quotes a 2013 NWTRB staff report asserting that "repackaging the [spent nuclear fuel] may be a lengthy process and could impact operational schedules at the utility sites, at a consolidated storage facility, or at the reposi-

---

[34] *See* SEED Motion to File at 6-7.

[35] SEED Reply at 2.

[36] *Id.* at 2-3.

[37] On the contrary, the Commission has expressly stated that a petitioner may not delay filing a contention "until a document becomes available that collects, summarizes and places into context the facts supporting that contention." *See Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), CLI-10-27, 72 NRC 481, 496 (2010).

[38] *See* Declaration of Robert Alvarez in Support of Motion of Intervenor Sustainable Energy and Economic Development Coalition for Leave to File Late-Filed Contention (Oct. 23, 2019) at 2 n.8 [hereinafter Alvarez Declaration].

[39] *Id.* at 1.

[40] *Id.* at 6 n.26.

[41] *Id.* at 8.

tory, depending on where repackaging is performed."[42] He quotes a 2014 GAO report for the proposition that "casks and canisters being used by the power utilities will be at least partially, and maybe largely, incompatible with future transport and repository requirements, meaning that some if not all, of the [used nuclear fuel] that is moved to dry storage by the utilities will ultimately need to be repackaged."[43]

Indeed, SEED concedes that its claim about the need for repackaging spent fuel is not "new" in any conventional sense.[44] But, SEED argues, "with the weight of the NWTRB behind it," this claim is "'new' in the sense that it can't simply be ignored any longer."[45] Again, the NRC recognizes no such distinction.

SEED fails to demonstrate that Contention 17 is based on new and materially different information, as required by 10 C.F.R. § 2.309(c)(1).

### B. Contention Admissibility

Even if SEED had demonstrated good cause for proffering Contention 17 after the initial deadline for filing a hearing petition, Contention 17 would also have to satisfy the NRC's usual requirements for contention admissibility.[46] Although we do not adjudicate disputed facts at this stage, an admissible contention must (1) show that a genuine dispute exists on a material issue of law or fact by referring to specific portions of the application that the petitioner disputes; and (2) state the alleged facts or expert opinions that support the petitioner's position.[47] Moreover, among other things, a contention must raise an issue that is within the scope of the proceeding.[48]

SEED fails to raise a genuine dispute with ISP's application, as required by 10 C.F.R. § 2.309(f)(1)(vi). Contrary to SEED's claims, the findings of the NWTRB Report do not contradict ISP's plans.

DOE's statutory responsibility to store the nation's spent nuclear fuel at a permanent repository (and hence eventually to implement a "national transportation program for nuclear waste"[49]) is not ISP's responsibility. Rather, ISP, a

[42] *Id.* at 8-9.
[43] *Id.* at 9.
[44] SEED Motion to File at 19.
[45] *Id.*
[46] *See* 10 C.F.R. § 2.309(f)(1).
[47] *Id.* § 2.309(f)(1)(v)-(vi).
[48] *Id.* § 2.309(f)(1)(iii).
[49] NWTRB Report at 3.

private applicant, seeks NRC authorization to possess and store 5,000 metric tons of spent nuclear fuel at an interim storage facility.[50]

According to SEED's own expert, nuclear power reactors in the United States have generated more than 80,000 tons of such fuel — a number that is only increasing.[51] As the NWTRB Report acknowledges, most of "the existing dry-storage casks and canisters for commercial [spent nuclear fuel] have been designed and approved for both storage and transportation."[52] Accordingly, while the NWTRB concludes that some technical issues must be resolved "before the nation's *entire* inventory of waste can be transported,"[53] it agrees that not all such issues "must be resolved before the first of the waste can be transported."[54]

Contrary to 10 C.F.R. § 2.309(f)(1)(v), therefore, the NWTRB Report does not support SEED's suggestion that 5,000 (out of 80,000) metric tons of spent nuclear fuel could not possibly be moved to ISP's facility within the term of the license ISP is requesting. And even if it did, as ISP points out[55] that would simply mean that its proposed facility would likely not be built. As we stated in LBP-19-7, the NRC is not concerned with the commercial viability of the facilities it licenses, because the business decision whether to use a license has no bearing on a licensee's ability to safely conduct the activities the license authorizes.[56]

SEED claims that "[t]he NWTRB has identified several flaws and/or weaknesses in DOE's role in the development of the ISP/WCS [interim storage facility] which change the expected timing and sequencing of [spent nuclear fuel] storage activity at the facility."[57] But neither DOE nor the NWTRB has any role in the NRC's licensing process for ISP's proposed facility.

As explained *supra,* the NWTRB's responsibility under the Nuclear Waste Policy Amendments Act of 1987 is to "evaluate the technical and scientific validity of activities undertaken by the Secretary [of Energy] . . . including activities relating to the packaging or transportation of high-level radioactive waste

---

[50] Because of the likelihood that ISP will seek license amendments, its Environmental Report analyzed the impacts of storing up to 40,000 metric tons of spent fuel, to be received under separate license amendments over a period of 20 years. *See* WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050 (rev. 2 July 2018) at 1-1 (ADAMS Accession No. ML18221A405 (package)) [hereinafter Environmental Report]. The application under review, however, would authorize storage of only 5,000 metric tons, and the only term limit for receiving the spent fuel would be the term of the initial license itself: that is, 40 years.

[51] Alvarez Declaration at 3.

[52] NWTRB Report at 73.

[53] *Id.* at xxiii (emphasis added).

[54] *Id.*

[55] ISP Answer at 17.

[56] *See* LBP-19-7, 90 NRC at 57.

[57] SEED Motion to File at 20.

or spent nuclear fuel."[58] The NWTRB does not license private spent fuel transportation systems; the NRC does. Contrary to SEED's claims,[59] the NWTRB has no ability to "effectively revise the scope" of ISP's project or of this adjudication.

ISP's Environmental Report confirms that spent nuclear fuel will be transported to ISP's proposed facility only in transportation packages that are approved and certified as safe by the NRC under 10 C.F.R. Part 71.[60] ISP's license application lists the specific, currently approved packages it proposes to accept for storage.[61] ISP's application, however, is for a storage facility under Part 72, not for a transportation system under Part 71. Responsibility for transporting spent nuclear fuel to ISP's proposed facility (including any repackaging required for such transportation) would lie with the title holders of the fuel, not with ISP.

Contrary to 10 C.F.R. § 2.309(f)(1)(iii), any challenge to the safety of NRC-approved transportation packages is outside the scope of this proceeding, as we ruled in LBP-19-7.[62] Although 10 C.F.R. § 72.108 requires consideration of transportation impacts in ISP'S Environmental Report, section 72.108 "does not require that the environmental report prove the safety of transportation packages," because 10 C.F.R. Part 71 separately addresses these issues.[63]

SEED fails to address, much less challenge, the parts of ISP's Environmental Report that do, in fact, analyze the potential environmental impacts associated with transportation of spent nuclear fuel (including high burnup fuel).[64] Likewise (and as we determined in connection with the contentions SEED initially proffered), SEED fails to acknowledge or dispute any safety analyses, aging management plans or quality assurance programs described in ISP's application, including provisions that specifically address how ISP proposes to address the challenges posed by high burnup fuel.[65]

Accordingly, SEED Contention 17 again fails to raise a genuine dispute on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(vi). Rather than address what ISP's application says, SEED mounts a generalized attack on the adequacy of the NRC's regulations.

For example, SEED claims that such safety-related transportation issues as "the travel-worthiness of high burnup [spent nuclear fuel] and its potential dam-

---

[58] NWTRB Report at 1.

[59] SEED Motion to File at 20.

[60] Environmental Report at 1-8.

[61] ISP License Application at 2-1.

[62] LBP-19-7, 90 NRC at 81.

[63] *Holtec International* (HI-STORE Consolidated Interim Storage Facility), LBP-19-4, 89 NRC 353, 415 (2019) (citation omitted), *appeal pending*.

[64] *See, e.g.,* Environmental Report at 4-9 to -10, 4-12, 4-16, 4-23.

[65] *See* LBP-19-7, 90 NRC at 102.

age from shipping" and "when to require standardized TAD canisters" must be addressed in the Environmental Report for a consolidated interim storage facility under Part 72.[66] SEED makes such claims even though ISP has committed to accepting at its facility only transportation packages that have been approved by the NRC and licensed under Part 71.

In essence, such claims try to expand a Part 72 application process into a dispute over the adequacy of the NRC's Part 71 requirements. Plainly, these claims are outside the scope of this Part 72 proceeding, in contravention of 10 C.F.R. § 2.309(f)(1)(iv). And, insofar as they attack Commission regulations without seeking a waiver, SEED's claims violate 10 C.F.R. § 2.335 as well.

SEED's challenge to what it calls "ISP's dogmatic refusal to have dry transfer system ('DTS') capability on site"[67] is similar. As we explained in LBP-19-7, "ISP's application does not set forth any intent to repackage spent fuel or any analysis of the costs of repackaging the fuel, and the Continued Storage Rule does not require a spent fuel storage facility applicant under Part 72 to include such an analysis beyond the license term."[68]

If SEED believes the NWTRB Report warrants revisions in the NRC's rules and regulations, it may petition the Commission.[69] In this adjudicatory proceeding, however, the Board applies the Commission's rules, and has no authority to change them.

SEED Contention 17 is not admissible.

## III. ORDER

For the foregoing reasons:

A. SEED's motion for leave to late-file Contention 17 is *denied.*

B. This proceeding is *terminated.* As this decision terminates this proceeding before the Board, any appeal to the Commission shall be filed in conformity with 10 C.F.R. § 2.311.

---

[66] SEED Motion to File at 16.

[67] SEED Reply at 6.

[68] LPB-19-7, 90 NRC at 92.

[69] *See* 10 C.F.R. § 2.802.

It is so ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Paul S. Ryerson, Chairman
ADMINISTRATIVE JUDGE

Nicholas G. Trikouros
ADMINISTRATIVE JUDGE

Dr. Gary S. Arnold
ADMINISTRATIVE JUDGE

Rockville, Maryland
December 13, 2019

# Tab 19

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | |
|---|---|
| In the Matter of<br><br>INTERIM STORAGE PARTNERS LLC<br><br>(WCS Consolidated Interim Storage Facility) | Docket No. 72-1050-ISFSI |

**ORDER**

On May 18, 2020, Fasken Land and Minerals, Ltd. and Permian Basin Land and Royalty Owners submitted an unopposed request to extend the deadline to file petitions to intervene, new or amended contentions, or hearing requests based on information in the Draft Environmental Impact Statement (DEIS) issued for the proposed WCS Consolidated Interim Storage Facility.[1] Pursuant to my authority under 10 C.F.R. § 2.346(b), petitions to intervene, hearing requests, and motions to admit contentions challenging the DEIS will be deemed timely if filed on or before July 6, 2020. This order does not affect any other requirement relating to the admission of contentions filed after the deadline under 10 C.F.R. § 2.309(c) or relating to motions to reopen under 10 C.F.R. § 2.326.

[1] *Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners' Unopposed Motion to Extend Deadlines Pending the Covid-19 National Emergency* (May 18, 2020).

IT IS SO ORDERED.

For the Commission

Annette L. Vietti-Cook

Digitally signed by Annette L. Vietti-Cook
Date: 2020.05.22 15:01:06 -04'00'

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 22nd day of May 2020

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| INTERIM STORAGE PARTNERS LLC | ) | Docket No. 72-1050-ISFSI |
| | ) | |
| (WCS Consolidated Interim Storage Facility) | ) | |
| | ) | |

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **ORDER (Extending Time to Intervene, Request for Hearing, and File New Contentions)** have been served upon the following persons by the Electronic Information Exchange:

U.S. Nuclear Regulatory Commission
Office of Commission Appellate Adjudication
Mail Stop: O16-B33
Washington, DC 20555-0001
E-mail: ocaamail.resource@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the Secretary of the Commission
Mail Stop: O16-B33
Washington, DC 20555-0001
Hearing Docket
E-mail: Hearing.Docket@nrc.gov

U.S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
Washington, DC 20555-0001

Paul S. Ryerson, Chair
Administrative Judge
E-mail: paul.ryerson@nrc.gov

Nicholas G. Trikouros
Administrative Judge
E-mail: nicholas.trikouros@nrc.gov

Dr. Gary S. Arnold
Administrative Judge
E-mail: gary.arnold@nrc.gov

Ian Curry, Law Clerk
Stephanie Fishman, Law Clerk
Molly Mattison, Law Clerk
Taylor Mayhall, Law Clerk
E-mail: ian.curry@nrc.gov
stephanie.fishman@nrc.gov
molly.mattison@nrc.gov
taylor.mayhall@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the General Counsel
Mail Stop - O-14A44
Washington, DC 20555-0001
Joe Gillespie, Esq.
Sara Kirkwood, Esq.
Mauri Lemoncelli, Esq.
Nicholas Moran, Esq.
Patrick Moulding, Esq.
Kevin Roach, Esq.
Carrie Safford, Esq.
Thomas Steinfeldt
Alana Wase, Esq.
Brian Newell, Senior Paralegal
E-mail: joe.gillespie@nrc.gov
sara.kirkwood@nrc.gov
mauri.lemoncelli@nrc.gov
nicholas.moran@nrc.gov
patrick.moulding@nrc.gov
kevin.roach@nrc.gov
carrie.safford@nrc.gov
thomas.steinfeldt@nrc.gov
alana.wase@nrc.gov
brian.newell@nrc.gov

Counsel for Beyond Nuclear

Diane Curran, Esq.
Harmon, Curran, Spielberg and Eisenberg
1725 DeSales Street NW, Suite 500
Washington, DC 20036
E-mail: dcurran@harmoncurran.com

Mindy Goldstein, Esq.
Emory University School of Law
Turner Environmental Law Clinic
1301 Clifton Road
Atlanta, GA 30322
E-mail: magolds@emory.edu

Nuclear Information and
Resource Service (NIRS)
Diane D'Arrigo
6930 Carroll Avenue
Suite 340
Takoma Park, MD 20912
Email: dianed@nirs.org

Chris Hebner, Esq.
City of San Antonio, TX
P.O. Box 839966
San Antonio, TX 78283
E-mail: chris.hebner@sanantonio.gov

Counsel for Sierra Club
Wallace Taylor
4403 1st Avenue S.E.
Suite 402
Cedar Rapids, IA 52402
E-mail: wtaylorlaw@aol.com

Counsel for Don't Waste Michigan, et al
Terry Lodge, Esq.
316 N. Michigan Street
Suite 520
Toledo, OH 43604
E-mail: tjlodge50@yahoo.com

Sustainable Energy and
Economic Development (SEED) Coalition
Karen D. Hadden
Executive Director,
605 Carismatic Lane
Austin, TX 78748
E-mail: karendhadden@gmail.com

Counsel for Interim Storage Partners LLC
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Avenue NW
Washington, DC 20004
Grant Eskelsen, Esq.
Timothy Matthews, Esq.
Ryan Lighty, Esq.
Paul Bessette, Esq.
E-mail: grant.eskelsen@morganlewis.com
timothy.matthews@morganlewis.com
ryan.lighty@morganlewis.com
paul.bessette@morganlewis.com

Counsel for Fasken Land and Oil and
Permian Basin Land and Royalty Owners

Monica R. Perales, Esq.
6101 Holiday Hill Road
Midland, TX 79707
E-mail: monicap@forl.com

Kanner & Whiteley, LLC
701 Camp Street
New Orleans, LA 70130
Allan Kanner, Esq.
Elizabeth Petersen, Esq.
Cynthia St. Amant, Esq
Conlee Whiteley, Esq .
E-mail: a.kanner@kanner-law.com
e.petersen@kanner-law.com
c.stamant@kanner-law.com
c.whiteley@kanner-law.com

Clara I. Sola Digitally signed by Clara I. Sola
Date: 2020.05.22 15:07:40
-04'00'

Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 22nd day of May 2020

# Tab 20

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC | Docket No. 72-1050 |
| | July 6, 2020 |
| (Consolidated Interim Storage Facility) | |

**FASKEN LAND AND MINERALS, LTD.'S AND PERMIAN BASIN LAND AND ROYALTY OWNERS MOTION TO REOPEN THE RECORD**

Now comes Fasken Oil and Ranch Ltd. ("Fasken") and Permian Basin Land and Royalty Owners ("PBLRO") (collectively "Joint Petitioners" or "Petitioners"),[1] by and through undersigned counsel, who respectfully move the Atomic Safety Licensing Board ("ASLB") and/or the United States Nuclear Regulatory Commission ("NRC") to reopen the record in the above-captioned matter and in support of same states as follows:

1. In June of 2018, Interim Storage Partners LLC ("ISP") submitted a revised license application and the NRC published a Federal Register Notice that permitted interested members of the public to request a hearing and petition to intervene.[2]

2. On October 29, 2018, Petitioners submitted a timely hearing request and four contentions relating to ISP proposed consolidated interim storage facility ("CISF") in Andrews Texas.[3] After hearing, in LBP-19-07, the Board denied Petitioners hearing request, finding Petitioners had demonstrated standing but not proffered an admissible contention.[4]

3. Subsequently, Petitioners along with other interested parties filed an appeal of LBP-19-07, which is pending before the Commission.[5]

---

[1] Fasken is a founding member of the Permian Basin Coalition of Land and Royalty Owners and Operators ("PBLRO").

[2] *See* Letter from Jeffery Isakson, ISP, to Document Control Desk, NRC, *Submittal of License Application Revision 2 and Request to Restart Review of Application for Approval of the WCS CISF*, Docket 72- 1050 (June 8, 2018) (ML18166A003). Letter from Jeffery Isakson, ISP, to Document Control Desk, NRC (July 19, 2018) (ML18206A482) (updated submittal); Interim Storage Partner's Waste Control Specialists Consolidated Interim Storage Facility, Revised License Application; Opportunity to Request a Hearing and to Petition for Leave to Intervene; Order Imposing Procedures, 83 Fed. Reg. 44,070, 44,070–75 (Aug. 29, 2018), corrected, 83 Fed. Reg. 44,680 (Aug. 31, 2018) (correcting the deadline date for petitioners to request a hearing to October 29, 2018). The Secretary of the Commission later extended this deadline to November 13, 2018. Order of the Secretary (Oct. 25, 2018) (ML18298A335) at 2 (unpublished).

[3] *Petition of Permian Basin Land and Royalty Organization and Fasken Land and Minerals for Intervention and Request for Hearing* (Oct. 29, 2018) (ML18302A412).

[4] *See* ASLB "Memorandum and Order" LBP-19-07 (August 23, 2019) (ADAMS Accession No. ML19235A165).

[5] *See e.g.* Fasken And PBLRO's Brief on Appeal of LBP-19-07 (Sept. 17, 2019) (ML19260J386).

4. On January 21, 2020, Fasken then filed a motion for leave to file amended Contention No. 4, relating to groundwater and subsurface properties, concurrently with a motion to reopen the record.[6] A decision and order has not yet been filed relating to same.

5. On May 22, 2020 the Secretary of the Commission issued an Order stating "Petitions to intervene, hearing requests, and motions to admit contentions challenging the ISP draft environmental impact statement" ("ISP DEIS") will be deemed timely if filed on or before July 6, 2020."[7]

6. It is unclear if Petitioners are required to file another motion to reopen the record under the circumstances, but out of an abundance file the foregoing Motion to Reopen the Record ("Motion to Reopen") concurrently with the attached Affidavit of A. Kanner and Petitioners' Motion for Leave to File New Contention No. 5 ("Motion for Leave"),.

7. 10 C.F.R. § 2.326 sets forth the requirements for reopening the record: (1) a motion to reopen the record must be timely; (2) the motion must address a significant safety or environmental issue; and (3) the motion must demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially.

8. NRC regulations do not expressly define a time period under 10 C.F.R. § 2.309(c)(1) that is considered "timely," however, the Commission has found 30 to 60 days to be a "reasonable deadline for proposing new or amended contentions."[8] Petitioners timely filed initial contentions within a reasonable time as noted in the NRC Staff Answers.

---

[6] *See Fasken Oil and Ranch and Permian Basin Land and Royalty Owners Motion for Leave to Reopen and Incorporate Contention Filed* August 1, 2019 (Sept. 3, 2019*); Fasken and PBLRO's Withdrawal of Their "Motion for Leave to Reopen and Incorporate Contention Filed August 1, 2019"* (Sept. 12, 2019).

[7] Commission "Order (Granting Motion for Extension of Time to File)" Docket No. 72-105 (May 22, 2020) (ADAMS Accession No. ML20098F515).

[8] *See In the Matter of Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-12-21, 76 N.R.C. 491, 491 (2012) (noting that "although 'timely' is not expressly defined by months or days in [NRC] regulations. . . typically [] 30 to 60 days from the initiating event [is considered] a reasonable

9. Petitioners' new Contention No. 5 should similarly be considered timely. The information forming the basis for new Contention No. 5 was not available prior to publication of the ISP DEIS. As discussed in Petitioners' Motion for Leave, the investigation and analyses of cumulative environmental, socioeconomic and transportation impacts for the proposed ISP CISF contain material omissions and improperly rely on speculation, inaccurate, insufficient and/or speculative data and information, rendering the recently developed conclusions invalid. Furthermore, the reliance on such faulty information and the conclusions drawn are inconsistent with and significantly vary in material respects from information contained in ISP's license application documents.

10. Pursuant to the May 22, 2020 Order by the Secretary of the Commission "[p]etitions to intervene, hearing requests, and motions to admit contentions challenging the [ISP] DEIS will be deemed timely if filed on or before July 6, 2020."[9] The foregoing Motion for Leave to admit new Contention No. 5 to address information and conclusions only recently published in the ISP DEIS, and filed on July 6, 2020 is thus timely.

11. At the foundation of Petitioners' new Contention No. 5 are statements made in the ISP DEIS that contain material omissions, inadequacies and inconsistencies when compared to ISP's licensing application documents, and which give rise to unaddressed technical and integration issues that the NRC must resolve to conduct a proper independent review as to the cumulative environmental, transportation, and socioeconomic impacts of the proposed project and to ensure that spent nuclear fuel ("SNF") and high-level radioactive nuclear waste can be safely

---

deadline for proposing new or amended contentions."); *Shaw AREVA MOX Services* (Mixed Oxide Fuel Fabrication Facility), 67 N.R.C. 460, 493 (2008) (30 days held as presumptive time frame for timeliness of late-filed contentions).

[9] Commission "Order (Granting Motion for Extension of Time to File)" Docket No. 72-1050 (May 22, 2020).

transported to and stored at the proposed ISP site over the lifetime of the project.[10] This new information and the unresolved issues it brings to light must be noticed, appropriately analyzed and fully disclosed in the ISP DEIS and final EIS and resolutions and risk-mitigation strategies delineated and implemented within the ISP SAR, as they implicate important legal issues, safety risks and environmental impacts relating to the transportation, construction, operation and decommissioning of the proposed ISP CISF project.

12. As further discussed in Petitioners' Motion for Leave and the attached expert Declaration(s), the ISP DEIS relies on speculative representative transportation routes, unfounded assumptions as to responsibility for infrastructure improvements and emergency responses and further disregards regional geologic characteristics and competing industry uses for transportation, painting a distorted picture of the socioeconomic costs and benefits for the proposed ISP CISF project. Such deficiencies taint not only the cumulative impact analyses, but also the evaluation and comparisons to the No-Action Alternative and cannot reasonably form the basis for a proper analysis of environmental impacts or safety risks under NEPA or NRC regulations, including but not limited to, proper assessment of siting evaluation factors. The ISP DEIS misleads the NRC and leaves the public and communities in the dark as to actual transportation routes, safety risks and environmental impacts and potential legal issues involving liabilities and responsibilities for risk in transporting the nuclear waste across the nation via rails, barges and/or heavy-haul trucks. The ISP DEIS further understates the ramifications of regional geologic characteristics, potential for

[10] Consistent with 10 C.F.R. § 51.23(c), the ISP DEIS "serves as the *site-specific review*" conducted for the construction, operation and decommissioning of the proposed CISF for the period of its proposed license term. See ISP DEIS at 1-6. The initial proposed license term is for a period of 40 years, but ISP has indicated that it intends to seek to renew the license and anticipates that SNF would be stored at the proposed CISF site for 60 to 100 years. *Id*. at 9-16. The NRC Staff's cumulative impact analyses in the ISP DEIS alleges to have "considered these expansion phases in its impact analysis. . .and carries forth those impacts into the description of cumulative impacts. . . so as to conduct a bounded analysis for the proposed CISF project." *Id*. at 5-11.

seismic events, subsidence and sinkholes, as well as competing industry operations will have on such transportation infrastructure and the cumulative impacts of the proposed CISF site and regional activities will have on the environment and surrounding populations.

13. Indeed, these are important safety and environmental issues that also influence the evaluation of the socioeconomics of the proposed ISP CISF project. As discussed in Petitioners' Motion for Leave, these issues relate to ISP's safety structures and components, the analysis of natural and man-induced events and siting evaluation factors required by NRC regulations. Under NRC and NEPA regulations, this information must be considered in an independent review and a evaluation by the NRC and must be made available for public comment and to allow interested parties to participate in the proceedings.

WHEREFORE, Petitioners respectfully request that the record be opened in this case, pursuant to 10 C.F.R. § 2.326, the rulings of the Commission and in further support of Petitioners' Motion for Leave to File New Contention No. 5.

Dated: July 6, 2020

Respectfully submitted,

/signed electronically by/
Monica Perales
6101 Holiday Hill Road
Midland, TX 79707
(432)687-1777
monicap@forl.com

/signed electronically by/
Allan Kanner
KANNER & WHITELEY, LLC
701 Camp Street
New Orleans, Louisiana 70130
(504)524-5777
a.kanner@kanner-law.com

*Counsel for Petitioners*

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC | Docket No. 72-1050 |
| | July 6, 2020 |
| (Consolidated Interim Storage Facility) | |

**AFFIDAVIT OF ALLAN KANNER**

Allan Kanner, under oath, declares as follows:

1. I am an attorney with the law firm of Kanner & Whiteley, LLC in this proceeding. I personally prepared Petitioners Motion for Leave to File new Contention No. 5. In preparing Contention No. 5, I reviewed the ISP ER and ISP DEIS that form the basis of new Contention No. 5, as well as the Declaration(s), submitted in conjunction with new Contention No. 5.
2. This affidavit is submitted to comply with the requirements of 10 C.F.R. § 2.326(b) in support of Petitioners Motion to Reopen the Record. The criteria in 10 C.F.R. § 2.326(a) are satisfied and incorporates all facts, arguments, references and Declaration(s) from Petitioners concurrently filed Motion for Leave to File Contention No. 5.
3. The information forming the basis of new Contention No. 5 was not available prior to publication of the ISP DEIS. As discussed in Petitioners Motion for Leave to File New Contention No. 5 ("Motion for Leave"). Pursuant to the May 22, 2020 Order by the Secretary of the Commission "[p]etitions to intervene, hearing requests, and motions to admit contentions challenging the [ISP] DEIS will be deemed timely if filed on or before July 6, 2020."[11] The foregoing Motion for Leave to admit new Contention No. 5 to address information and conclusions only recently published in the ISP DEIS, and filed on July 6, 2020 is thus timely
4. By its very nature, information in the ISP DEIS implicates significant environmental, socioeconomic, transportation and safety related issues. Tommy Taylor, a petroleum engineer with 34 years of oil and gas property interests, extraction and production experience and agricultural use of the land in the region, reviewed the ISP DEIS and issued a Declaration discussing the serious and significant implications as to the inaccuracies of the ISP DEIS as they relate to industry use of transportation infrastructure, the risk of transportation incidents as they relate to economic value of oil and gas assets and foreclosure of agricultural and ranching activities and regional industry operations and geologic characteristics. Mr. Taylor's Declaration is attached to the Petitioners' Motion for Leave filed concurrently with the foregoing Motion to Reopen. Mr. Taylor concludes that the ISP DEIS:

[11] Commission "Order (Granting Motion for Extension of Time to File)" Docket No. 72-1050 (May 22, 2020).

- Erroneously and inconsistently depicts oil and gas and agricultural utilization of transportation infrastructure near the proposed ISP CISF, presenting a misleading cumulative transportation impacts analysis;
- Relies on speculative information and representative transportation routes which improperly ignore ongoing oil, gas, agricultural and ranching operations and utilization of transportation infrastructure in the region of interest and along rail lines in the Permian Basin;
- Further fails to acknowledge the potential for radiological contamination to individuals working on oil, gas, agricultural and ranching operations in the vicinity of the proposed CISF and along the rail lines subject to background radiation exposure and potential accidents; and
- Willfully ignores and/or materially omits regional geological characteristics and interdependent industry operations that may significantly impact potential for seismicity, subsidence and sinkholes.

5. ISP's application misleads the NRC and the public regarding the potential safety and impacts of transportation of nuclear waste to the proposed CISF site, and further misrepresent the socioeconomic costs and benefits of the proposed project by presenting inconsistent information as to title of the nuclear waste, responsibility for infrastructure improvements and emergency responses. Moreover, the cumulative impacts analyses fail to account for regional ion operations, geologic characteristics and the cumulative impacts the proposed CISF site and regional activities will have on the environment, land use, and surrounding populations.
6. As detailed in the concurrently filed Motion for Leave, not only do the above-mentioned items implicate important safety, socioeconomic, transportation and environmental issues, they are required under NRC and NEPA regulations. Misleading, incomplete, speculative, inaccurate and inconsistent information cannot form the basis for a proper review of cumulative impact analyses, siting evaluation factors or the preliminary recommendations in connection with an NRC licensing application.
    a. Petitioners dispute the following material facts, statements and conclusions and have provided evidence to the contrary in their Motion for Leave (incorporated herein by reference):

i. The proposed project is projected to have a SMALL incremental effect for traffic-related impacts and cumulative transportation impact;
ii. the regional benefits for the proposed CISF project result in a net benefit;
iii. the proposed project is projected to have a SMALL incremental effect when added to past, present and reasonably foreseeable future actions / land use;
iv. the status of past, present and future oil and gas and mining extraction operations in the area; and
v. the interdependent factors that influence possible subsidence, sinkholes, and seismicity.

Dated: July 6, 2020

/signed electronically by/

Allan Kanner
KANNER & WHITELEY, LLC
701 Camp Street
New Orleans, Louisiana 70130
(504)524-5777
a.kanner@kanner-law.com

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>July 6, 2020 |

## CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305, I Allan Kanner certify that, on this 6th day of July, 2020, true and correct copies of Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion to Reopen the Record were served upon the Electronic Information Exchange (the NRC's E-Filing System) in the above-captioned proceeding.

_/signed electronically by/
Monica Perales
6101 Holiday Hill Road
Midland, TX 79707
(432)687-1777
monicap@forl.com

/signed electronically by/
Allan Kanner
KANNER & WHITELEY, LLC
701 Camp Street
New Orleans, Louisiana 70130
(504)524-5777
a.kanner@kanner-law.com

*Counsel for Petitioners*

# Tab 21

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>July 6, 2020 |

**FASKEN LAND AND MINERALS, LTD.'S AND PERMIAN BASIN LAND AND ROYALTY OWNERS MOTION FOR LEAVE TO FILE NEW AND/OR AMENDED CONTENTION**

# Table of Contents

**Authorities** ..... ii

**I. INTRODUCTION** ..... 1

**II. PETITIONERS HAVE STANDING** ..... 3

**III. LEGAL STANDARDS** ..... 4

**A. Petitioners Have Good Cause to File New Contention No. 5.** ..... 5

**B. Petitioners New Contention No. 5 is Admissible** ..... 6

**C. NRC and NEPA Legal Standards** ..... 8

**IV. NEW CONTENTION NO. 5** ..... 11

**A. Basis for New Contention No. 5** ..... 11

**B. Facts Petitioners Intend to Rely on In Support New Contention No. 5.** ..... 12

**C. Petitioners Raise Genuine Disputes of Material Fact and Law** ..... 14

**i. Transportation is Vital to the Proposed ISP CISF Project – A Connected Activity That Must Be Addressed and Fully Analyzed** ..... 14

**ii. New and Significant Data and/or Conclusions in the ISP DEIS** ..... 14

**1. Responsibility Emergency Responses in Event of Accident and Radiologic Exposure** ..... 14

**2. Responsibility for Infrastructure Improvements** ..... 16

**iii. Lack of Independent and Adequate NRC Review for Cumulative Impacts** ..... 17

**1. ISP DEIS is Based on Faulty Underling Premises and Speculative, Inaccurate and Unreliable Information** ..... 19

**a. Faulty Underlying Premises** ..... 19

**b. Cumulative Transportation Impacts Fail to Consider Regional Characteristics** ..... 19

**i. Seismicity, Subsidence and Sinkholes** ..... 20

**ii. Oil and Gas Industry Operations and Use of Rails and Highways** ..... 21

**c. Cumulative Impacts Analysis Fails to Consider Potential for Terrorist Attacks, Derailments and Sabotage in Permian Basin** ..... 21

**iv. Improper Cumulative Analyses Taint the Socioeconomic Benefits and Costs Comparison and Artificially Narrow the Site Selection Process** ..... 22

**v. ISP DEIS Cumulative Impact Analyses are Deficient in Violation of NEPA and NRC Regulations** ..... 24

**V. CONCLUSION** ..... 26

# Authorities

## Cases

*Balt. Gas & Elec. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97, 103 (1983) ..... 10

*Fansteel, Inc.* (Muskogee, Okla. Site), CLI-03-13, 58 N.R.C. 195, 203 (2003) ..... 7, 8

*Fla. Power & Light Co.* (Turkey Point Units 6 & 7), LBP-17-6, 86 N.R.C. 37, 48 (2017) ..... 5

*In the Matter of Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-12-21, 76 N.R.C. 491 (2012) ..... 5

*In re Matter of TVA* Intervenors' Reply to Responses in Opposition to Motion for Leave to File Contention 4 and Contention 5 Docket No. 52-047-ESP (June 22, 2018) ..... 11

*Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 533 (2005) ..... 5, 6

*Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 371 (1989) ..... 10

*Nextera Energy Seabrook, LLC* (Seabrook Station, Unit 1), LBP-17-07, 75 NRC 301 (2017) ..... 7

*Oconee*, CLI-99-11, 49 N.R.C. at 334 (1999) ..... 7, 8

*Private Fuel Storage, LLC* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 179-80 (1998) ..... 7

*Shaw AREVA MOX Services* (Mixed Oxide Fuel Fabrication Facility), 67 N.R.C. 460, 493 (2008) ..... 5

*U.S. Dept. of Energy*, CLI-09-14, 69 NRC 580, 588 (2009) ..... 7, 8

*Vermont Yankee Nuclear Power Corp. v. Nat. Res. Def. Council*, 435 U.S. 519, 553 (1978) ..... 10

## Statutes

43 U.S.C. § 4332 ..... 10

Atomic Energy Act, 42 U.S.C. § 2011 ..... 9

National Environmental Policy Act, 42 U.S.C. § 4321 ..... *passim*

## Other Authorities

Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467 (Jun. 5, 1996) ..... 10
Correction, 66 Fed. Reg. 39,277 (Jul. 30, 2001) ..... 10

NUREG-1567-"Standard Review Plan for Spent Fuel Dry Storage Facilities" ..... 9

Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33, 168, 33, 170-71 (Aug. 11, 1989) ..... 8

Amendments to Adjudicatory Process Rules and Related Requirements, 77 Fed. Reg. 46, 562 (Aug. 3, 2012) ..... 5

## Regulations

10 C.F.R. § 2.309 ..... *passim*
10 C.F.R. § 51.10 ..... 9
10 C.F.R. § 51.23 ..... 1
10 C.F.R. § 51.70 ..... 10
10 C.F.R. § 51.71 ..... 11
10 C.F.R. § 51.104 ..... 9
10 C.F.R. § 72.11 ..... 9, 20
10 C.F.R. § 72.24 ..... 9
10 C.F.R. § 72.40 ..... 9
10 C.F.R. § 72.90 ..... *passim*
40 C.F.R. § 1508.7 ..... 11

Now comes Fasken Oil and Ranch Ltd. ("Fasken") and Permian Basin Land and Royalty Owners ("PBLRO") (collectively "Joint Petitioners")[1], by and through undersigned counsel, who respectfully move the Atomic Safety Licensing Board ("ASLB") for leave to file new Contention No. 5 in the above-captioned matter, filed concurrently with Petitioners' Motion for Leave to Reopen the Record, and in support of their Motion for Leave to File New Contention No. 5, state as follows:

## I. INTRODUCTION

Pursuant to 10 C.F.R. §§ 2.309(c)(1) and (f)(1), Joint Petitioners seek leave to file new Contention No. 5 based on the Interim Storage Partners LLC ("ISP") draft environmental impact statement ("DEIS")[2] and to contest newly disclosed and non-transparent analyses and material omissions and unforgiveable unknowns in ISP's licensing application documents, which give rise to unaddressed technical and integration issues that the U.S. Nuclear Regulatory Commission ("NRC") must resolve to properly review and analyze cumulative environmental impacts, as well as safety risks and the socioeconomic benefits of alternatives, to ensure that spent nuclear fuel ("SNF") and high-level radioactive nuclear waste can be safely transported to, and stored at, the proposed ISP consolidated interim storage facility ("CISF") in Andrews County, Texas over the entire course of the license term.[3] This new information and the unresolved issues it brings to

[1] Fasken is a founding member of the Permian Basin Coalition of Land and Royalty Owners and Operators ("PBLRO").
[2] Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas, Draft Report for Comment, NUREG-2239 (May 2020) (ADAMS Accession No. ML20122A220), herein after "ISP DEIS."
[3] Consistent with 10 C.F.R. § 51.23(c), the ISP DEIS "serves as the site-specific review" conducted for the construction, operation and decommissioning of the proposed CISF for the period of its proposed license term. *See* ISP DEIS at 1-6. The initial proposed license term is for a period of 40 years, but ISP has indicated that it intends to seeks to renew the license and anticipates that SNF would be stored at the proposed CISF site for 60 to 100 years. *Id.* at 9-16. The NRC Staff's cumulative impact analyses in the ISP DEIS alleges to have "considered these expansion phases in its impact analysis. . .and carries forth those impacts into the description of cumulative impacts. . . so as to conduct a bounded analysis for the proposed CISF project." *Id.* at 5-11

light must be noticed, appropriately investigated, analyzed and fully disclosed in the ISP DEIS and final Environmental Impact Statement ("EIS"), and resolutions and risk-mitigation strategies delineated and implemented within the ISP Safety Analysis Report ("SAR"),[4] as they inevitably implicate important legal issues, safety risks and environmental impacts relating to the transportation, construction, operation and decommissioning of the proposed CISF project.

As explained *infra*, the underlying faulty premises, with baked in layers of assumptions, based on unreliable data, uncertain variables and unknown transportation routes, render the cumulative impact analyses and ultimate conclusions regarding site evaluation factors, as well as preliminary agency recommendations for approval in the ISP DEIS, deficient. Not only do they vary significantly from ISP's Environmental Report ("ISP ER"),[5] but they are also misleading, inaccurate and inconsistent.

Transportation is key to any nuclear waste storage facility. Transportation is a functionally and financially interdependent cog in the wheel - an undeniably linked activity necessary to the proposed ISP CISF project. As such, cumulative analyses of transportation must be adequately and appropriately reviewed in a national context with respect to actual transportation routes and the varying status of the aging spent nuclear fuel to be stored. Moreover, transportation of such nuclear waste must be evaluated with respect to the regional surrounding area, its geologic characteristics, land use and nearby industry operations.

The potentially devastating impacts to communities along each and every transportation route cannot be insulated from consideration. Questions as to which entities will be taking title to the nuclear waste and which communities, states and/or business entities will be taking

[4] WCS Consolidated Interim Storage Facility System Safety Analysis Report, Docket No. 72-1050, Rev. 2, (July 19, 2018) (ADAMS Accession No. ML18206A550), hereinafter "ISP SAR."
[5] WCS Consolidated Interim Storage Facility Environmental Report, Docket No. 72-1050, Rev. 3, (Feb. 17, 2020) (ADAMS Accession No. ML20052E152), hereinafter "ISP ER."

responsibility / liability for incidents during transport must be answered and appropriately evaluated under National Environmental Policy Act ("NEPA")[6] and NRC regulations.[7] Reliance on incomplete, uncertain and speculative sources of information and lack of transparency in such evaluations prevents proper public participation, precludes cumulative impact analyses NEPA and further violates NRC regulations.[8] When dealing with multiple rounds of transporting the nation's high-level radioactive waste in the absence of a permanent repository for same – a one size fits all approach, rooted in uncertainties as to transportation routes and layers of extrapolations as to potential radiation exposure risks, while failing to account for regional attributes of the nuclear waste's final resting place is simply unacceptable.

## II. PETITIONERS HAVE STANDING

If a petitioner has already satisfied the general standing requirements under 10 C.F.R. § 2.309(d), in the same proceeding for which a new contention is filed, the petitioner "does not need to do so again."[9] On August 23, 2019, the ASLB held that "Fasken and PBLRO have demonstrated standing" in the current proceeding.[10] Thus, Petitioners have standing to bring Contention No. 5.

The proposed ISP CISF site is situated in the Permian Basin oil hub, one of the most vital petroleum resources for the nation's energy, security and independence. As set forth in the Declaration of Tommy E. Taylor (Vice President of Fasken Management, L.L.C., which is the

[6] The National Environmental Policy Act of 1969, 42 U.S.C. § 4321 *et seq.*, herein after "NEPA."
[7] *See* 10 C.F.R. §§ 72.90-108 (NRC Siting Evaluation Factor regulations, *e.g.*, 10 C.F.R. § 72.108 ("proposed ISFSI or MRS must be evaluated with respect to the potential impact on the environment of the transportation of spent nuclear fuel, radioactive waste, or reactor-related GTCC waste within the region")).
[8] *See* NRC Siting Evaluation Factors 10 C.F.R. §§ 72.90-108; §72.108 regarding necessary evaluation of transportation risks.
[9] 10 C.F.R. § 2.309(c)(4).
[10] *See* ASLB "Memorandum and Order" LBP-19-07 (August 23, 2019) (ADAMS Accession No. MLML19235A165), at 19 ("the Board concludes their proximity to the proposed facility is sufficient to confer standing on Fasken and representative standing on PBLRO. In light of the Commission's direction to construe standing claims in favor of the petitioner, we agree with the NRC Staff's original view that they both have shown enough. . .Fasken and PBLRO have demonstrated standing."

general partner of Fasken Land and Minerals, Ltd.), Fasken is a member of the PBLRO.[11] Petitioner PBLRO has 65 individual members and at least three being publicly traded corporations as well as numerous private companies with substantial oil and gas operations and leases and agricultural and ranching activities throughout the Permian Basin in southeast New Mexico and Texas.[12] Its members have been drilling and extracting oil in the region for over 80 years. A founding member owns land and minerals within two miles of the proposed ISP CISF.[13]

Fasken owns and/or leases property related to oil and gas activities located approximately 18 miles from the ISP site.[14] Additionally, Fasken owns grazing property and operates significant agricultural operations nearby with considerable acreage. This property has been in the Fasken family for over one-hundred years.

Petitioners have a multitude of mineral leases surrounding the proposed CISF site and support the development of industry infrastructure and support services throughout the region. Both PBLRO and Fasken regularly utilize rail transportation and local highways to support their industries and have individuals frequently visit the region for work related purposes, including routine checks and maintenance on oil and gas production equipment and to monitor operations. Petitioners also have legitimate concerns regarding potential health effects of their employees, operations, and the communities in the region generally, including the costs associated with medical care and treatment of radiation-related conditions and the adverse financial impacts on property values and threats to ongoing extraction and mineral development, agricultural and ranching activities posed by the proposed ISP CISF.

## III. LEGAL STANDARDS

[11] *See* Declaration of Tommy E. Taylor, attached hereto as Exhibit 1, hereinafter "Decl. Taylor."
[12] *Id.*
[13] *Id.*
[14] *Id.*

### A. Petitioners Have Good Cause to File New Contention No. 5.

New or amended contentions submitted after the initial date for hearing requests must meet the requirements of 10 C.F.R. § 2.309(c)(1). To do so, a party must demonstrate good cause by showing the following three conditions are met:

(i) The information upon which the filing is based was not previously available.

(ii) The information upon which the filing is based is materially different than information previously available.[15]

(iii) The filing has been submitted in a timely fashion based on the availability of the subsequent information[16].

New or amended contentions regarding NEPA may be filed if there are data or conclusions in the NRC DEIS or final EIS or any supplements relating thereto, that differ significantly from the data or conclusions in the applicant's documents. [17]

If the NRC DEIS "contains data or conclusions. . . of the proposed action that differ significantly from those contained in the [ER] (an applicant's document), the petitioner [] may file an amended contention, or an entirely new contention, to challenge the new data or conclusions."[18] The use of a disjunctive phrase here indicates a "contention may therefore challenge a DEIS even though

[15] The Commission has stated that "materially different" information is that which "differs significantly. . . from the information in the applicant's documents." Amendments to Adjudicatory Process Rules and Related Requirements, 77 Fed. Reg. 46, 562 at 46, 572 (Aug. 3, 2012). *See also*, Fla. Power & Light Co. (Turkey Point Units 6 & 7), LBP-, 86 N.R.C. 37, 48, *aff'd*, CLI-17-12, 86 N.R.C. 215 (2017) (in the context of late-filed contentions, "materially different" concerns the "type or degree of difference between new information and previously available information").

[16] *See In the Matter of Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc*. (Pilgrim Nuclear Power Station), CLI-12-21, 76 N.R.C. 491, 491 (2012) (noting that "although 'timely' is not expressly defined by months or days in [NRC] regulations. . . typically [] 30 to 60 days from the initiating event [is considered] a reasonable deadline for proposing new or amended contentions."); *Shaw AREVA MOX Services* (Mixed Oxide Fuel Fabrication Facility), 67 N.R.C. 460, 493 (2008) (30 days held as presumptive time frame for timeliness of late-filed contentions).

[17] 10 C.F.R. § 2.309(f)(2). See *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 533 (2005) ("Our rules expressly allow timely amendment of NEPA contentions if there is significant new information or different conclusions in the DEIS that could not have been challenged previously") (citing 10 C.F.R. § 2.309).

[18] *In the Matter of Calvert Cliffs 3 Nuclear Project, LLC and Unistar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), 72 N.R.C. 720, 729-730, LBP-10-24 (Dec. 28, 2010) ("*Calvert*").

its ultimate conclusion on a particular issue. . . is the same as that in the ER, as long as the DEIS relies on significantly different data than the ER to support the determination."[19]

Petitioners' Contention No. 5 satisfies the requisite three conditions for good cause set out in 10 C.F.R. § 2.309(c)(1). The information forming the basis for new Contention No. 5 was not available prior to publication of the ISP DEIS on May of 2020. As discussed *infra*, the NRC for the first time relies on and cites to data in the DOE Yucca 2008 transportation analysis and discloses recently developed conclusions for the very first time in the ISP DEIS that significantly vary in material respects from information contained in ISP's license application documents. Pursuant to the May 22, 2020 Order by the Secretary of the Commission "[p]etitions to intervene, hearing requests, and motions to admit contentions challenging the [ISP] DEIS will be deemed timely if filed on or before July 6, 2020."[20] The foregoing Motion to admit contentions, based on information only recently published in the ISP DEIS, and filed on July 6, 2020 is timely. And Petitioners have demonstrated good cause to file same.

**B. Petitioners New Contention No. 5 is Admissible**

In addition to meeting the requirements of 10 C.F.R. § 2.309(c)(1), new or amended contentions must also satisfy the basic standards for admissibility under 10 C.F.R. § 2.309(f)(1). This section requires that each contention:

i) Provide a specific statement of the issue of law or fact to be raised or controverted;

ii) Provide a brief explanation of the basis for the contention;

iii) Demonstrate that the issue raised in the contention is within the

[19] *Calvert*, 72 N.R.C. at 730 ("The reverse is also true: a significantly different conclusion in the DEIS may be challenged even though it is based on the same information that was cited in the ER.").*See also*, *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 533 (2005) ("Our rules expressly allow timely amendment of NEPA contentions if there is significant new information or different conclusions in the DEIS that could not have been challenged previously").

[20] Commission "Order (Granting Motion for Extension of Time to File)" Docket No. 72-1050 (May 22, 2020).

scope of the proceeding;[21]

iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding;[15]

v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue…together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue;[22] and

vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact. This information must include references to specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute, or, if the petitioner believes the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief.[23]

10 C.F.R. § 2.309(f)(1)(i-vi).

A contention may state an "issue of law or fact." A purely legal issue contention need not necessarily address every requirement of 10 C.F.R. § 2.309(f)(1), such as the requirement to provide "a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue."[24]

---

[21] Requires a significant link between the claimed deficiency in the application and the agency's ultimate determination whether the applicant will adequately protect the health and safety of the public and the environment. *Nextera Energy Seabrook, LLC* (Seabrook Station, Unit 1), LBP-17-07, 75 NRC 301 (2017) (citing *Private Fuel Storage, LLC* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 179-80 (1998), *Aff'd*, CLI-98-13, 48 NRC 26 (1998)). *See also, Oconee*, CLI-99-11, 49 N.R.C. at 333-34 (to show that a dispute is "material" a petitioner must show that its resolution would make a difference in the outcome of the licensing proceeding).

[22] At the contention admissibility stage, petitioners are not required to prove their case on the merits. *Fansteel, Inc.* (Muskogee, Okla. Site), CLI-03-13, 58 N.R.C. 195, 203 (2003).

[23] *See, U.S. Dept. of Energy*, CLI-09-14, 69 NRC 580, 588 (2009) (demonstrating a genuine dispute of fact or law requires a petitioner to show "specific ties to NRC regulatory requirements, or to safety in general"); *Nextera*, LBP- 17-07, 75 NRC 301 (finding "sufficient information" to demonstrate a genuine dispute to require inclusion of references to specific portions of the application that a petitioner disputes and for deficient applications, identification of alleged areas of deficiencies with supporting beliefs).

[24] 10 C.F.R. § 2.309(f)(1)(v). *See U.S. Dep't of Energy*, CLI-09-14, 69 NRC 580 at 588–91.("We agree, for example, with the Boards' view in this proceeding that requiring a petitioner to allege 'facts' under section 2.309(f)(1)(v) or to

To satisfy basic contention admissibility requirements, a petitioner must "proffer at least some minimal factual and legal foundation in support of their contentions."[25] Although a petitioner need not prove the merits of contentions at this stage, mere notice pleading of proffered contentions is insufficient.[26] Rather the NRC requires a petitioner read the pertinent portions of the license application, state the applicant's position and the petitioner's opposing view, and explain the disagreement.[27]

As discussed in further detail below, Petitioners are filing new Contention No. 5 relating to the ISP DEIS to challenge newly disclosed conclusions relating to the transportation of nuclear waste, which contain glaring omissions, inaccuracies, and inconsistencies and new material facts regarding cumulative impacts and which also turn a blind eye to the geologic characteristics and ongoing and extensive oil and gas and mining extraction operations in the region of the proposed ISP CISF project, as well as the status of compliance with federal and state laws and approvals, which preclude a proper analysis of ISP's licensing application under NEPA and NRC regulations. Reliance on a less-than-complete record and speculation in the context of licensing a facility to house the entire nation's nuclear storage will not suffice. Petitioners' Contention No. 5 implicates serious and important safety, transportation and environmental issues that the NRC must notice, disclose and appropriately address in the licensing of the proposed ISP CISF project.

### C. NRC and NEPA Legal Standards

The overarching goal of the NRC is to avoid avoidable risks of harms. Its regulations promote that goal. As such, the NRC may only issue a license upon a finding that the proposed

provide an affidavit that sets out the 'factual and/or technical bases' under section 51.109(a)(2) in support of a legal contention—as opposed to a factual contention—is not necessary.")

[25] *Oconee*, CLI-99-11, 49 N.R.C. at 334.

[26] *Fansteel, Inc.*, CLI-03-13, 58 N.R.C. 195 at 203.

[27] Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33, 168, 33, 170-71 (Aug. 11, 1989).

site complies with NRC siting evaluation factors.[28] More specifically, NRC regulations require that proposed sites "be examined with respect to the frequency and the severity of external natural and man[-]induced events that could affect [] safe operation."[29] Pursuant to 10 C.F.R. § 72.108, license applicants for a "proposed ISFSI or MRS must [also] be evaluated with respect to the potential impact on the environment of the transportation of spent fuel, high-level radioactive waste, or reactor-related GTCC waste within the region." It is further imperative that all information provided by a license applicant to the Commission is "complete and accurate in all material respects."[30]

Additionally, the NRC cannot grant a license for construction or operation of the proposed CISF project until it determines that applicable regulatory requirements of the Atomic Energy Act of 1954 ("AEA"),[31] the National Waste Policy Act ("NWPA")[32] and NEPA requirements are satisfied.[33] Any NRC licensing action must be viewed through the lenses / from the perspective of congressional intent for authorizing federal agency actions under the respective legislations.

NRC regulations implementing NEPA reflect amendments designed to improve regulatory efficiency in environmental reviews and to provide for "more focused and therefore more effective" NRC NEPA reviews by focusing on "significant case[-]specific concerns."[34]

---

[28] *See* 10 C.F.R. §§ 72.40(a)(2), 72.90 – 72.108.

[29] *See* 10 C.F.R. § 72.90(b); *see also* 10 C.F.R. § 72.24(a) (requires applicants to provide a description and safety assessment of the site on which the ISFSI is to be located, "with appropriate attention to the design bases for external events."); NUREG-1567 § 2.4.2 (requires applicants to identify products or materials produced, stored, or transported by nearby industries, and discuss "any potential hazards to the ISFSI from activities or materials" produced by nearby industries).

[30] 10 C.F.R. § 72.11(a).

[31] The Atomic Energy Act of 1954, as amended, 42 §§2011, *et seq.* ("AEA").

[32] The National Waste Policy Act of 1982, as amended, 42 U.S.C. §§10101, *et seq.* ("NWPA").

[33] *See* 10 C.F.R. §51.10(a) (Nothing in the NRC NEPA implementing regulations alter the cardinal requirement that license applications comply with all NRC regulations. Indeed, NEPA regulations must be carried out in a "manner which is consistent with the NRC's domestic licensing and regulatory authority under the [AEA]."

[34] Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467 (Jun. 5, 1996); *id.*, 61 Fed. Reg. 66,537 (making minor clarifying and conforming changes and adding text omitted from Table B-1); Correction, 66 Fed. Reg. 39,277 (Jul. 30, 2001) (making further corrections to Table B-1).

NEPA mandates that federal agencies prepare an EIS before undertaking any "major Federal actions significantly affecting the quality of the human environment."[35] The preparation of an EIS is meant to ensure that federal agencies "***will not act on incomplete information, only to regret [their] decision after it is too late to correct.***"[36] NEPA requires agencies to take a "hard look at environmental consequences" of the proposed action, and imposes a duty upon the agency to both "consider every significant aspect of the environmental impact of a proposed action" and "inform the public" of its analysis and conclusion.[37]

Pursuant to NRC regulations, a draft EIS must "state how ***alternatives considered*** in it and decisions based on it will or will not achieve [NEPA][] requirements,[38] . . . *identify any methodologies used and sources relied upon, . . . be supported by evidence that the necessary environmental analyses have been made . . .[and that] [t]he NRC staff [] independently evaluate and be responsible for the reliability of all information used in the draft [EIS]*."[39] In completing a draft EIS, the NRC is encouraged to cooperate with State and local agencies and "include consideration of major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies, by any affected Indian Tribes, and by other interested parties."[40]

Additionally, a draft EIS must include discussion of the cumulative effects for a proposed

[35] 43 U.S.C. § 4332(2)(c) (Including a detailed statement by the responsible official on "(i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) alternatives to the proposed action, (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.")
[36] *Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 371 (1989) (emphasis added).
[37] *Balt. Gas & Elec. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97, 103 (1983) (quoting *Vermont Yankee Nuclear Power Corp. v. Nat. Res. Def. Council*, 435 U.S. 519, 553 (1978)).
[38] Specifically, "Sections 101 and 102(1) of NEPA and of any other relevant and applicable environmental laws and policies."
[39] 10 C.F.R. § 51.70(b) (emphasis added).
[40] 10 C.F.R. § 51.71(b).

project, defined as "the impact on the environment which results from the incremental impact of the *action when added to other past, present, and* ***reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions***."[41] Cumulative effects, synonymous with cumulative impacts, can result from individually minor but collectively significant actions taking place over a period of time.

Draft and final EISs are government-sponsored documents that will subsequently be issued to other federal agencies, state agencies, and the public. Because the government stands by the reliability of the information and conclusions in its EISs, they are often used as references for a broad array of decisions. "To casually include information that has not been independently verified for its reliability and completeness by the NRC would violate both NRC regulations and NEPA's fundamental purpose of informing the public about environmental issues."[42] Moreover, to protect the inclusion of information in an EIS from challenge in a licensing proceeding would violate NRC regulations governing public participation requirements.[43]

## IV. NEW CONTENTION NO. 5

> ISP's application fails to adequately, accurately, completely and consistently consider the cumulative impacts of transporting high-level radioactive waste and spent nuclear fuel to and the socioeconomic benefits of the proposed CISF project, which precludes a proper analysis under NEPA, and further nullifies ISP's ability to satisfy NRC's siting evaluation factors now and anticipated in the future and is in further violation of NRC regulations.

### *A. Basis for New Contention No. 5*

Petitioners submit new Contention No. 5 to address materially different conclusions and

[41] 40 C.F.R. § 1508.7 (emphasis added); Council on Environmental Quality ("CEQ") Regulations.
[42] *TVA*, Intervenors' Reply to Responses in Opposition to Motion for Leave to File Contention 4 (Inadequate Discussion of Environmental Impacts of Spent Nuclear Fuel Pool Fires) and Contention 5 (Impermissible Discussion of Energy Alternatives and Need for The Proposed SMR), Docket No. 52-047-ESP (June 22, 2018), (ADAMS Accession No. ML18174A075).
[43] 10 C.F.R. § 51.104

reliance on sources of data, information and statements, made for the very first time in the recent ISP DEIS, which materially mislead the public as to the ownership and responsibility, as well as the radiological risks and socioeconomic impacts, of transporting nuclear waste from decommissioned sites to the proposed ISP site (and inevitably decommissioning and presumably later moving to a permanent repository). Furthermore, the transportation cumulative impacts (as well as other analyses) fail to account for ongoing and extensive industry operations, recent seismic events, and uncertain geologic characteristics in the region of the proposed ISP CISF project that present real threats of subsidence and sinkholes to transportation and storage. Reliance on conjecture and unverified and speculative information in the ISP DEIS cannot reasonably form the basis for a proper evaluation of safety risks or environmental impacts of transporting nuclear waste through countless communities across the country, who deserve fair warning and adequate notice of potential consequences. Such obscurity as to ownership and responsibilities during transport further skew the socioeconomic cost and benefits of the proposed ISP project when compared to the alternatives in violation of NEPA and NRC regulations.

Petitioners assert transportation is a necessary and connected activity to the proposed CISF project that must be appropriately and adequately analyzed in NEPA cumulative impacts analyses, in light of costs and benefits of the proposed project, and in terms of the financial assurances in transporting, storing and then decommissioning and having multiple rounds of transportation for high-level radioactive waste. Petitioners dispute the data and conclusions presented in the recently published ISP DEIS as they omit material information, and present incomplete, inaccurate, unreliable and misleading information rendering the cumulative impact analyses flawed.

### *B. Facts Petitioners Intend to Rely on In Support New Contention No. 5.*

According to the ISP DEIS, the NRC's analysis of potential cumulative impacts from the

proposed CISF project are "based on publicly available information on past, present, and reasonably foreseeable future projects; information in . . . [ISP ER and SAR]. . .; responses to requests for additional information (RAI) (ISP, 2019); and general knowledge of the conditions in west Texas, southeast New Mexico, and in the nearby communities."[44]

The ISP DEIS considered a region of interest of 50-mile radius. For the proposed ISP CISF project, other past, present and reasonably foreseeable future actions in the vicinity of the proposed project include "livestock grazing; agriculture; oil and gas exploration and development and other mining; and solid, hazardous, and radioactive waste disposal."[45]

The ISP DEIS cumulative transportation analysis fails to consider regional geologic characteristics including the potential for seismicity, sinkholes and subsidence; fails to consider ongoing and extensive oil and gas and mining operations in the region; and further fails to acknowledge the potential of terrorist attack, sabotage, or even train derailment. ISP's application misleads the NRC and the public regarding safety and environmental impacts of transporting nuclear waste across the country to the proposed CISF site in Texas and relies on underlying premises that are faulty or speculative at best. Such deficiencies include flaws in the underlying Yucca Mountain transportation analyses, misguided reliance on reference radiation dosing which fails to consider elevated risks for children, elderly and expectant mothers, unsubstantiated assumptions that a permanent repository will be built by 2048 and that infrastructure improvements will be made along with responsibility and liability for nuclear waste during transit or in the event of an accident. As a result, the ISP DEIS improperly evaluates the cost benefits of the proposed action and the No-Action alternative and fails to appropriately assess the cumulative impacts the

[44] ISP DEIS at 5-1.
[45] ISP DEIS at 5-1.

proposed CISF site will have on the environment, land use, and surrounding populations. Such inaccurate, incomplete and unreliable facts and information relied on include, but are not limited to, those listed in attached Exhibit 2. Petitioners reserve the right to amend and/or supplement same as additional relevant information becomes available.

### *C. Petitioners Raise Genuine Disputes of Material Fact and Law*

#### i. Transportation is Vital to the Proposed ISP CISF Project – A Connected Activity That Must Be Addressed and Fully Analyzed

NRC admittedly cannot execute or license the proposed ISP project without a change in congressional intent. It cannot fulfill its NEPA obligations to conduct an adequate independent analysis of cumulative impacts of transportation risks without evaluating the underlying variables. In terms of transporting nuclear waste – extrapolations based on prior facilities and the use of "representative routes" simply will not do and further prevent a proper assessment of cost and benefit scenarios in the ISP DEIS.

The NRC and the Department of Transportation ("DOT") both exercise federal jurisdiction over the transportation of nuclear materials.[46] The transportation of nuclear waste to the proposed ISP CISF has a clear physical, functional and temporal nexus to the project. Such a storage facility would have no purpose unless it is supplied with something to store. "[F]ederal actions encompassed within a larger, private project" like rail transportation contracting can clearly be connected.[47] Transportation and storage in the context here are inextricably linked actions.

#### ii. New and Significant Data and/or Conclusions in the ISP DEIS

##### 1. Responsibility for Emergency Responses in Event of

[46] Under the NRC's regulations, the transportation of "radioactive waste" away from a reactor must be included in environmental reports prepared for a reactor license. 10 C.F.R. § 51.52. The NRC set forth "[t]he environmental impacts of transportation of fuel and waste to and from the reactor, with respect to normal conditions of transport and possible accidents in transport," in Table S–4 in the regulations. *Id.* § 51.52(6). *See Nuclear Info. & Res. Serv. v. NRC*, 457 F.3d 941, 944–45 (9th Cir. 2006) ("NRC and the [DOT] . . . co-regulate the transportation of radioactive material in the [U.S.]").
[47] *Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs*, 301 F. Supp. 3d 50, 67 (D.D.C. 2018).

**Accident and/or Radiologic Exposure**

New and significant disclosures in the ISP DEIS relate to both transportation and socioeconomic cost and benefit analyses and hinge on the responsibility and costs for coordinating transportation, payments for needed infrastructure improvements and providing necessary emergency training for first responders in the case of an accident along the unknown transportation routes. The ISP ER states "DOE or private qualified logistics company will also be responsible for coordinating with federal agencies. . .regarding transportation of SNF. . .*If DOE is the shipper, the federal government, through DOE, is responsible* for providing emergency training to states, tribes, and local emergency responders along the transportation routes where SNF would be transported to the CISF."[48]

By contrast, however, the ISP DEIS for the very first time asserts that "the NRC Staff recognizes that if SNF is shipped to a CISF, *some States, Tribes, or municipalities along transportation routes may incur costs* for emergency-response training and equipment that might otherwise be eligible for funding under NWPA Section 180(c) provisions if DOE shipped the SNF from existing sites to a repository."[49] Later it states that "*States are recognized as responsible for protecting health and safety during radiological transportation accidents*."[50] It additionally states, without reasonable justification, that "[a]nother cost factor shared by the proposed CISF and the No-Action alternative is emergency preparedness along the SNF transportation route."[51] Instead of further investigating this significant change in the ISP DEIS, the NRC opted to end its cumulative impacts analysis, concluding that "[b]ecause needs of individual municipalities along transportation routes and the costs. . .vary widely, quantification of such would be speculative. .

[48] ISP ER at 4-8. (*emphasis added*)
[49] ISP DEIS 4-74. (*emphasis added*)
[50] ISP DEIS at 8-11. (*emphasis added*)
[51] ISP at 8-11.

.and is beyond the scope of this EIS."[52]

Petitioners dispute this omission and maintain that such information must be included, assessed and taken into consideration not only for the cumulative transportation impacts analysis, but also in terms of the purported socioeconomic benefits of the proposed ISP CISF project and with respect to the No-Action Alternative. Indeed, these costs and the responsibility for same could be substantial, just as the costs required for improvements of infrastructure to ensure safe transport.

**2. Responsibility for Infrastructure Improvements**

The very last revision to the ER and the ISP DEIS acknowledge that the "DOE or the SNF Title Holder(s) are. . .responsible for the transportation of SNF from the shutdown and decommissioned reactors across the country."[53] However, there are significant and material differences in conclusions as to which entities would be responsible for payments to upgrade and improve rail and other infrastructure to ensure safe transport of nuclear waste across the country and on unknown, not-yet identified routes.

For example, the ISP ER states: "[s]tudies have been performed by the DOE to determine the level of work that would be needed to improve the infrastructure that would be required to remove SNF currently in storage at shutdown and decommissioned reactors for transport to an ISFSI or a geologic repository."[54] By comparison, the ISP DEIS states some decommissioned reactor sites "may require local transportation infrastructure upgrades to remove the SNF from the site" for example "installing or upgrading rail track, roads, or barge slips necessary to transfer SNF offsite."[55] Yet the ISP DEIS concludes without justification that such upgrades and the associated costs with same were not quantified or considered in the No-Action Alternative analysis, because

[52] ISP DEIS at 4-75.
[53] *See e.g.,* ISP ER at 3-8.
[54] *Id.*
[55] ISP DEIS at 4-10.

it: "(i) would be difficult to establish, (ii) would vary based on the individual generation sites, and (iii) would be a common need for both the proposed CISF and the No-Action alternative."[56]

These costs are part and parcel of the transportation necessary for proposed storage at the ISP CISF site and must be accounted for in the cumulative transportation analyses, any socioeconomic cost and benefit evaluation, and in terms of the No-Action Alternative. While NEPA does not require agencies to have a crystal ball to look into the future, it does require a reasonable "hard look" into the cumulative impacts – particularly given the gravity and seriousness of the nuclear waste cargo and costs at issue.

#### iii. Lack of Independent and Adequate NRC Review for Cumulative Impacts

As noted above, the ISP DEIS fail to adequately investigate and review cumulative impacts under NEPA and NRC regulations requiring an independent review and support of reliable data. The ISP DEIS further fails to identify, let alone accurately and completely analyze the cumulative impacts of, transportation routes from the decommissioned sites to the proposed ISP CISF site, improperly relying on representative routes conducted for purposes of other facilities.

The ISP DEIS, makes clear that the exact routes for transportation of the nuclear waste are unknown, speculating they will be determined at some unknown time in the future prior to shipment. As an alternative, the NRC based its evaluation on three representative routes. Despite the uncertainty and unknowns as to the myriad aspects of impacts involved with said transportation routes, the NRC Staff states that it "considers that representative or bounding routes applicable to a national SNF shipping campaign" that the DOE conducted in 2008 for Yucca Mountain and its analysis for a separate ISFSI site.[57] The NRC claims this should "provide sufficient information

[56] ISP DEIS at 8-11. Petitioners further dispute this statement, to the extent it lacks any significant discussion, supporting evidence or reasonable justification for the proposition this would be a common need.
[57] ISP DEIS at 3-8.

about potential transportation routes to support the analysis of impacts here."[58]

Surprisingly and in seemly contradictory position, the ISP DEIS eliminates the analysis of alternatives that also meet the purpose and need for the proposed CISF action, a DOE integrated waste management system, because it would necessarily "include . . .other key infrastructure needed to safely manage SNF from commercial nuclear reactors. . . and the DOE has not released detailed information concerning the planned interim storage facilities, such as . . . SNF transportation options and details . . .that would allow this alternative to be analyzed in detail."[59] The NRC concluded that the lack of information on transportation would be "details . . .needed for a comparison of environmental impacts," so the alternative was eliminated.[60]

This is new and material information, as it is the first of NRC's citation to the DOE 2008 publication in the ISP DEIS, under its independent review of the license application. Reliance on the DOE publication for evaluation for the use of barges for sites not accessible by rail also appears for the first time in the ISP DEIS, with the NRC finding the supplemental mode of transportation did "not significantly change the minor radiological impacts from a national mostly rail SNF transportation campaign." The NRC merely glossed over and did not fully evaluate the environmental impacts from transportation of SNF via barges or via heavy-haul trucks in the ISP DEIS. Similar to the infrastructure improvements, emergency responses along routes, turning a blind eye to supplemental modes of transportation, potential radiation exposure risks and environmental impacts is unacceptable.

Additionally, the NRC's alleged "independent" investigation and review are not site-specific to the ISP site as the representative routes considered involve hypothetical shipments of

[58] ISP DEIS at 3-8.
[59] ISP DEIS at 2-22.
[60] *Id.*

nuclear waste to Deaf Smith, Texas. This location is notably outside the Permian Basin and fails to adequately take into account the regional issues discussed below.

### 1. ISP DEIS is Based on Faulty Underling Premises and Speculative, Inaccurate and Unreliable Information

#### a. Faulty Underlying Premises

Contrary to statements in ISP's application documents, it is unlikely that a permanent repository will be built by 2048.[61] Cumulative transportation impacts must account for this delay and the possibility of repackaging and returning to sender.

Assumptions as to impacted populations who live within 50-mile radius of the proposed ISP CISF and along any potential but not-yet-determined transportation routes are erroneous as they rely on reference dosing for healthy, white middle-aged male. Vulnerable populations of elderly, children, expectant mothers and the immune suppressed (especially in these trying times COVID-19) must be accordingly notified of the potential safety risks and costs of transporting nuclear waste and the potential for radiologic exposure over the course of the CISF project lifetime.

Previous statements in the ISP ER indicated that infrastructure improvements would be funded by the DOE. Truth of matter is that local communities and states will be forced to foot the bill for infrastructure improvements and also shoulder the responsibility for providing emergency responders and resources in the event of an accident. Furthermore, it is unclear how or if the Price-Anderson Act would cover liability for accidents in transit if the DOE does not take title and ownership of the nuclear waste. These issues must each be addressed and accounted for in the underlying investigation and analyses.

#### b. Cumulative Transportation Impacts Fail to Consider Regional Characteristics

[61] ISP's license application documents recognize same. *See e.g.,* ISP ER at Attachments 1-1 and 1-2.

The NRC's most recent cumulative transportation impacts analyses fails to adequately consider potential safety risks and environmental impacts and sorely lacks discussion of the unique and interdependent regional characteristics within the 50-mile radius of the proposed ISP CISF site. Regional consideration must be accounted for and incorporated into the cumulative transportation impacts analyses, including the effects of seismic events, sinkholes and subsidence on transportation infrastructure, during the transport and transferring of casks at the proposed ISP site and the associated increased safety risks for radiological exposure. A proper cumulative transportation analysis must also consider, in the context of the foregoing, the impact and gravity of transporting 40,000 tons and competing regional utilization and accident prevalence on rail systems, highways and access roads near the proposed ISP CISF site.

**i. Seismicity, Subsidence and Sinkholes**

The potential effects of seismicity, subsidence and sinkholes on transportation infrastructure and resulting increased safety risks and environmental impacts derived from same must be adequately analyzed and incorporated into cumulative transportation impact analyses. The NRC adopting previously conducted analyses based on representative transportation routes with baked in assumptions for other proposed but not actively operating facilities (e.g. Private Fuel Storage, Yucca Mountain) fail to properly analyze site-specific conditions and the 50-mile radius surrounding the proposed ISP CISF site.

The proposed ISP CISF site is located in one of the least stable regions of the Central Basin Platform from a structural geology standpoint that has "undergone more fault reactivation in its history" than the remainder of the Central Bain Platform. While there is no consensus between academia, government and industry as to the cause of the seismicity in the region – the fact remains that recently it has experienced an increase in seismic events. Within the past 30 days, there have

been several dozen earthquakes in the area..[62] Additionally, in late March a magnitude 5.0 earthquake occurred within the 50-mile radius region of interest of the proposed ISP CISF site.[63] The ISP DEIS underestimates the potential risk for seismic events declaring the site has "less than 10% risk of fluid induced fault slip."[64]

Risk of seismic events in transporting heavy and extremely dangerous nuclear waste material throughout the Permian Basin and the potential for accidents in transferring the casks at the proposed ISP CISF and related impacts on regional industry transportation must be adequately analyzed and investigated.

**ii. Oil and Gas and Agricultural Industry Operations and Use of Rails and Highways**

Petitioners, as well as others in related industries, frequently and consistently rely on the cost-effective transportation infrastructure throughout the Permian Basin.[65] A proper cumulative impact analyses and assessment of siting evaluation factors must acknowledge these regional characteristics.[66] As illustrated in the newly disclosed ISP DEIS, all three of the hypothetical representative routes analyzed for cumulative impacts will be travelling along rail transportation that "serve oil, gas, agricultural and ranching industries in the region of the proposed CISF."[67] The ISP DEIS also does a disservice in terms of its lackluster investigation and evaluations into regional highways and access road transportation cumulative impacts.

**c. Cumulative Impacts Analysis Fails to Consider Potential for Terrorist Attacks, Derailments and Sabotage in**

[62] United States Geological Survey, Latest Earthquakes, last accessed July 6, 2020.
[63] D. Rice, *5.0 magnitude earthquake rattles West Texas: 'Like the vibration of a train, but bigger,'* USA TODAY (Mar. 26, 2020), available at: https://www.usatoday.com/story/news/nation/2020/03/26/el-paso-earthquake-5-0-magnitude-quake-rattles-west-texas/2916849001/.
[64] ISP DEIS at … (citations omitted).
[65] *See generally*, Decl. Taylor.
[66] Petitioners maintain their position that use of hypothetical or representative transportation routes in the context of the cumulative transportation impact analyses here is inadequate and inappropriate.
[67] *See* Dec. Taylor at ¶11.

**Permian Basin**

Given the extensive oil and gas, mineral resources, agricultural and ranching activities in the near vicinity of the proposed ISP CISF project, placing the nation's nuclear waste for interim storage in the Permian Basin puts a target on the nation's back in terms of national security – the likes of which has never been seen before. On top of a lack of adequate characterization of regional subsidence, seismicity and sinkholes, the anticipated subsequent transport and then re-transport of the nuclear waste through this sector, unnecessarily puts communities, industry and the nation at risk. Such compounded threats and risks cannot simply be ignored and must be evaluated given the volume of nuclear waste to be stored in the region given nearby facilities.

Moreover, given the experiences of regional geologic catastrophic subsidence in surrounding areas, possible derailment is a plausible event that must be considered in NRC's independent review and assessment of cumulative impacts.

**iv. Improper Cumulative Analyses Taint the Socioeconomic Benefits and Costs Comparison and Artificially Narrow the Site Selection Process**

The purpose and need of ISP's application is stated in such a way as to render the site selection process artificially narrow, and the NRC's inadequate cumulative impact investigation and evaluation of transportation is wholly deficient generally to provide any type of independent analysis, lacking any certainty as to the infrastructure improvement costs and, emergency response costs, and largely ignoring regional characteristics and land use and industry operations – tainting the well from a proper socioeconomic review and evaluation. A license applicant cannot "artificially narrow" the site selection process "as to circumvent the requirement that reasonable alternatives must be considered."[68]

[68] *See* ISP Memo and Order at 51; *see also*, *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-90-08, 32 NRC 201, 206 (1991).

Siting evaluation factors and selection of the proposed ISP CISF location cannot be premised on bias in an applicant's selection process without explanation, justification and supporting evidence of the underlying logic. Without a good faith effort in attempting to conduct a consent-based siting evaluation in violation of NEPA and NRC regulations, the ISP DEIS states: "NRC staff reviewed ISP's assessment process and determined that the ISP site-selection process. . . appears reasonable. . [n]one of the three other potential CISF sites was clearly environmentally preferable. . . therefore, no other site was selected for further analysis in this EIS."[69]

Summary of the impacts for transporting tens of thousands of metric tons of nuclear waste material over transportation infrastructure with substantial unknowns and inconsistencies as to improvements and necessary safeguards for transport, without definitively analyzing transportation routes, cannot reasonably serve as basis for developing a CISF that serves a national strategy to provide for the orderly transfer and/or storage of SNF. Let alone a proposed CISF that may become a permanent de facto storage solution.

The ISP DEIS fails to give appropriate weight to relevant regional characteristics that may influence both multiple rounds of transportation and ultimate storage at the proposed ISP CISF site in the Permian Basin. Without concrete evidence or valid citations and support, the ISP DEIS concludes that that the project will have SMALL cumulative impacts for transportation, land use along with nearly every other parameter considered. Without investigation and consideration to the issues cited herein, this shallow and superficial assessment lacks candor and falls short when considering the potential negative impacts and externalized costs that communities along the transportation routes and within the 50-mile region of interest will incur in the event of an accident or radiologic release of such high-level radioactive waste. NEPA and NRC regulations require transparent processes and depend

[69] ISP DEIS at 2-25.

on reasonable, fulsome agency reviews that will provide the pertinent facts and information to the public and enable a level of investigation and inquiry capable of assessing the reality of potential cumulative impacts of the proposed ISP CISF project.

#### v. ISP DEIS Cumulative Impact Analyses are Deficient in Violation of NEPA and NRC Regulations

A proper NEPA requires the agency take a "hard look" at the realistic benefits and legitimate costs – and NRC regulations likewise require the agency to reasonably consider alternatives in light of all siting evaluation factors, safety risks and environmental impacts for an ISFSI and MRS.[70] These regulations both warrant reasonable investigations. The NRC regulations specifically require application to be material, complete and accurate in all respects.[71] Pursuant to 10 C.F.R. § 72.108, license applicants for "proposed ISFSI or MRS must be evaluated with respect to the potential impact on the environment of the transportation of spent fuel, high-level radioactive waste, or reactor-related GTCC waste within the region." The examination in the recent ISP DEIS merely gives transportation issues a passing glance.

There are serious deficiencies in the cumulative impacts analyses of the ISP DEIS that lack of proper review of siting evaluation factors, extrapolating layer on top of layer of assumptions from previously conducted examinations and prior analyses for proposed operations (that are not currently and were never operable), employing uncertain and unknown variables as the fence posts for the transport and storage of nuclear waste – defies common sense. As a result of such deficiencies, the socioeconomic benefits of the proposed ISP CISF project are skewed and unreliable, and the public and communities along undisclosed transportation routes and rail lines are tangled in a web of speculation that they cannot afford to ignore. The ISP DEIS cumulative impact analyses are riddled

[70] 10 C.F.R. §§ 72.90-108.
[71] 10 C.F.R. § 72.11.

with unspecified variables and parameters that have the potential to change the entire equation. Such secrecy in this context robs the public of a meaningful opportunity to participate and comment on the proceedings, including those that may be subject to or injured by safety risks, transportation, socioeconomic, and/or environmental impacts. Obscurity of these notable issues violates NRC and NEPA regulations (as well as other federal and state laws).

As discussed *infra*, Petitioners object to reliance on insufficient data, speculative agreements with unknown terms, omissions of material information, and further object to the improper conclusions drawn from same in the recent ISP DEIS. Petitioners further dispute the ISP DEIS disregard and failure to account for interdependent and unique regional factors and geologic characteristics to fully and appropriately analyze the potential cumulative impacts of the proposed project. Accurate, complete, and reliable inputs and information are necessary to fully assess the safety risks and cumulative environmental impacts of the proposed ISP CISF over the lifetime of the project.

An inventory of origination sites and transportation modalities will help communities to better understand the shipment numbers going through their communities by rail, truck and barge. The lack of details, at best a cursory discussion of transportation, in the proposal is problematic. Considerations of exact number of shipments to CISF; expected numbers of start clean/stay clean shipments (return to sender) and the number of shipments from CISF to a permanent repository based on operational lifespan of CISF is necessary to make a best estimate of risks to communities in the transportation corridor.

ISP's improper reliance on speculative and inaccurate information eliminates its ability to satisfy an applicant's necessary requirements to support their arguments with "appropriate and accurate references to legal authority and factual basis"[50] and evaluate crucial site evaluation factors.

NEPA and NRC regulations call for concrete evidence and facts based on the current state of knowledge. ISP DEIS failure to provide such material information, inevitably renders its underlying methodologies and analyses incomplete at best. such analyses impossible and falls short of the transparency and independent review required of the NRC and necessary to ensure public participation in the ISP licensing proceedings. ISP and the NRC cannot conclusory rely on representative routes, unknown liabilities and contracting with terms unknown and employ unreliable methodologies in assessing cumulative impacts and the No-Action Alternative.

## V. CONCLUSION

Because the ISP DEIS and its licensing application documents are based on faulty premises and inaccurate and incomplete information. As a result, the ISP DEIS cumulative analyses and findings are deficient and in violation of NEPA and NRC regulations.

Dated July 6, 2020

/*electronically signed by Allan Kanner*

**KANNER & WHITELEY, LLC**
Allan Kanner, Esq.
Conlee S. Whiteley, Esq.
Cynthia St. Amant, Esq.
Annemieke M. Tennis, Esq.
701 Camp Street
New Orleans, Louisiana 70130
Phone: (504) 524-5777
Fax: (504) 524-5763

/signed electronically by/
Monica Perales
6101 Holiday Hill Road
Midland, TX 79707
(432)687-1777
monicap@forl.com

*Attorneys for Petitioners*

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>July 6, 2020 |

## CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305, I Allan Kanner certify that, on this 6th day of July, 2020, true and correct copies of Fasken's Motion for Leave to File New Contention No. 5, and attachments were served upon the Electronic Information Exchange (the NRC's E-Filing System) in the above-captioned proceeding.

/*electronically signed by Allan Kanner*

**KANNER & WHITELEY, LLC**

Allan Kanner, Esq.
Conlee S. Whiteley, Esq.
Cynthia St. Amant, Esq.
Annemieke M. Tennis, Esq.
701 Camp Street
New Orleans, Louisiana 70130
Phone: (504) 524-5777
Fax: (504) 524-5763

*Attorneys for Petitioners*

# Tab 22

# Exhibit 1

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE COMMISSION**

| | | |
|---|---|---|
| In the Matter of: | ) | |
| | ) | |
| | ) | Docket No. 72-1050 |
| IN THE MATTER OF | ) | |
| INTERIM STORAGE | ) | July 6, 2020 |
| PARTNERS LLC | ) | |
| | ) | |
| (Consolidated Interim Storage Facility) | ) | |

## DECLARATION

1. My name is Tommy E. Taylor and my business address is 6101 Holiday Hill Road, Midland, Texas 79707. I reside at 4100 Timberglen Circle, Midland, Texas 79707. My position with Fasken Management, LLC is Vice President and Director of Oil and Gas Development. I am authorized by the business to execute this declaration on its behalf and on behalf of the Permian Basin Coalition of Land and Royalty Owners and Oil & Gas Operators (PBLRO) of which I am an officer.
2. This declaration is in support of the Motion for Leave to File New and/or Amended Contention of Fasken Land and Minerals and the PBLRO in the above-captioned docket.
3. Fasken Land and Minerals, of which Fasken Management, LLC is its General Partner, is engaged in ranching as well as oil and gas extraction and production activities. The business currently operates active oil and gas properties within eighteen miles of the proposed ISP CISF. The PBLRO presently has lands, mineral interests, and active leases throughout Andrews County with a founding member owning land within four miles of the proposed ISP CISF.
4. I am personally familiar with other members of PBLRO of which there are 65 individual members with multiple ranchers engaged in agricultural activities and owning land in the area for over a century and at least three members being publicly traded corporations (two integrated and one large independent oil and gas operator) as well as numerous private companies involved in the extraction and production of oil and gas in the Permian Basin.
5. As the Director of Oil and Gas Development for Fasken, I am personally familiar with ongoing oil and gas activities in the vicinity of the proposed CISF and throughout the Permian Basin. Fasken has owned the land and minerals within the vicinity of the proposed CISF for over a century and drilled its first well in the Permian Basin approximately 70 years ago. I also have personal knowledge of the activities of other oil and gas entities that are members of the PBLRO, one of which began drilling in the Permian Basin approximately 80 years ago and has extensive interests within close proximity to the proposed CISF. Neither Fasken nor any member of the PBLRO has relinquished control of their interests for the proposed ISP CISF.

6. I am personally familiar with the agricultural use of the land within the vicinity of the proposed site and of the members of the PBLRO that graze their animals within four miles of the proposed CISF and draw water from wells that are fed by groundwater from formations that are present beneath the proposed CISF.
7. My understanding is that Interim Storage Partners (ISP) plans to establish a facility at the proposed site to store spent nuclear fuel from commercial reactors in the United States.
8. I understand that a significant radiation release during the transport of spent fuel is a possibility and that it may contaminate areas in which Fasken Land and Minerals, Ltd. and other members of PBLRO have oil and gas and other property interests and/or extraction and production facilities.
9. I understand that even the most minimal transportation incident, such as a derailment or collision involving spent fuel, would amount to a dangerous materials emergency that has the potential to interrupt or foreclose further oil and gas extraction/production activities within the area of the incident as well as adversely affecting the recipients of oil commodities which are regularly transported by rail. A transportation incident involving either of the two rail lines named in ISP's Draft Environmental Impact Statement (DEIS) would likely diminish or has the potential to eliminate the economic value of oil and gas assets belonging to Fasken and other members of PBLRO.
10. Even the most minimal transportation incident involving spent fuel has the potential to interrupt or foreclose agricultural and ranching activities in the Permian Basin, thereby diminishing or eliminating the economic value of the real property interests and assets of Fasken and other members of the PBLRO.
11. Both Fasken and the PBLRO regularly utilize rail transportation to support their industries. Those named in the DEIS at issue, Union Pacific (UP) and the Texas-Mexico Railroad (TNMR), both serve the oil, gas, agricultural and ranching industries in the region of the proposed CISF. According to Union Pacific, two of its four key operating segments are the agricultural and energy industries. Union Pacific reported revenue from energy freight in 2019 as $3.8 billion. It reports that railroads are the most efficient and cost-effective means of transportation of crude, frac sand, and petroleum by-products and transported 1.4 million carloads of energy freight shipments in 2019. In fiscal year 2019, agricultural commodities accounted for 18% of UP's shipments and energy freight accounted for 22%. The Texas-New Mexico Railroad extends from a UP connection at Monahans, Texas. It is one of two lines owned by Watco that primarily serve the Permian Basin. Watco reports oilfield commodities as its primary shipments on the TNMR and agricultural commodities as primary on its Lubbock and Western Railways shipments.
12. With regard to energy freight: Fasken relies upon the rail lines of the Permian Basin primarily for sand, acid, casing and tubing, cement, gel, and various liquid and dry chemical components that are used for blending associated products that are all necessary to drill and complete an oil well and bring it to production. PBLRO members utilize the Permian Basin rail lines primarily for materials similar to that of Fasken but also for water, additional frac chemicals, and acid. According to the DEIS, the proposed CISF would utilize the same rail lines which the oil and gas industry of the Permian Basin relies upon. Any hazardous materials emergency upon the rails that interferes with energy freight poses a loss of millions of dollars per day affecting multiple operators in the Permian Basin. As an example, a typical Fasken horizontal multi-well drilling project

cannot be completed until the staging of materials is achieved. Rail delays amount to potential lost production totals of approximately 5,800 barrels of oil per day (BOPD) and 3,500 cubic feet (MCF) of gas daily, per multi-well horizontal drilling pad. This equates to a loss of $350,000 daily and $10.6 million monthly in lost production from a single multi-well pad. A delay on the rails that results in standby costs on a frac job amount to $115,000 per day, per well and drilling rig operation standby costs amount to $50,000 per day, per drilling rig. Additionally, leases are susceptible to termination under Texas' rules on nonproducing wells. In the event such a loss occurs, an operator such as Fasken, or one of the members of the PBLRO, stands to lose a capital investment of $10 to $14 million per well. Possible remedies, including lease extensions, are onerous and expensive. As a representative of the industry, one must look to the risk posed by sharing the same rail lines that have primarily been transporting oil commodities with spent fuel. One must also question whether an objective and thorough analysis of possible injury to the oil and gas industry will be conducted as part of a risk assessment.

13. The single-track railway proposed in the DEIS for the transport of spent fuel traverses through rural, remote areas. The DEIS and the transportation studies referenced in the DEIS fail to determine the risks and vulnerabilities relating to the remoteness of the majority of said rail lines. Although the rail lines in the Permian Basin are a major means of transportation, they are situated in desert-like areas served mostly by volunteer fire departments or areas lacking emergency responder resources. In consulting crane operators regarding the DEIS, there are real logistical problems in situating a crane capable of resetting a spent fuel transport cask and rail car in some of the more remote areas of the Permian Basin. Also, a single hazardous materials emergency would not only have a detrimental effect upon the oil and agricultural industries of the Permian Basin but would also likely overwhelm our first responders and the small communities adjacent to the rail track.
14. The DEIS and the transportation study referenced by the DEIS fail to account for the subsidence, sink holes and seismicity prone areas of the Permian Basin through which the spent fuel will be transported.
15. The DEIS and the transportation study referenced by the DEIS fail to account for rail related accidents in the Permian Basin. Not including derailments, the region has experienced a highly significant increase in rail related crashes in recent years. In fact, the Midland-Odessa Transportation Alliance (MOTRAN) reports that from 2016-2018, there were 158 rail related crashes in the Texas Department of Transportation Odessa District with just over half of those accidents occurring in Midland and Ector Counties. This is the very area through which the spent fuel shall be transported via rail. MOTRAN reports that during that same period, other Permian Basin counties also experienced drastic increases: Ector County saw a 55% increase, Reeves saw a 266% increase, and Ward County saw a 700% increase in rail related crashes.
16. I am personally familiar with oil and gas activity in the vicinity of the proposed CISF and of the approximately 120 individual persons required to facilitate the completion of each, individual oil and gas well in the vicinity of the proposed CISF. The potential harm to those individuals in the oil and gas industry, the potential harm to the ranchers and livestock, the potential impacts upon agriculture and, especially, upon human mortality and morbidity rates, and the economic costs associated with medical care and treatment

of radiation related conditions could possibly affect Fasken and other members of PBLRO.

17. The CISF proposed transportation method of sharing the rail lines of the Permian Basin with the oil, gas, and agricultural industry of the region is a flawed proposal. An integral part of the DEIS and its transportation study must include an objective, comprehensive analysis of the issues raised in this declaration and of the very real potential that the transport of spent fuel via rail through the Permian Basin could diminish or foreclose further development of oil and gas assets of Fasken, of the members of the PBLRO and of the entire Permian Basin.
18. In order to assure that the licensing decision in this matter adequately protects the interests of Fasken and other PBLRO members and to protect the economic interests of Fasken and PBLRO, of which I am a part, I am authorized to effect the participation of both Fasken and PBLRO in the above-captioned NRC docket.
19. As a petroleum engineer with 35 years of oil and gas production experience, the contentions raised by petitioners in this matter are sound.

Under penalty of perjury, the above is true and correct to the best of my knowledge and understanding.

_____

Declarant: Fasken Land and Minerals, Ltd.
By Fasken Management, LLC, its General Partner
Tommy E. Taylor, Vice President

*/s/ Tommy E. Taylor*_____
Date: July 6, 2020

of radiation related conditions could possibly affect Fasken and other members of PBLRO.

17. The CISF proposed transportation method of sharing the rail lines of the Permian Basin with the oil, gas, and agricultural industry of the region is a flawed proposal. An integral part of the DEIS and its transportation study must include an objective, comprehensive analysis of the issues raised in this declaration and of the very real potential that the transport of spent fuel via rail through the Permian Basin could diminish or foreclose further development of oil and gas assets of Fasken, of the members of the PBLRO and of the entire Permian Basin.
18. In order to assure that the licensing decision in this matter adequately protects the interests of Fasken and other PBLRO members and to protect the economic interests of Fasken and PBLRO, of which I am a part, I am authorized to effect the participation of both Fasken and PBLRO in the above-captioned NRC docket.
19. As a petroleum engineer with 35 years of oil and gas production experience, the contentions raised by petitioners in this matter are sound.

Under penalty of perjury, the above is true and correct to the best of my knowledge and understanding.

Tommy E. Taylor

Declarant: Fasken Land and Minerals, Ltd.
By Fasken Management, LLC, its General Partner
Tommy E. Taylor, Vice President

7/6/2020

Date

# Tab 23

# Exhibit 2

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE<br>PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>July 6, 2020 |

**FACTS PETITIONERS INTEND TO RELY ON TO SUPPORT NEW AND AMENDED CONTENTIONS**

**Interim Storage Partners LLC ("ISP") Environmental Report Rev. 3[1]**

- "The DOE or the SNF Title Holder(s) are is also responsible for the transportation of SNF from the shutdown and decommissioned reactors across the country. Studies have been performed by the DOE to determine the level of work that would be needed to improve the infrastructure that would be required to remove SNF currently in storage at 12 shutdown and decommissioned reactors for transport to an ISFSI or a geologic repository."[2]
- "The environmental impacts to the affected areas would be attributable to radiation doses received by members of the public along the transportation routes. Over the next several years, the DOE is expected to commission new transportation systems needed to transport SNF from existing commercial reactor sites, including the shutdown reactor sites, to a CISF or geologic repository. Other environmental impacts would be attributable to upgrades that would be required to the railroad lines leading from the former reactor sites to a CISF or geologic repository. The connected environmental impacts potentially associated with the transportation of SNF and upgrades required to support the removal of SNF from the shutdown and decommissioned reactor sites are discussed in Section 4.2."[3]
- "A non-local cumulative impact is the cumulative dose to the public associated with transporting radioactive materials in commerce. Both the NRC and the TCEQ evaluated the environmental impacts attributable to transportation at the NEF and Waste Control Specialists LLRW Disposal Facility, respectively . The number of annual shipments transported by highway in the analysis by NEF

[1] WCS Consolidated Interim Storage Facility Environmental Report, Docket No. 72-1050, Rev. 3, (Feb. 17, 2020) (ADAMS Accession No. ML20052E152), hereinafter "ISP Environmental Report."
[2] ISP Environmental Report at 3-8.
[3] ISP Environmental Report at 3-9.

was estimated at 1,500. Approximately 1,026 shipments by highway and 96 shipments by rail were received in 2015 to support operations at Waste Control Specialists. In comparison, ISP anticipates that no more than 200 shipments of SNF would be received annually at the CISF."[4]

- "Impacts from construction transportation would include the generation of fugitive dust, changes in scenic quality, and added noise. Dust would be generated to some degree during the various stages of construction activity. The amount of dust emissions would vary according to the types of activity. The first 12 months of construction would likely be the period of highest emissions since approximately 63 ha (155 acres) would be involved, along with the greatest number of construction vehicles operating on an unprepared surface. However, it is expected that no more than 20 ha (50 acres) would be involved in this type of work at any one time."[5]
- "Based on the average daily traffic on nearby roadways, the temporary increase in vehicle flow associated with onsite operations would occur for periods of short duration during shift changes with little effect on anticipated transportation impacts to the surrounding area. Integrated transportation impacts are small."[6]
- If the DOE is the shipper, the federal government, through DOE, is responsible for providing emergency training to states, tribes, and local emergency responders along the transportation routes where SNF would be transported to the CISF. ISP joint venture member Waste Control Specialists has acquired considerable experience in responding to the potential transportation events given its relative proximity to the Waste Isolation Pilot Plant. Local fire fighters, law enforcement, and emergency medical staff have been trained to respond to put out fires and organizing any emergency response actions that may be needed to reduce the severity of events related to transportation incidents involving SNF.[7]
- SNF would be transported exclusively by rail. All SNF would be transported approximately 169 km (105 mi) from Monahans, Texas to the CISF along the transportation corridor. The DOE or nuclear plant owner(s) holding title to the SNF will be responsible for transporting SNF from existing nuclear power plants to the CISF by rail in transportation casks licensed by the NRC pursuant to 10 CFR 71. The preparation of such shipments will be conducted in accordance with written procedures prepared by the commercial nuclear power plant, the DOE, or their contractors. The DOE or private qualified logistics company will also be responsible for coordinating with federal agencies, such as the U.S. Department of Transportation, U.S. Department of Homeland Security, U.S. Environmental Protection Agency, and the Federal Emergency Management Agency, regarding transportation of SNF from the commercial nuclear reactor sites to the CISF.[8]

[4] ISP Environmental Report at 2-67.
[5] ISP Environmental Report at 4-4.
[6] ISP Environmental Report at 4-7.
[7] ISP Environmental Report at 4-8.
[8] ISP Environmental Report at 4-8.

- Non-radiological environmental impacts connected to upgrades associated with the fabrication of new rail transport carriers and enhancements to rail infrastructure needed to remove SNF from the decommissioned reactors and transport to an ISFSI or geologic repository are discussed in a DOE report titled, A Project Concept for Nuclear Fuels Storage and Transportation. ISP anticipates initially receiving up to approximately 5,000 MTUs of SNF and related GTCC waste from decommissioned reactor sites at 12 locations across the U.S. As discussed in Section 3.2, heavy-haul trucks may be needed to move SNF over short distances from a decommissioned reactor site to a rail transfer facility. The NRC previously analyzed the environmental impacts associated with using heavy haul trucks to transport SNF from a rail transfer facility to an interim storage facility in NUREG-1714. The distances analyzed in the NUREG-1714 report transporting are much greater than the distances between the shutdown decommissioned reactor sites and the rail transfer facilities. Thus, the environmental impacts analyzed in NUREG-1714 are bounding. The radiological impacts potentially affecting members of the public along the three transportation routes have been analyzed and are described below. The radiological environmental impacts attributable to the transport of SNF from the decommissioned reactor sites are insignificant. [9]
- "The radiological impacts potentially affecting members of the public along the three transportation routes have been analyzed and are described below. The radiological environmental impacts attributable to the transport of SNF from the decommissioned reactor sites are insignificant."[10]
- "During construction, fugitive dust emissions are expected and are authorized under a "Permit By Rule" by the TCEQ. Transportation impacts to air quality include emissions from employee automobiles and the diesel locomotive used to transport SNF along the transportation corridor to the Cask Handling Facility at the CISF. Air quality would also be impacted from emissions of carbon monoxide, carbon dioxide and particulates from the combustion of diesel and other fuels used to construct, assemble and transport the spent fuel storage. The environmental impacts to air quality would not be significant. Additional information regarding the environmental impacts to air quality is provided in Sections 3.6 and 4.6."[11]
- "ISP would obtain any needed storm water permit addressing potential runoff of sediments and required BMPs during construction of the rail side track. No significant environmental impacts to water quality are expected to be attributable to the transportation of SNF, to the CISF, including during construction of the rail sidetrack. Additional information regarding impacts to water quality during transportation is provided in Sections 3.4 and 4.4."[12]
- "The CISF would be designed and constructed in manner that would minimize the quantity of radioactive wastes and contaminated equipment, and facilitate the removal of radioactive wastes and contaminated materials at the time the

[9] ISP Environmental Report at 4-9.
[10] ISP Environmental Report at 4-9.
[11] ISP Environmental Report at 4-10.
[12] ISP Environmental Report at 4-10.

CISF is permanently decommissioned pursuant to 10 CFR 72.130, Criteria for decommissioning. At the time of license termination, the site would be released for unrestricted use in accordance with 10 CFR 20, Subpart E. Radioactive materials generated would be transported and disposed of at Waste Control Specialists LLRW Disposal Facilities. As such, the transportation impacts at the time of decommissioning would be small."[13]

- "The evaluation determined that the radiological impacts for both incident-free transportation and accidents for shipments to and from the CISF were small and well below background doses. It further showed that barge and heavy haul shipments were not major contributors to overall collective dose."[14]
- The assumptions related to the number of casks per shipment, number of casks shipped per year, total number of casks and shipments over the time used to determine the radiological impacts of transporting SNF in this evaluation are different that those used to calculate the Cost Benefits documented in Chapter 7. The assumptions used in herein are appropriate because they are bounding and conservative for determining bounding dose estimates at 4-13.
- "In licensing the PFS SNF Storage facility, the NRC analyzed the radiological impacts associated with transporting 40,000 MTUs of SNF from Maine Yankee to Goshute Indian Reservation near Salt Lake City, Utah. The radiological impacts attributable to transportation were not significant and served as a basis for issuance of the Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation for the Skull Valley Band of the Goshute Indians and the Related Transportation Facility in Tooele County, Utah."[15]
- "The radiological transportation impacts that could potentially occur during off-normal events were analyzed. Type B transportation casks licensed in accordance with 10 CFR Part 71 are constructed to withstand severe accidents so that most transport accidents would not result in damage to the cask body or seals that would result in a release. The evaluation looked at three types of potential accidents involving the transportation of SNF by rail, accidents involving no release, accidents involving a release and accidents resulting in a loss of shielding. The dose risk was found to be small for all three types of accidents, and is described in more detail in Attachment 4.1. The conclusion that the accident dose risk is small is consistent with previous studies conducted by the NRC."[16]
- "The data on minority and low-income populations in the 6.4 km (4 mi) radius study area does not indicate the presence of an environmental justice community of concern. No relocations or displacements would be required for the proposed CISF activities. Any noise or air quality considerations would be primarily limited to temporary impacts during the construction phase. Deliveries of storage casks would happen only a few times a week and transportation would be on rail cars, resulting in limited noise or air quality

[13] ISP Environmental Report at 4-10.
[14] ISP Environmental Report at 4-11.
[15] ISP Environmental Report at 4-14.
[16] ISP Environmental Report at 4-22.

impacts. Economic impacts from construction and operations would result in small positive effects on the local and regional economy."[17]

- "There are no anticipated integrated impacts to the rail since it will be used for transportation of canisters during operation but will not be used for construction of pads. There would be small integrated impacts to the local transportation system when construction and operation are concurrent due to the movement of operation workers commuting each day to the proposed CISF and due to the movement of construction workers commuting to the proposed CISF. It is anticipated the integrated impacts would be small since the construction will be on and off over the course of 20 years. The operations workforce is expected to have 30 workers distributed among 3 shifts per day using individual or light trucks. These workers could account for an increase of 60 vehicle trips per day on Texas Highway 176/ New Mexico Highway 234. The construction work force would be a maximum of 50 construction workers using individual vehicles, work trucks or cement trucks. These workers would account for an increase of 100 vehicle trips per day local roads for approximately 60% of one year or 7.2 months out of 12 months."[18]
- "For an "away-from-reactor" storage facility such as the CISF, the NRC concluded in its GEIS that the unavoidable adverse environmental impacts for each resource area were small except for air quality, terrestrial ecology, aesthetics, waste management, and transportation; the impacts to these resources could range from small to moderate. Socioeconomic impacts would range from small to beneficial and large. Historic and cultural impacts could be small, moderate, or large, depending on a variety of local conditions. The potential moderate impacts to air quality, terrestrial wildlife, and transportation were based on construction-related potential fugitive dust emissions, terrestrial wildlife direct and indirect mortalities, and temporary construction traffic impacts. The potential moderate impacts to aesthetics and waste management were based on noticeable changes to the viewshed from constructing a new ISFSI. The volume of nonhazardous solid waste generated by assumed ISFSI and dry transfer system replacement activities would be minimal. Potential large positive impacts to socioeconomics would be due to local economic tax revenue increases from the CISF. The GEIS' potential large impacts to historic and cultural and special status species apply to assumed site-specific circumstances at an away-from-reactor ISFSI involving the presence of these resources during construction activities and the absence of effective protection measures. Specifically, these potential historic and cultural impacts vary depending on whether resources are present, the extent of proposed land disturbance, and whether the licensee has management plans and procedures in place that are protective of historic and cultural resources. For the WCS CISF, the land disturbance area is relatively small and the impact on threatened or endangered species is very small. ISP joint venture member Waste Control Specialists has implemented management plans to be protective of the

[17] ISP Environmental Report at 4-77.
[18] ISP Environmental Report at 4-87.

ecology."[19]

- "For an away-from-reactor ISFSI, the NRC concluded in its GEIS that there would be no irreversible and irretrievable commitments of resources during continued storage for most resources. However, impacts on land use, aesthetics, historic and cultural resources, waste management, and transportation would result in irreversible and irretrievable commitments. As finite resources, the loss of historic and cultural resources would constitute irreversible and irretrievable impacts. For the indefinite storage timeframe, land and visual resources allocated for SNF storage would be committed in perpetuity as continued operations would preempt other productive land uses and permanently affect the viewshed. Waste-management activities involving waste treatment, storage, and disposal would result in the irreversible commitment of capacity for waste disposal. Transportation activities would involve the irreversible and irretrievable commitment of resources, including vehicle fuel for commuting workers and shipping activities."[20]
- Attachment 1-1 Letters[21]
- Attachment 1-2 TCEQ's Assessment of HLRW Storage Options (2014)[22]
- Attachment 2-2 Site Scoring Analysis[23]
- Attachment 4-1 Explanation of Transportation Analysis[24]
- Appendix A – Socioeconomic Impact Analysis (November 2019)[25]

**ISP Draft Environmental Impact Statement ("DEIS")[26]**

- During operation of any project phase, SNF would be shipped from existing storage sites at nuclear power plants or ISFSIs to the proposed CISF. These shipments must comply with applicable NRC and U.S. Department of Transportation (DOT) regulations for the transportation 25 of radioactive materials in 10 CFR Parts 71 and 73 and 49 CFR Parts 107, 171–180, and 390–397, as appropriate to the mode of transport. The NRC staff evaluated the radiological and nonradiological health impacts to workers and the public from this project-specific transportation, considering both incident-free and accident conditions"[27]
- Because no arrangements regarding which nuclear power plants would store SNF at the proposed CISF have been made yet, the exact locations of SNF shipment origins have not been determined; therefore, the details regarding the

[19] ISP Environmental Report at 8-4.
[20] ISP Environmental Report at 8-5.
[21] ISP Environmental Report starting at A1-1-1.
[22] ISP Environmental Report starting at A1-2-1.
[23] ISP Environmental Report starting at A2-2-1.
[24] ISP Environmental Report starting at A4-1-1.
[25] ISP Environmental Report starting at A-A-1.
[26] Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas, Draft Report for Comment, NUREG-2239 (May 2020) (ADAMS Accession No. ML20122A220), herein after "ISP DEIS."
[27] ISP DEIS at xxiii.

specific routes that would be used also are not known at this time.[28]

- Additionally, the SNF stored at the proposed CISF project would eventually need to be transported to a permanent geologic repository, in accordance with the U.S. national policy for SNF management established in the Nuclear Waste Policy Act of 1982, as amended (NWPA). The NWPA requires that DOE submit an application for a repository at Yucca Mountain, Nevada. Unless and until Congress amends the statutory requirement, the NRC assumes that the transportation of SNF from the CISF to a permanent repository will be to a repository at Yucca Mountain, Nevada.[29]
- The exact routes for SNF transportation to and from the proposed CISF would be determined in the future prior to making the shipments. However, to evaluate the potential impacts of these shipments and to aid the evaluation of the ISP transportation analyses, the NRC staff considers that representative or bounding routes applicable to a national SNF shipping campaign such as those described and evaluated in Section 2.1.7.2 of DOE's Final Supplemental Environmental Impact Statement for a geologic repository at Yucca Mountain (DOE, 2008) and NRC's most recent SNF transportation risk assessment in NUREG–2125 (NRC, 2014), provide sufficient 15 information about potential transportation routes to support the analysis of impacts in EIS 16 Section 4.3. The NRC staff considers the routes evaluated in these prior transportation 17 analyses to be representative or bounding for SNF shipments to and from the proposed CISF 18 project because they were derived based on typical transportation industry route selection 19 practices, they considered existing power plant locations, and can be applied to EIS analyses 20 using conservative or bounding assumptions (e.g., as described further in Section 4.3 of this 21 EIS, selecting a route that is longer than most of the routes that would actually be used).[30]
- DOE. "Final Supplemental Environmental Impact Statement for a Geologic Repository for the 2 Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, 3 Nye County, Nevada." DOE/EIS-0250F-S1. ADAMS Accession No. ML081750191. 4 Washington, DC: U.S. Department of Energy, Office of Civilian Radioactive Waste 5 Management. (2008)
- Sinkholes and karst fissures formed in gypsum bedrock are common features on the rim of the 42 Delaware Basin, a sub-basin of the Permian, which abuts the Central Basin Platform in west 43 Texas and southeastern New Mexico. New sinkholes form almost annually,. . .[31]
- The Wink sinkholes in Winkler 7 County, Texas, are approximately 72 km [45 mi] south-southwest of the proposed CISF project 8 area and probably formed by dissolution of salt beds in the upper Permian Salado Formation 9 that resulted from an improperly cased abandoned oil well (Johnson et al., 2003). The Jal 10 Sinkhole near Jal, New Mexico, is approximately 30 km [18 mi]

[28] ISP DEIS at 3-7.
[29] ISP DEIS at 3-8.
[30] ISP DEIS at 3-8.
[31] ISP DEIS at 3-19.

southwest of the proposed CISF 11 and also probably formed by dissolution of salt beds in the Salado Formation caused by an 12 improperly cased groundwater well (Powers, 2003). The Jim's Water Service Sinkhole, Loco 13 Hills Sinkhole, Denver City Sinkhole, and I&W Brine Well resulted from injection of freshwater 14 into underlying salt beds and pumping out the resulting brine for use as oil field drilling fluid 15 (Land, 2013). The Jim's Water Service, Loco Hills, and Denver City sinkholes are located in 16 relatively remote areas; however, the I&W Brine Well is located in a more densely populated 17 area within the City of Carlsbad, New Mexico. The wells and karst features described above all 18 occur outside of the land use study area. In the proposed CISF project area, there are no 19 subsurface salt mining operations.[32]

- Recent studies employing satellite imagery have identified movement of the ground surface across an approximately 10,360 km2 [4,000 mi2 21 ] area of west Texas that includes Winkler, 22 Ward, Reeves, and Pecos counties (Kim et al., 2016; SMU Research News, 2018). In one 23 area, as much as 102 cm [40 in] of subsidence was identified over the past 2.5 years. This area 24 is approximately 0.8 km [0.5 mi] east of the Wink No. 2 sinkhole in Winkler County, Texas, 25 where there are two subsidence bowls. The rapid sinking in this area is most likely caused by 26 water leaking through abandoned wells into the Salado Formation and dissolving salt layers 27 (SMU Research News, 2018)[33]
- "Potential transportation impacts include increases in traffic, potential changes to traffic safety, and increased degradation of roads. These impacts would result from transport of equipment, supplies, and produced construction wastes. Workers commuting to and from the facility would also increase traffic. These impacts were found to be minor for the proposed action and full build-out (Phases 1-8). Other impacts, including radiological and nonradiological health and safety impacts under normal and accident conditions, could result from the proposed use of national rail lines to transport shipments of SNF to and from the CISF. These rail shipments of SNF could include relatively short segments of barge or heavy haul truck transportation as needed to move SNF from reactor sites to the nearest rail line where onsite rail access is limited."[34]
- The largest 33 earthquake recorded in the vicinity of the proposed CISF was the Rattlesnake Canyon 34 earthquake recorded in 1992, which had a magnitude 5.0 M and an epicenter located 35 approximately 30 km [18 mi] southwest of the proposed project area.[35]
- "Radiological impacts from transportation to both workers and the public were estimated based on prior NRC transportation risk estimates in NUREG–2125, "Spent Fuel Transportation Risk Assessment," and scaled using a representative transportation route that is longer than the distance from most reactor sites to

[32] ISP DEIS at 3-20.
[33] ISP DEIS at 3-20.
[34] ISP DEIS at 13.
[35] ISP DEIS at 3-20.

the CISF. Because dose estimates increase with shipment distance, selecting a route with a larger distance than that actually expected is bounding (i.e., it overestimates potential dose). The radiological impact to workers from incident-free transportation of SNF to and from the CISF for the proposed action and for full build-out (Phases 1-8) were found to be below the NRC 10 CFR Part 20 standard dose limit of 0.05 Sv (5 rem) (see Section 4.3.1 of the draft EIS)."[36]

- "The potential radiological health impacts to the public from incident-free transportation of SNF to and from the CISF would occur from exposures to the normal radiation emitted (during transportation) from the loaded transportation casks. All of the estimated public health effects from the proposed incident-free SNF transportation for all phases are below the thresholds for health effects (Section 4.3.1.2.2.2 of the draft EIS) and, therefore, are most likely to be zero. Someone who stands about 30 meters [98 feet] from the tracks and watches all 3,400 shipments over 20 years would receive a dose of about 0.019 mSv, or 1.9 mrem, of direct radiation emitted from the heavily shielded transportation casks. For comparison, the NRC limits annual public doses from licensed facility operations to 1 mSv [100 mrem] (10 CFR Part 20) and the average annual background radiation exposure in the United States is 6.2 mSv [620 mrem], with approximately 3.1 mSv [310 mrem] from natural sources of radiation and 3.1 mSv [310 mrem] from man-made sources [medical, commercial, and industrial sources]."[37]
- "For most resource areas, the impacts are SMALL. Resource areas with a SMALL impact are land use, transportation, geology and soils, surface water, groundwater, air quality, noise, historic and cultural resources, visual and scenic resources, public and occupational health, and waste management. Ecology resources would experience a SMALL to MODERATE impact. There would be a SMALL to MODERATE (beneficial) impact to socioeconomics, due to new businesses and residents, and tax revenues. For environmental justice, no disproportionately high and adverse human health and environmental effects were found for minority and low income populations. Additional information about resource impacts may be found in Chapter 4 of the draft EIS."[38]
- ISP completed a site-specific probabilistic seismic hazard analysis (PSHA) of the proposed 4 CISF project area in 2016 to estimate the levels of ground motions that could be exceeded at a 5 specified annual frequency (or return period) at the site, incorporate the site-specific effects of 6 the near-surface geology on ground motions, and develop seismic design parameters for the 7 site (ISP, 2020).[39]
- As part of the analysis for the WCS site, the PSHA estimated a 2,500- 10 year return period peak horizontal acceleration on soft rock of only 0.04g (ISP, 2020).

[36] *Id.*
[37] *Id.*
[38] ISP DEIS at 15.
[39] ISP DEIS at 3-21.

- The environmental impacts are based upon information provided in the applicant's 3 Environmental Report (ER) (ISP, 2020), Safety Analysis Report (SAR) (ISP, 2018), and 4 responses to NRC requests for additional information (RAIs) (ISP, 2019a) and supplemented by 5 the best available information and established science the NRC staff identified.[40]
- Outside of the fenced owner-controlled area (OCA) there would be 9 0.6 ha [1.5 acres] of land disturbance for the rail sidetrack along with 1.2 ha [3 ac] for 10 construction of the 1.6 kilometers (km) [1 mile (mi)] site access road, and 1.6 ha [4 ac] for a 11 construction laydown area south of the proposed CISF at 4-3.
- As discussed in EIS Section 3.2.4, the proposed project area is in a region of active oil and gas 9 exploration and development. Because the oil and gas wells outside the proposed CISF project 10 area are already constructed and operating and their owners would retain ownership or leasing 11 rights to extract oil and gas, project construction activities would not disturb those oil and 12 gas wells.[41]
- Defueling the CISF would involve removal of SNF from the proposed CISF and transport of the 15 fuel to a permanent geologic repository (EIS Section 2.2.1.3.2). Because ISP expects to use 16 similar equipment to remove the SNF canisters from the storage facility to that used for 17 emplacement, and no new construction is anticipated, defueling would have land use impacts 18 similar to the earlier activities of the operations stage. For example, the previously constructed 19 rail sidetrack would be utilized and maintained, but no additional land use impacts would be 20 anticipated. Therefore, the NRC staff concludes that the land use impacts from defueling for the 21 proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF during 22 operations would be SMALL.[42]
- Impacts such as increases in traffic, potential changes to 24 traffic safety, and increased degradation of roads would result from the proposed use of roads 25 for shipping equipment, supplies, and produced wastes, as well as from commuting workers 26 during the lifecycle of the proposed CISF. Other impacts, including radiological and 27 nonradiological health and safety impacts under normal and accident conditions, could result 28 from the proposed use of national rail lines to transport shipments of SNF to and from the 29 proposed CISF. These shipments could include relatively short segments of barge or 30 heavy-haul truck transportation as needed to move the SNF from generator sites (or ISFSIs) 31 (EIS Sections 2.2.1.2 and 2.2.1.3.2) to the nearest rail line when onsite rail access is limited.[43]
- During the construction stage of the proposed CISF, ISP would use trucks to transport 37 construction supplies and equipment (e.g., concrete and conventional earthmoving and grading 38 equipment) to the proposed project area. The regional and local transportation infrastructure 39 that would serve

[40] ISP DEIS at 4-2.
[41] ISP DEIS at 4-4.
[42] ISP DEIS at 4-5.
[43] ISP DEIS at 4-6.

the proposed CISF is described in EIS Section 3.3. Access to the proposed 40 CISF from nearby communities would be from State Route 18, which connects the cities of 41 Hobbs and Eunice, New Mexico, and Texas State Route 176, which travels past the proposed 42 project area between the cities of Eunice, New Mexico, and Andrews, Texas. ISP proposes no 43 new access road on Texas State Highway 176 to provide access to the proposed CISF. An 44 existing roadway on the WCS property would be extended north to the proposed CISF.[44]

- The impacts of using these other modes to supplement rail 15 transportation of SNF was previously evaluated by the U.S. Department of Energy (DOE) 16 (DOE, 2008, 2002) and found to not significantly change the minor radiological impacts from a 17 national mostly rail SNF transportation campaign and therefore are not evaluated further in this 18 EIS. This DOE analysis evaluated the differences in estimated impacts of using barge to 19 transport SNF from 17 of 24 reactor sites (that did not have direct rail access but were located 20 along waterways) to the nearest barge dock with rail access. The estimated incident-free 21 radiological and nonradiological impacts for national SNF transportation under the mostly rail 22 with barge transportation scenario were the same or less than the minor impacts DOE 23 estimated for the mostly rail scenario (for example, 1.7 latent cancer fatalities for involved 24 workers; 0.7 latent cancer fatalities for the public). DOE also found minor radiological and 25 nonradiological accident impacts that were the same or not notably different between the mostly 26 rail and mostly rail with barge transportation scenarios.[45]
- Some reactor sites, in particular, those that have been shut down or decommissioned but 28 continue to store SNF in dry storage casks, may require local transportation infrastructure 29 upgrades to remove the SNF from the site (DOE, 2014). These upgrades, for example, could 30 include installing or upgrading rail track, roads, or barge slips necessary to transfer SNF offsite. 31 Because these infrastructure upgrades would be needed – regardless of whether the proposed 32 CISF project is approved – to allow shipment of SNF from reactor sites to a repository in 33 accordance with the Nuclear Waste Policy Act of 1982 (NWPA), these enhancements are 34 beyond the scope of the proposed action and are therefore not evaluated further. Additionally, 35 because these infrastructure improvements are expected to be small construction projects 36 limited to preexisting, previously disturbed, and previously evaluated reactor sites that are 37 dispersed throughout the U.S., the environmental impacts are expected to be minor and are not 38 evaluated further for cumulative impacts in Chapter 5 of this EIS.[46]
- The representative route selected from NUREG–2125 for the NRC staff's CISF analysis was rail 5 transport from the Maine Yankee nuclear power plant to the town of Deaf Smith, Texas. The 6 reported distance for this shipment was 3,362 km [2,089 mi] (NRC, 2014a). This route was 7 selected as bounding because

[44] ISP DEIS at 4-6.
[45] ISP DEIS at 4-10.
[46] ISP DEIS at 4-10.

most of the potential origins (U.S. nuclear power plants) for 8 shipments destined for the proposed CISF are located east of the proposed CISF and the 9 distance of the selected representative route is longer than the actual distances that would be 10 traveled from most U.S. nuclear power plants to the proposed CISF. Furthermore, (for the 11 public dose calculations described in the following section) the transportation characteristics 12 along the route from Maine to Texas would be diverse and include several rural small towns as 13 well as suburban and urban areas that would have dose- and risk-related conditions that are 14 representative of conditions on railways that could be potentially used for the proposed project.[47]

- The highest accumulated exposures over time to this low level of radiation to members of the 12 public would occur to those individuals who spend the most time within close proximity to the rail 13 lines used for SNF transportation. This includes individuals who may live or work adjacent to 14 rail lines used for SNF transportation.[48]
- ISP 3 provided more detailed proprietary documentation of their transportation dose and risk 4 calculations that was the NRC staff reviewed. The NRC review found that the methods ISP 5 used to calculate the incident-free SNF transportation impacts to the public were acceptable, 6 as described previously for the ISP transportation worker dose calculations (EIS 7 Section 4.3.1.2.2.1). As part of this review, the NRC staff conducted independent confirmatory 8 calculations as an additional check of the technical adequacy of the calculations and results.[49]
- For a loss of shielding accident, ISP estimated a first responder at 5 m [5.5 yd] 40 from the cask would receive a dose rate of 8.1 mSv/hr [810 mrem/hr] from the damage to cask 41 shielding that a fire caused or 7.1 mSv/hr [710 mrem/hr] from the damage that impact force 42 caused. For an accident involving a release, ISP estimated a maximum individual occupational 43 dose to a first responder of 0.0771 Sv [7.71 rem] when spending a day at 33 meters from 44 the cask.[50]
- The potential impacts of the additional SNF shipments to the local rail traffic on the 24 Texas-New Mexico Railroad (TNMR) traveling north from the Union Pacific connection at 25 Monahans, Texas, to Lovington, New Mexico, would be minor because the 170 or fewer 26 proposed annual SNF shipments to the CISF would not be a large addition to the existing railcar 27 traffic of 22,500 railroad carloads per year (EIS Section 3.3) and the speed of all traffic would be 28 limited based on the class of the track, thereby limiting the potential for delays resulting from 29 differences in the speed of travel. On the broader national rail network, the potential traffic 30 impacts of the additional SNF shipments would be addressed by rail industry traffic flow 31 monitoring and

[47] ISP DEIS at 4-13.
[48] ISP DEIS at 4-15.
[49] ISP DEIS at 4-16.
[50] ISP DEIS at 4-17.

routing and therefore the NRC staff expects it to be minor.[51]

- The assumed route of SNF shipments would travel from the proposed CISF to the proposed 35 repository at Yucca Mountain, Nevada. The representative route selected from NUREG–2125 36 for the NRC staff's CISF defueling analysis travels by rail from the town of Deaf Smith, Texas, to 37 the Idaho National Engineering Laboratory. The reported distance for this shipment was 38 1,913 km [1,189 mi] (NRC, 2014a). This route was selected because the distance was 39 bounding and the NRC staff considered the varied conditions (e.g., population characteristics) to 40 be adequate to represent the routes that would be taken by actual SNF shipments from the 41 proposed CISF for the purpose of evaluating the potential radiological impacts of the proposed 42 SNF transportation. By comparison, ISP's calculations included a representative route from the 43 proposed CISF to the proposed Yucca Mountain repository that was based on modeling the rail 44 distance from Monahans, Texas, to Jean, Nevada, a distance of 1,935 km [1,202 mi]; therefore, 45 the NRC staff's representative route selection is comparable to the approximate distance 46 between the two project areas.[52]
- Significant additional costs to States would likely not be incurred related to unique or 47 different training to respond to potential transportation accidents involving SNF as compared to 48 existing radioactive materials commerce. However, the NRC staff recognizes that if SNF is shipped to a CISF, some States, Tribes, or municipalities along transportation routes may incur 2 costs for emergency-response training and equipment that might otherwise be eligible for 3 funding under NWPA Section 180(c) provisions if DOE shipped the SNF from existing sites to a 4 repository. Because needs of individual municipalities along transportation routes and the costs 5 of this training and equipment vary widely, quantification of such would be speculative. 6 Furthermore, how the States may distribute funding for first responder training and equipment to 7 local municipalities is not within NRC's authority and is beyond the scope of this EIS. [53]
- The proposed CISF consists of two SNF transportation campaigns while the No-Action 31 alternative consists of just one campaign. This affects more than just the estimated costs. As 32 described in EIS Section 4.3, the No-Action alternative results in a net reduction in overall 33 occupational and public exposures from the transportation of SNF, because the overall distance 34 traveled from reactor sites to a repository would likely be less than from reactor sites to the 35 proposed CISF and then to a repository. Similarly, as described in EIS Section 5.7.2.1, this 36 overall reduction in the distance SNF would likely travel means that the No-Action alternative 37 would generate fewer combustion air emissions than the proposed CISF.[54]
- The proposed CISF and No-Action alternative also share or have in common

[51] ISP DEIS at 4-20.
[52] ISP DEIS at 4-22.
[53] ISP DEIS at 4-74 to 4-75.
[54] ISP DEIS at 8-9.

other SNF 2 transportation cost factors. A key difference between the proposed CISF and the No-Action 3 alternative concerning these other common cost factors is the time these activities occur. For 4 example, infrastructure improvements at or near generation sites would be needed for some 5 generation sites (e.g., decommissioned sites) that no longer have the ability to transport SNF 6 from the current storage location to the national rail route. This cost was not quantified in this 7 EIS, because it (i) would be difficult to establish, (ii) would vary based on the individual 8 generation sites, and (iii) would be a common need for both the proposed CISF and the 9 No-Action alternative. It is also possible that transporting SNF across the country would require infrastructure 11 improvements along the national rail route. This could be the case for both the proposed CISF 12 and the No-Action alternative. However, because the routes for transportation have not yet 13 been established, the need for (and hypothetical cost of) infrastructure upgrades is speculative 14 and beyond the scope of the EIS.[55]

- Another cost factor shared by the proposed CISF and the No-Action alternative is emergency 16 preparedness along the SNF transportation route. States are recognized as responsible for 17 protecting public health and safety during radiological transportation accidents. Federal 18 agencies are prepared to monitor transportation accidents and provide assistance if requested 19 by States to do so. Nationwide, there are many shipments of radioactive material each year for 20 which the States already provide capable emergency response, and a discussion about funding 21 for emergency response is in EIS Section 4.11.[56]
- The NRC 18 staff assumed that the cost for transporting the SNF from the generation sites to the proposed 19 CISF would be the same as the cost for transporting the SNF from the proposed CISF to the 20 repository. For the SNF transportation to the repository, the NRC staff assumed that this cost 21 would be evenly distributed over the last 2 years of the proposed CISF license term for the 22 proposed action (Phase 1) and the last 10 years of the license term for full build-out 23 (Phases 1-8) (i.e., starting when the last SNF is received from the generation sites until the end 24 of the proposed CISF license term).
- "a SMALL to MODERATE and beneficial impact on local finances because of increased taxes and revenues, and a SMALL impact on employment, housing, school enrollment, and utilities and public services because of the influx of workers and their families from construction."[57]
- ISP stated that it may seek to renew the license and anticipates that the SNF would be stored at the CISF for 60 to 100 years (ISP, 2020).[58]
- Under the No-Action alternative, the NRC would not approve the ISP license application for the 26 proposed CISF in Andrews County, Texas. The No-Action alternative would result in ISP not 27 constructing or operating the

[55] ISP DEIS at 8-11.
[56] ISP DEIS at 8-11.
[57] ISP DEIS at 9-12.
[58] ISP DEIS at 9-16.

proposed CISF. No concrete storage pad or infrastructure 28 (e.g., rail sidetrack or cask-handling building) for transporting and transferring SNF to the 29 proposed CISF would be constructed. SNF destined for the proposed CISF would not be 30 transferred from commercial reactor sites (in either dry or wet storage) to the proposed facility.[59]

- The DOE's integrated waste management system would necessarily "include facilities and other key infrastructure needed to safely manage SNF from commercial nuclear reactors."[60] While the NRC admits "this alternative meets the purpose and need for the proposed action" it asserts that "the DOE has not released detailed information concerning the planned SNF interim storage facilities, such as . . . SNF transportation options and details. . .that would allow this alternative to be analyzed in detail." *Id.* NRC states that "[b]ecause the DOE's integrated waste management system is in the planning stages and provides no. . .transportation. . .details that would be needed for a comparison of environmental impacts, this alternative was eliminated from detailed consideration."
- The applicant's screening process determined that the Andrews County, Texas, site (i.e., the 2 proposed CISF site on the WCS property) had the fewest environmental and operational 3 impacts because of the availability of utilities, an established local nuclear-related labor culture, 4 and an existing site railhead, along with readily available site characterization data and existing 5 site infrastructure (ISP, 2020).[61]

***Preparing for Nuclear Waste Transportation: Technical Issues That Need to Be Addressed in Preparing for a Nationwide Effort to Transport Spent Nuclear Fuel and High-Level Radioactive Waste*, A Report to the U.S. Congress and the Secretary of Energy (Sept. 2019) (ADAMS Accession No. ML19297D146)**

[59] ISP DEIS at xxxviii.
[60] ISP DEIS at 4-22.
[61] ISP DEIS at 2-25.

# Tab 24

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>August 7, 2020 |

**FASKEN LAND AND MINERALS, LTD.'S AND PERMIAN BASIN LAND AND ROYALTY OWNERS' COMBINED REPLY TO NRC STAFF'S AND INTERIM STORAGE PARTNERS LLC'S OPPOSITIONS TO MOTION FOR LEAVE TO FILE NEW CONTENTION AND MOTION TO REOPEN THE RECORD**

Now comes Fasken Oil and Ranch Ltd. ("Fasken") and Permian Basin Land and Royalty Owners ("PBLRO") (collectively "Petitioners"), by and through undersigned counsel, who respectfully submit the foregoing reply in further support of their Motion for Leave to File New Contention[1] and Motion for Leave to Reopen the Record[2] in the above-captioned matter, and state as follows:

## I. INTRODUCTION

Petitioners filed New Contention No. 5 ("Contention") to challenge newly disclosed material facts, information and conclusions in the Interim Storage Partners, LLC ("ISP") draft environmental impact statement ("DEIS"),[3] which significantly differ from the information relied on and conclusions drawn in the ISP Environmental Report ("ISP ER").[4] The ISP DEIS unfairly discounts necessary emergency and infrastructure improvement costs, skewing the socioeconomic benefits of the proposed consolidated interim storage facility ("CISF") project, and inadequately consider regional geologic instability, land use and industry operations, and increasing trends in seismicity, which preclude a proper analysis of cumulative impacts of transportation under the National Environmental Policy Act ("NEPA")[5] and NRC regulations.[6]

---

[1] *Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion for Leave to File New Contention No. 5* (July 6, 2020) (ADAMS Accession No. ML ML20189A000), hereinafter "Motion for Leave."
[2] *Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion to Reopen the Record* (May 11, 2020) (ML20189A000), hereinafter "Motion to Reopen."
[3] Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas, Draft Report for Comment, NUREG-2239 (May 2020) (ADAMS Accession No. ML20122A220), herein after "ISP DEIS."
[4] WCS Consolidated Interim Storage Facility Environmental Report, Docket No. 72-1050, Rev. 3, (Feb. 17, 2020) (ADAMS Accession No. ML20052E152), hereinafter "ISP ER."
[5] The National Environmental Policy Act of 1969, 42 U.S.C. § 4321 *et seq.*, herein after "NEPA."
[6] *See* NRC Siting Evaluation Factors 10 C.F.R. §§ 72.90-108; §72.108 (regarding necessary evaluation of transportation risks).

The transportation of spent nuclear fuel is a vital component to the proposed ISP CISF project that must be appropriately and adequately analyzed in light of all relevant costs and benefits. The ISP DEIS conclusions rely on little more than blind faith that transportation infrastructure improvements will be made, that private nuclear power plant operators will assume financial and legal responsibility for the nuclear waste during transportation and that funding will be available for emergency training and equipment in the event of an incident. Contrary to the NRC Staff's and ISP's Oppositions,[7] these are not merely "business decisions" outside the scope of the licensing proceeding, but directly implicate important legal, safety and environmental impacts that must be investigated and evaluated in any proper analysis of transportation impacts under NEPA and NRC regulations.

Petitioners' Contention is supported by robust factual and expert evidence, which precisely identify material differences in specific sections of the ISP DEIS and clearly articulate deficiencies in the ISP DEIS's transportation related data, analyses and conclusions. Petitioners have good cause to file their Contention, it is timely, admissible, and further supported by a Motion to Reopen the Record which satisfies the requirements of 10 C.F.R. § 2.236.[8] Alternatively, Petitioners'

---

[7] *NRC Staff Answer in Opposition to Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motions for Leave to File Contention No. 5 and Reopen Record* (July 6, 2020) (ADAMS Accession No. ML20213C523), hereinafter "NRC's Opposition"; *Interim Storage Partners LLC's Answer Opposing Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion to Reopen the Record and Motion for Leave to File New Contention No. 5* (July 6, 2020) (ADAMS Accession No. ML20213C708), hereinafter "ISP's Opposition," collectively referred to as the "Oppositions."

[8] *See Calvert* at 730-731 ("The regulations do not define or specify an exact number of days within which a new or amended contention must be filed in order to be considered 'timely,'…unless a deadline has been specified…timeliness is subject to a reasonableness standard that depends on the facts and circumstances of each situation."); *In the Matter of Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-12-21, 76 N.R.C. 491, 491 (2012) (noting that "although 'timely' is not expressly defined by months or days in [NRC] regulations. . . typically [] 30 to 60 days from the initiating event [is considered] a reasonable deadline for proposing new or amended contentions."); *Shaw AREVA MOX Services* (Mixed Oxide Fuel Fabrication Facility), 67 N.R.C. 460, 493 (2008) (30 days held as presumptive time frame for timeliness of late-filed contentions).

Contention presents an exceptionally grave issue. Thus, the Board should grant Petitioners' Motions.

## II. LEGAL STANDARDS

The NRC cannot grant a license for the proposed CISF project until it determines that applicable regulatory requirements of the Atomic Energy Act of 1954 ("AEA"), NEPA and NRC are satisfied.[9] NRC regulations demand complete, accurate and reliable data to analyze site evaluation factors, including the "potential impact on the environment of the transportation of spent nuclear fuel, high-level radioactive waste or reactor-related GTCC waste within the region,"[10] subsurface and geologic characteristics, and a competent technical review of natural and man-induced events based on the "current state of knowledge."[11] It should go without saying that all NRC license applications must be "complete and accurate in all material respects."[12]

NEPA requires the NRC focus on "the environmental consequences" of the proposed CISF project "[so] that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast."[13] NEPA's primary purpose is to inform the public of environmental issues to encourage public participation and challenges to

---

[9] *See* 10 C.F.R. §51.10(a) (Nothing in the NRC NEPA implementing regulations alter the cardinal rule that license applications comply with all NRC regulations. Indeed, NEPA regulations must be carried out in a "manner which is consistent with the NRC's domestic licensing and regulatory authority under the [AEA].")

[10] *See* 10 C.F.R. § 72.108.

[11] *See* 10 C.F.R. §§ 72.92, 72.94 (requiring examination of important natural phenomena and man-induced events, "based on the current state of knowledge of such events"); *see also,* 10 C.F.R. § 72.103(a)(1) (The NRC requires "…the results from onsite foundation and geological investigation, literature review, and *regional geological reconnaissance show no unstable geological characteristics*, *soil stability problems, or potential for vibratory ground motion at the site*….") (emphasis added).

[12] *See* 10 C.F.R. § 72.11(a) (information provided by a license applicant to the Commission must be "*complete and accurate in all material respects*") (emphasis added).

[13] *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 349 (1989).

ensure significant issues are fully addressed on best possible record. This is especially true with respect to the transportation of highly dangerous and radioactive nuclear waste.

Pursuant to 10 C.F.R. § 2.309(f)(2), a petitioner may amend contentions based on an applicant's environmental report or file new contentions if there are "data or conclusions in the NRC draft or final environmental impact statement, environmental assessment, or any supplements relating thereto, that differ significantly from the state or conclusions in the applicant's documents." This provision "tempers the restrictive effect of the agency's requirement that NEPA contentions be filed based on the ER by allowing petitioners or intervenors to challenge significantly different data or conclusions."[14] The use of a disjunctive phrase here indicates a "contention may therefore challenge a DEIS even though its ultimate conclusion on a particular issue. . . is the same as that in the ER, as long as the DEIS relies on significantly different data than the ER to support the determination."[15] Likewise, a petitioner may file a contention to challenge significantly different conclusion in the DEIS even though it is based on the same information or data cited in the applicant's licensing documents.[16]

## III. FURTHER SUPPORT FOR NEW CONTENTION

### A. *Petitioners Have Good Cause to File New Contention*

Reliance on speculative information in the ISP DEIS, by its very nature, prevents proper NEPA or NRC evaluation of environmental impacts and safety risks. Petitioners have good cause to file Contention No. 5 and meet the requirements of both 10 C.F.R. §§ 2.309(f)(2) and 2.309(c)(1). Accurate, complete, and reliable inputs and site-specific information are necessary to

---

[14] *In the Matter of Calvert Cliffs 3 Nuclear Project, LLC and Unistar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), 72 N.R.C. 720, 729-730, LBP-10-24 at 7, (Dec. 28, 2010) ("*Calvert*").
[15] *Calvert,* 72 N.R.C. at 730.
[16] *Id.*

adequately assess and analyze the potential safety risks and cumulative environmental impacts associated with transporting nuclear waste through the Permian Basin, one of the nation's most productive oil and gas hubs, over the lifetime of the proposed ISP CISF project.

The recently published ISP DEIS offers only a distorted view of the variables and consequences relating to nuclear waste transportation absent Department of Energy ("DOE") involvement, which relies on new and materially different information and draws significantly different conclusions as to the financial costs for training first responders along transportation routes and is notably silent on the responsibility for transportation infrastructure costs. The ISP DEIS also relies on information that fails to incorporate the use of local transportation corridors near the proposed site, inappropriately disregarding unstable geologic characteristics and the prevalence of sinkholes, karst fissures substantial subsidence known to exist in the region, which present increased potential for accidents, derailment and deterioration of transportation infrastructure.

In connection with its DEIS, the NRC is independently responsible for reviewing and confirming the reliability of such information and to ensure there is adequate evidence to analyze cumulative transportation impacts. As described herein, Petitioners genuinely dispute the reliability, completeness and accuracy of the transportation related information and conclusions in the ISP DEIS.

Petitioners timely filed Contention No. 5 on July 6, 2020 pursuant to the NRC's May 11, 2020 Order[17] deeming "petitions to intervene, new or amended contentions, or hearing requests based on information in the [ISP DEIS]. . ." timely if filed on or before that date.[18]

### A. *Transportation of Nuclear Waste Implicates Multiple Important Legal, Safety and Environmental Issues*

As stated publicly by the DOE, it may not take title to the vast majority of private plant companies' nuclear waste until a permanent geologic repository is built without violating the Nuclear Waste Policy Act ("NWPA") currently in effect.[19] Indeed, ISP itself conceded this during the August 23, 2019 hearing before the NRC and it is further demonstrated by ISP's withdrawal of its request for an exemption from NRC's decommissioning financial assurance requirements, which inherently relied on DOE participation.

Ensuring the safe transport of nuclear waste from nuclear reactor sites will require a robust railroad and transportation infrastructure capable of withstanding oversized loads and heavy haul trucks needed to travel to the proposed ISP CISF. This transportation will inevitably involve significant costs for infrastructure improvements, mitigation measures, and proper funding for emergency training and equipment in the event of an accident along the transportation routes.[20] And the cumulative impacts of such transportation implicate important legal, safety and

---

[17] *ISP* (Consolidated Interim Storage Facility), Order of the Secretary (May 22, 2020), at 1 (unpublished) Docket No. 72-1050.

[18] Fasken disputes ISP's assertion that the Secretary's Order was not intended to cover Motion to Reopen the Record. Although Motions to Reopen are not expressly listed in the Order, any petition to intervene in a closed proceeding such as this one would necessarily require a Motion to Reopen the Record. To the extent, notice of Fasken's Motion to Reopen the Record was received by ISP at 12:01am on July 7, 2020, Fasken respectfully requests the Board, in its discretion, to excuse the minute delay and deem Fasken's filing timely.

[19] *See* Memorandum and Order (Aug 23, 2019), LBP-19-07 at 27.

[20] As noted in a recent letter from New Mexico Governor: "Safe transportation of spent nuclear fuel across the country and through the Permian Basin, with booming agricultural and oil and gas industry operations, "requires both well-maintained infrastructure and highly specialized emergency response equipment and personnel that can respond quickly to an incident at the facility and on transit routes." *See* State of New Mexico Governor Michelle Lujan Grisham Letter to President Trump (July 28, 2020).

environmental issues that demand adequate investigations and thoughtful assessment by the agency.

#### i. *New and Materially Different Information in the ISP DEIS Regarding Emergency Training and Equipment Costs*

The NRC Staff's ISP DEIS for the first time states that "if SNF is shipped to a CISF, some States, Tribes, or municipalities along transportation routes may incur costs for emergency-response training and equipment *that might otherwise be eligible for funding under the NWPA*" if the DOE was responsible for transporting the nuclear waste.[21] This is new and materially different than statements made in ISP's licensing application documents, which simply note that "[i]f the DOE is the shipper, the federal government, through DOE, is responsible for providing emergency training. . .along the transportation routes."[22] ISP's ER is silent as to the financial responsibility of communities along the transportation route which may be substantial. The ISP DEIS fails to fully analyze or even consider these costs, absolutely necessary to the safe transport of nuclear waste, "[b]ecause the needs of individual municipalities along transportation routes and the costs of this training and equipment vary widely, quantification of such costs would be speculative."[23]

The NRC Staff, in its independent review and analysis of cumulative transportation impacts and the socioeconomic benefits of the proposed ISP CISF project, cannot on the one hand allow ISP to rely on rampant speculation as to DOE involvement based on future changes in NWPA law and/or highly unlikely future contracts with private entities with yet-to-be determined terms, and on the other hand skirt its obligation to inform the public and improperly exclude such costs in considering alternatives and comparing costs and benefits of the ISP DEIS. Stating there would be

---

[21] *See* ISP DEIS at 4-74 to 4-75; NWPA Section 180(c).
[22] *See* ISP ER at 4-8.
[23] *Id.*

"a SMALL to MODERATE (beneficial) impact to socioeconomics" without accounting for the known and necessary infrastructure and emergency training and equipment costs is disingenuous and presents a biased view of actual impacts. This is unacceptable and fails to fully inform the public of the project's impact in violation of NEPA and NRC regulations. Shielding this information prevents meaningful and well-informed challenges to evaluations of the substantive impacts of the proposed project on the human environment, circumventing NEPA and NRC fundamental purpose of public participation.

#### ii. *The ISP DEIS Relies on New and Materially Different Information that Fails to Account for Regional Characteristics and Inadequately Assesses Cumulative Transportation Impacts*

Unlike ISP's calculations for a representative route traveling "from Monahans, Texas to the CISF along the transportation corridor,"[24] the ISP DEIS calculations rely on a representative route traveling only from Deaf Smith, Texas.[25] Contrary to the assertions in the Oppositions, these representative routes and materially different and fail to account for the unique regional attributes, including extensive oil and gas and agricultural industries use of the rails, historic and ongoing mineral extraction activities, trends of increasing seismicity, and well-documented existence of sinkholes, karst development and substantial subsidence in and around the proposed ISP site. In short, the use of NRC's representative routes precludes a proper site-specific analysis of transportation impacts in violation of NEPA and NRC regulations.

As acknowledged in the ISP DEIS, sinkholes and karst fissures are common features in the rim of the Delaware Basin and new sinkholes form annually.[26] Two well-documented sinkholes,

---

[24] ISP ER at 4-8.
[25] ISP DEIS at 4-22.
[26] ISP DEIS at 3-19.

Wink sinkhole in Winkler County, Texas and Jal sinkhole in Jal, New Mexico, resulting from improperly cased and abandoned wells and subsurface salt mining operations are located in close proximity to the local rail lines which will be used to transport massive canisters of spent nuclear fuel to the proposed ISP site. It is well known that subsidence in the region is controlled by interdependent factors and complex mechanisms, including historical and ongoing extraction activities. These unknown and sometimes unpredictable risks frequently lead to subsurface deformation, uneven settlement and the potential for catastrophic subsidence. Such regional geologic characteristics must be incorporated in any investigation and evaluation of the risk for representative routes and the ISP DEIS transportation impacts analysis.

The transportation study and ISP DEIS also fail to account for the significant increase in rail related accidents in the Permian Basin in recent years. The Midland-Odessa Transportation Alliance (MOTRAN) reports that from 2016-2018, there were 158 rail related crashes in the very area that the spent nuclear fuel will travel through.

Petitioners and industries throughout the Permian Basin extensively rely on the Texas-New Mexico Railroad extending from Monahans, Texas to ship necessary products to bring oil and gas to production and facilitate agricultural operations.[27] As noted in the Declaration of Tommy Taylor, although the rail lines are a major means for industry operations, they are situated in remote desert-like areas and served mostly by volunteer fire department, lacking sufficient emergency responder resources and equipment to handle nuclear incidents. Even the most minimal transportation incident, such as derailment or collision involving spent nuclear fuel, would have the potential to interrupt or foreclose further oil and gas extraction/production activities and

[27] *See* Fasken Motion for Leave, Exhibit 1.

agricultural and ranching activities. Any hazardous materials emergency upon the rails in the region that interfere with energy freight "poses a loss of millions of dollars per day affecting multiple operators in the Permian Basin."[28] Indeed, "a single hazardous materials emergency would not only have a determinantal effect upon oil and agricultural industries of the Permian Basin but would also likely overwhelm, our first responders and the small communities adjacent to the rail track."[29]

Regional considerations must be accounted for in the risk assessment and calculus for transporting nuclear waste through the Permian Basin, including industry operations, seismicity, geologic instability and the potential for subsidence and sinkholes negatively impacting railroad infrastructure unstable geologic features. The ISP DEIS falls short of NEPA and NRC standards as it fails to account for regional risks and attendant costs necessary for the safe transportation of spent nuclear fuel necessary to the proposed ISP CISF project.

**B. CONCLUSION**

Threshold admissibility requirements should not be turned into a "fortress to deny intervention."[30] There is no requirement at this stage in NRC proceedings that Petitioners prove the merits of their case.[31] Timeliness and procedural issues should not over take substance here where Petitioners have presented exceptionally grave issues relating to the transport of nuclear waste.

---

[28] *Id.*
[29] *Id.*
[30] *Power Authority of the State of New York, et al.* (James FitzPatrick Nuclear Power Plant; Indian Point Nuclear Generating Unit 3), CLI-00-22, 52 NRC 266, 295 (2000); *Matter of Duke Energy Corp.* (Oconee Nuclear Power Plant), CLI-99-11, 49 NRC 328, 335 (1999) (quoting *Philadelphia Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), 8 AEC 13, 20-21 (1974), rev'd in part, CLI-74-32, 8 AEC 217 (1974), rev'd in part, *York Committee for a Safe Environment v. N.R.C.*, 527 F.2d 812 (D.C. Cir. 1975)).
[31] *Matter of Entergy Nuclear Generation Co., et al.* (Pilgrim Nuclear Power Station), 50-293-LR (ASLB Oct. 16, 2006), 2006 WL 4801142 at (NRC) 85 (quoting *Oconee,* 49 NRC at 342)

Dated August 7, 2020

/*electronically signed by Allan Kanner*

**Kanner & Whiteley, LLC**

Allan Kanner, Esq.
Conlee S. Whiteley, Esq.
Cynthia St. Amant, Esq.
Annemieke M. Tennis, Esq
701 Camp Street
New Orleans, Louisiana 70130
Phone: (504) 524-5777
Fax: (504) 524-5763

/signed electronically by/
Monica Perales
6101 Holiday Hill Road
Midland, TX 79707
(432) 687-1777
monicap@forl.com

*Attorneys for Petitioners*

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**
**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

| | |
|---|---|
| IN THE MATTER OF<br>INTERIM STORAGE PARTNERS LLC<br><br>(Consolidated Interim Storage Facility) | Docket No. 72-1050<br><br>August 7, 2020 |

## CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305, I Allan Kanner certify that, on this 7th day of August, 2020, true and correct copies of Fasken's Motion for Leave to File New Contention No. 5, and attachments were served upon the Electronic Information Exchange (the NRC's E-Filing System) in the above-captioned proceeding.

/*electronically signed by Allan Kanner*

**Kanner & Whiteley, LLC**

Allan Kanner, Esq.
Conlee S. Whiteley, Esq.
Cynthia St. Amant, Esq.
Annemieke M. Tennis, Esq.
701 Camp Street
New Orleans, Louisiana 70130
Phone: (504) 524-5777
Fax: (504) 524-5763

*Attorneys for Petitioners*

# Tab 25

Cite as 92 NRC 457 (2020) **CLI-20-13**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**COMMISSIONERS:**

**Kristine L. Svinicki,** Chairman
**Jeff Baran**
**Annie Caputo**
**David A. Wright**
**Christopher T. Hanson**

**In the Matter of** **Docket No. 72-1050-ISFSI**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **December 4, 2020**

**STANDARD OF REVIEW**

The Commission affords substantial deference to the Board's threshold determinations on contention admissibility unless an appeal demonstrates an error of law or abuse of discretion.

**CONTENTIONS, ADMISSIBILITY**

The Board properly found a contention regarding waste packaging and transportation that did not specifically challenge pertinent analyses in the application was inadmissible because it did not state a genuine dispute with the application.

## MEMORANDUM AND ORDER

Today we address Sustainable Energy and Economic Development Coalition's (SEED's) appeal of the Atomic Safety and Licensing Board's denial of SEED's motion to file a late-filed contention in the proceeding regarding Interim Storage Partners LLC's (ISP's) application to build and operate a consolidated

interim storage facility (CISF) in Andrews County, TX.[1] For the reasons described below, we affirm the Board's decision.

## I. BACKGROUND

ISP proposes to locate its CISF adjacent to an existing low-level radioactive waste disposal facility owned and operated by Waste Control Specialists, LLC, which has partnered with ISP in the proposed CISF project.[2] If licensed, the CISF would be authorized to store up to 5,000 metric tons of waste in NRC-approved packages for up to forty years.[3]

The NRC published notice of ISP's application in August 2018 and offered interested persons an opportunity to request a hearing.[4] SEED joined several other organizations (collectively, Joint Petitioners) in filing a hearing request with several contentions.[5] The Board found that SEED demonstrated standing but denied Joint Petitioners' hearing request because none of the proposed contentions were admissible.[6]

Thereafter, SEED filed with the Board a motion for leave to admit an additional contention (Contention 17) based on the Nuclear Waste Technical Review Board (NWTRB) September 2019 report to Congress and the Secretary of Energy.[7] The Board denied SEED's motion and found that SEED had not shown good cause for filing proposed Contention 17 after the deadline and that Contention 17 was inadmissible.[8] In affirming the Board's decision on appeal, we do not reach the question of whether SEED has shown good cause for filing

---

[1] *See* Interim Storage Partners LLC, License Application, rev. 2 (July 19, 2018), at 1-1 (ADAMS accession no. ML18221A397 (package)) (License Application).

[2] *See id.* at 1-4, 1-5.

[3] WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, rev. 2 (July 19, 2018), at 1-1 (ML18221A405 (package)) (Environmental Report).

[4] Interim Storage Partners Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44,070, 44,070-75 (Aug. 29, 2018), *corrected,* 83 Fed. Reg. 44,680 (Aug. 31, 2018) (correcting the deadline date for petitioners to request a hearing to October 29, 2018).

[5] Petition of Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, to Intervene, and Request for an Adjudicatory Hearing (Nov. 13, 2018).

[6] LBP-19-7, 90 NRC 31, 39, 87-109 (2019).

[7] *See* Motion of Intervenor Sustainable Energy and Economic Development Coalition for Leave to File Late-Filed Contention, and Contention 17 (Oct. 23, 2019), at 1-2 (SEED Motion); U.S. Nuclear Waste Technical Review Board, "Preparing for Nuclear Waste Transportation: Technical Issues that Need to Be Addressed in Preparing for a Nationwide Effort to Transport Spent Nuclear Fuel and High-Level Radioactive Waste" (Sept. 2019) (ML19297A235) (NWTRB Report).

[8] LBP-19-11, 90 NRC 358, 362-68 (2019).

proposed Contention 17 after the deadline because SEED has not shown error in the Board's determination regarding the admissibility of Contention 17.[9]

## II. DISCUSSION

### A. Standard of Review

Our regulations allow a petitioner whose hearing request has been wholly denied to appeal.[10] We afford substantial deference to the Board's threshold determinations on contention admissibility unless an appeal demonstrates an error of law or abuse of discretion.[11]

### B. SEED's Proposed Contention 17

In proposed Contention 17, SEED asserted that ISP's Environmental Report was insufficient because it did not account for the findings of the NWTRB Report.[12] SEED argued that the NWTRB Report "significantly alters . . . the scope of this proceeding" beyond the question of whether ISP's application to build and construct a proposed CISF meets our regulations.[13] SEED asserted that, based on the NWTRB Report, a range of potential waste transportation and packaging issues must be addressed.[14] According to SEED, these issues include: improvements to highways and rail lines that might be used for shipments; the deployment of dry transfer systems (DTSs) at reactor sites to repackage fuel into standardized transportation, aging, and disposal canisters that DOE may develop in the future; and the actual timing and cost of future shipments, especially those involving high-burnup fuel.[15] SEED claimed that ISP must evaluate these additional issues or the environmental effects of waste transportation to the site will be impermissibly segmented from those associated with building and operating the proposed CISF.[16]

---

[9] Notice of Appeal of LBP-19-11 by Intervenor Sustainable Energy and Economic Development Coalition and Brief in Support of Appeal (Jan. 7, 2020) (SEED Appeal).

[10] 10 C.F.R. § 2.311(c).

[11] *See, e.g., Tennessee Valley Authority* (Browns Ferry Nuclear Plant, Units 1, 2, and 3), CLI-17-5, 85 NRC 87, 91 (2017); *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-16-9, 83 NRC 472, 482 (2016).

[12] *See* SEED Motion at 5-20.

[13] *Id.* at 4.

[14] *See id.* at 5-7.

[15] *See id.* at 5-7, 9-11, 19-20.

[16] *See id.* at 11-13.

The Board rejected SEED's argument and found that proposed Contention 17 did not raise a genuine dispute with the transportation evaluations already contained in ISP's application. The Board found ISP's Environmental Report addressed the potential environmental impacts of transporting spent nuclear fuel to the proposed CISF but that SEED did not challenge the discussion in the Environmental Report and moreover "fail[ed] to acknowledge or dispute any safety analyses, aging management plans or quality assurance programs described in ISP's application."[17] The Board ruled that proposed Contention 17 therefore did not meet the threshold admissibility requirements of 10 C.F.R. § 2.309(f)(1)(vi).[18]

The Board also found proposed Contention 17 to be outside the scope of this proceeding. ISP did not seek approval for waste transportation, packaging, or repackaging activities like those addressed by the NWTRB Report.[19] Instead, the Board determined that the proposed CISF would accept only NRC-approved transportation and waste packages, which the NWTRB Report acknowledged are currently in use and could be shipped in the near term.[20] New transportation and waste package designs would be reviewed separately under our regulations in 10 C.F.R. Part 71.[21] Further, the title holders of spent nuclear fuel — which include private companies — would be responsible for transporting waste to the proposed facility, not ISP.[22] Accordingly, the Board found SEED's assertion that ISP must evaluate the impacts associated with the development and deployment of future packaging systems and transportation to be outside the scope of this proceeding.[23]

On appeal, SEED argues (as it did before the Board) that the National Environmental Policy Act (NEPA) requires ISP to further evaluate the environmental effects of waste transportation and repackaging.[24] SEED also asserts that the Board impermissibly raised SEED's burden to demonstrate the admissibility of proposed Contention 17.[25] However, SEED does not challenge the Board's finding that ISP's Environmental Report has already evaluated the expected impacts

---

[17] LBP-19-11, 90 NRC at 367. ISP's evaluation of the environmental impacts of transporting spent nuclear fuel (including high-burnup fuel) is set forth in its Environmental Report. *See* Environmental Report at 4-9 to -10, 4-12, 4-16, 4-23.

[18] LBP-19-11, 90 NRC at 367.

[19] *See id.* at 366-67.

[20] *See id.* at 366; *see also* NWTRB Report at xxiii, xxvii (noting that commercial spent nuclear fuel currently stored in NRC-approved dual-purpose storage and transportation canisters "likely could be shipped within a year or two" of developing a destination site and obtaining funding).

[21] LBP-19-11, 90 NRC at 367-68.

[22] *Id.* at 367.

[23] *Id.* at 367-68.

[24] *See* SEED Appeal at 17-19.

[25] *See id.* at 19.

of transporting waste in NRC-approved packages to its proposed facility. SEED therefore does not show that the Board erred.

SEED also argues on appeal that proposed Contention 17 should be admitted because the NWTRB Report includes materially different information than what is in ISP's application.[26] Specifically, SEED states that the NWTRB Report discusses DOE's potential development of standardized waste canisters and the need for at-reactor DTSs to load waste from existing packages into those canisters, while ISP's application does not.[27] But as the Board explained, the NWTRB Report's recommendations — advice to DOE on how to advance its plans for nuclear waste transportation, storage, and disposal solutions at the Federal level — do not determine the scope of ISP's project or this licensing proceeding.[28] The NWTRB Report does not provide a legal basis to expand the scope of this proceeding beyond what our regulations require.[29] We see no error in the Board's reasoning.

Further, we do not agree with SEED that the Board's refusal to admit proposed Contention 17 will result in an incomplete evaluation of the project's environmental impacts under NEPA. As we have noted, ISP's application already evaluates the impacts of waste transportation to the proposed CISF during the proposed license term.[30] Moreover, the NRC's Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, as codified in our regulations, evaluates the environmental impacts of DTS construction and waste repackaging beyond the proposed license term.[31] We would require separate safety and environmental reviews before we approve any future license application from DOE (or another entity) for new transportation or storage packages or for the construction and operation of a DTS.

---

[26] *See id.* at 15-17.

[27] *Id.* at 16.

[28] *See* LBP-19-11, 90 NRC at 366-67.

[29] *Id.*

[30] *See* note 17, *supra.* Although ISP's application does not analyze the impacts of building and operating a DTS to enable spent fuel repackaging at its facility, the Board found ISP was not required to do so; ISP does not seek authorization to construct or operate a DTS. *See* LBP-19-11, 90 NRC at 368. Our regulations do not require an applicant to address the impacts of spent nuclear fuel storage beyond the license term. *See* 10 C.F.R. § 51.23(b).

[31] *See* "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel" (Final Report), NUREG-2157, vol. 1, ch. 5 (Sept. 2014) (ML14196A105); 10 C.F.R. § 51.23(b). The environmental impacts described in NUREG-2157 are deemed incorporated into the environmental impact statement for an independent spent fuel storage installation. 10 C.F.R. §§ 51.23(b), 51.80(b)(1).

## III. CONCLUSION

For the foregoing reasons, we *affirm* the Board's decision denying SEED's motion for leave to file proposed Contention 17.

IT IS SO ORDERED.

For the Commission

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 4th day of December 2020.

# Tab 26

Cite as 92 NRC 463 (2020) **CLI-20-14**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**COMMISSIONERS:**

**Kristine L. Svinicki,** Chairman
**Jeff Baran**
**Annie Caputo**
**David A. Wright**
**Christopher T. Hanson**

**In the Matter of** **Docket No. 72-1050-ISFSI**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **December 17, 2020**

## NUCLEAR WASTE POLICY ACT

The NWPA does not authorize DOE to take title to spent nuclear fuel before a permanent repository is available. *See* Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. §§ 10101-10270 (2012).

## LICENSE CONDITIONS

A license may be conditioned to anticipate a change in the law.

## ADMINISTRATIVE PROCEDURE ACT

Conditioning a license to anticipate a change in the law does not violate the Administrative Procedure Act's prohibition on an agency acting "unlawfully."

## APPEALS

We do not permit a participant to raise new arguments on appeal. *See Crow Butte Resources, Inc.* (North Trend Expansion Project), CLI-09-12, 69 NRC 535, 546 (2009).

**CREDIBLE ACCIDENTS**

A facility need not be designed to withstand every conceivable accident, but it must be designed to withstand those found to be credible. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 259 (2001).

**REGULATORY GUIDES**

Regulatory guidance documents describe approaches to compliance that have been deemed acceptable by the Staff in the past, but regulatory guides do not create new regulatory requirements. *Private Fuel Storage,* CLI-01-22, 54 NRC at 264; *International Uranium (USA) Corp.* (Request for Materials License Amendment), CLI-00-1, 51 NRC 9, 19 (2000). Where an applicant follows an applicable guidance document, the burden is on the petitioner to show that the application nonetheless falls short of regulatory requirements.

**LICENSING**

The Board properly found that challenges regarding as-yet-unknown waste transportation routes were outside the scope of the proceeding to license a consolidated interim storage facility.

**INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

NRC regulations governing independent spent fuel storage installations do not require a dry transfer system for the repackaging of spent nuclear fuel to be in place during the period of licensed operation.

**NATIONAL ENVIRONMENTAL POLICY ACT**

NRC regulations do not require a license applicant to describe in its environmental report the impacts of building and operating a dry transfer system after the period of licensed operation, which are already described in the Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel.

**NATIONAL ENVIRONMENTAL POLICY ACT**

An agency is not required to conduct an environmental analysis of every alternative suggested by commenters. The First Circuit's decision in *Dubois v. USDA,* 102 F.3d 1273 (1st Cir. 1996) only required that when a proposed project may have serious adverse environmental impacts, an agency must ad-

dress "reasonably thoughtful" alternative proposals and explain its reasoning if it rejected those proposals.

**NATIONAL ENVIRONMENTAL POLICY ACT**

Board correctly rejected contention claiming that an applicant must consider the effects of a terrorist attack in its environmental analysis. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124 (2007), *review denied, N.J. Dep't of Envtl. Prot. v. NRC,* 561 F.3d 132 (3d Cir. 2009).

**MOTION TO REOPEN**

Although the Commission has jurisdiction to consider motions to reopen the record, it will often remand such motions to the Board. *See, e.g., Holtec International* (HI-STORE Consolidated Interim Storage Facility), CLI-20-4, 91 NRC 167, 191, 211 (2020); *Virginia Electric and Power Co.* (North Anna Power Station, Unit 3), CLI-12-14, 75 NRC 692, 701-02 (2012).

## MEMORANDUM AND ORDER

This proceeding involves the application of Interim Storage Partners LLC (ISP) for a license to construct and operate a consolidated interim storage facility (CISF) in Andrews County, Texas. Today we address the appeals of an Atomic Safety and Licensing Board decision from petitioners Beyond Nuclear, Inc. (Beyond Nuclear); Fasken Land and Minerals, Ltd. and Permian Basin Land and Royalty Owners (together, Fasken); and a coalition of petitioners known as the "Joint Petitioners."[1] We also refer Fasken's motion to admit a new contention based on the Staff's draft environmental impact statement to the Board for consideration.[2]

---

[1] LBP-19-7, 90 NRC 31 (2019). Joint Petitioners are a coalition of Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Louis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition (SEED Coalition), and Leona Morgan, individually.

[2] *See* Fasken Land and Minerals, Ltd.'s and Permian Basin Land and Royalty Owners Motion for Leave to File New and/or Amended Contention (July 6, 2020) (Fasken Motion for Contention 5); *see also* NRC Staff's Answer in Opposition to Fasken Oil and Ranch, Ltd.'s and Permian Basin Land and Royalty Owners' Motion to Reopen the Record and File New Contention 5 (July 31, 2020); Interim Storage Partners LLC's Answer Opposing Fasken's and PBLRO's Second Motion to Reopen the Record and Motion for Leave to File New Contention "5" (July 31, 2020).

## I. BACKGROUND

ISP is a joint venture between Waste Control Specialists LLC (WCS) and Orano CIS LLC formed to design, build, and operate the WCS CISF.[3] The proposed CISF would be located within the owner-controlled area of the existing WCS site in Andrews, Texas, which currently includes two separate low-level radioactive waste (LLRW) disposal facilities.[4] ISP has applied for a forty-year license to store 5,000 metric tons of spent nuclear fuel (SNF), mixed oxide fuel, and Greater than Class C LLRW in the proposed CISF.[5] If the license is granted, ISP anticipates that it will request license amendments for seven expansion phases over the next twenty years, and the CISF may ultimately store up to 40,000 metric tons of waste.[6]

The Board found that although Beyond Nuclear, Fasken, and at least one member of the Joint Petitioners had established standing, none proffered an admissible contention.[7] Beyond Nuclear, Fasken, and Joint Petitioners have appealed the denial of their hearing requests, and our decision today addresses those appeals. We also address Fasken's request for access to sensitive unclassified non-safeguards information (SUNSI) relating to one of the contentions the Board rejected in its ruling.[8]

Also, the Board initially found that Sierra Club had demonstrated standing and proposed an admissible contention.[9] Sierra Club's contention has since been dismissed as moot, and we will address Sierra Club's appeals separately.[10] On December 13, 2019, the Board rejected a late-filed contention proposed by Joint Petitioners and terminated the proceeding.[11]

---

[3] WCS Consolidated Interim Storage Facility System Safety Analysis Report (Public Version), Docket No. 72-1050, rev. 2 (Aug. 9, 2018), at 1-2 (ADAMS accession no. ML18221A408 (package)) (SAR).

[4] *Id.* at 1-2.

[5] WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050, rev. 2 (Aug. 9, 2018), at 1-1 (ML18221A405 (package)) (Environmental Report).

[6] Environmental Report at 1-1.

[7] LBP-19-7, 90 NRC at 39.

[8] Appeal of Staff Denial of Petitioners' Request for SUNSI Information Related to ISP's Responses to RAIs (Feb. 12, 2020) (Fasken SUNSI Appeal); *see also* Request for Sensitive Unclassified Non-Safeguards Information (SUNSI) regarding Interim Storage Partner's Waste Control Specialist Consolidated Interim Storage Facility (Jan. 16, 2020) (Fasken SUNSI Request).

[9] *See* LBP-19-7, 90 NRC at 50, 78-80.

[10] *See* LBP-19-9, 90 NRC 181 (2019); Sierra Club's Brief in Support of Appeal from Atomic Safety and Licensing Board Rulings Denying Admissibility of Contentions in Licensing Proceeding (Dec. 13, 2019). The Board's dismissal of Sierra Club's contention has mooted ISP's appeal of the decision granting Sierra Club a hearing, and we therefore dismiss ISP's appeal without addressing its merits.

[11] *See* LBP-19-11, 90 NRC 258 (2019), *aff'd,* CLI-20-13, 92 NRC 457 (2020).

## II. DISCUSSION

### A. Standard of Review

Our regulations allow a petitioner whose hearing request has been wholly denied to appeal.[12] We generally defer to the Board on matters of contention admissibility and standing unless an appeal demonstrates an error of law or abuse of discretion.[13]

### B. Beyond Nuclear's Appeal

Beyond Nuclear proposed one contention in which it asserted that the application must be denied because "the central premise of ISP's application" is that the U.S. Department of Energy (DOE) will take ownership of the waste and contract with ISP to store it until a permanent repository is available and this arrangement would violate the Nuclear Waste Policy Act (NWPA).[14] The contention is substantially similar to the claim raised by Beyond Nuclear and other petitioners in the Holtec International CISF application proceeding, and we affirm the Board here for the reasons explained in our recent decision in that proceeding.[15]

The Staff, ISP, and the Board all recognize that the NWPA does not authorize DOE to take title to SNF at this time.[16] ISP's proposed license would include a license condition requiring that, before ISP could begin operations, it must have storage contracts in place assuring that ISP's clients would fund operations.[17] And the proposed wording of the license provides that DOE could be that client.[18] Specifically, the proposed license condition states that ISP must

---

[12] 10 C.F.R. § 2.311(c).

[13] *See, e.g., Crow Butte Resources, Inc.* (Marsland Expansion Area), CLI-14-2, 79 NRC 11, 13-14 (2014); *Strata Energy, Inc.* (Ross *In Situ* Uranium Recovery Project), CLI-12-12, 75 NRC 603, 608-13 (2012).

[14] Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Oct. 3, 2018) (Beyond Nuclear Petition).

[15] *See Holtec International* (HI-STORE Consolidated Interim Storage Facility), CLI-20-4, 91 NRC 167, 173-76 (2020); Beyond Nuclear, Inc.'s Hearing Request and Petition to Intervene (Sept. 14, 2018), at 10-11 (ML18257A324).

[16] *See* LBP-19-7, 90 NRC at 57; Interim Storage Partners LLC's Response to the Atomic Safety and Licensing Board's Questions Regarding the U.S. Department of Energy's Authority Under the Nuclear Waste Policy Act (June 28, 2019) (ISP Response to Board Questions) (acknowledging that DOE may not take title under current law).

[17] *See* Interim Storage Partners LLC, License Application (Aug. 9, 2018) (License Application), Attach. A, License for Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, at 3 (ML18221A397 (package)).

[18] *Id.*

have contracts in place "with [DOE] or other SNF title holder(s) stipulating that the DOE or the other SNF title holder(s) is/are responsible for funding operations required for storing the material" prior to commencing operations.[19] In other words, the proposed license would be conditioned on ISP contracting either with the nuclear power plant operators who generated the spent nuclear fuel, consistent with current law, or with DOE, which would require statutory amendment.

ISP acknowledges that it hopes Congress will change the law to allow DOE to enter storage contracts prior to the availability of a repository.[20] Thus, if the proposed license were to be issued, ISP could take advantage of a future change in the law by bidding for a DOE contract without having to first amend its license.

The Board found that Beyond Nuclear's proposed contention did not raise a genuine dispute with the application.[21] The Board reasoned that rather than being centrally premised on ISP contracting with DOE in violation of the NWPA, the application also includes the option of contracting with nuclear plant owners, which is consistent with existing law, and whether that option will prove commercially viable was not an issue before it.[22]

On appeal, Beyond Nuclear argues that the Board erred by "reframing" the contention to eliminate its central premise and thereby "failed to judge the contention by its own terms."[23] Beyond Nuclear further argues that the proposed license condition would, contrary to law, give "ISP and/or DOE . . . rights under the license" to enter storage contracts.[24] Along the same lines, it claims that the license would "allow DOE to be an owner of spent fuel during transportation and storage" at the CISF.[25] Beyond Nuclear misunderstands the nature of the proposed license and its conditions.

As an initial matter, the Board agreed with Beyond Nuclear's central argument that the NWPA prevents DOE from taking title to SNF at this time. But this does not mean that the application must automatically be rejected. The proposed license would not "authorize" ISP to enter into illegal contracts. Rather, the proposed license would require that, before it can begin operations, ISP must have contracts in place to ensure it has a flow of operating funds. Because an illegal contract is unenforceable, ISP plainly could not rely on such contracts to

---

[19] *Id.*

[20] ISP Response to Board Questions at 3.

[21] LBP-19-7, 90 NRC at 57-58.

[22] *Id.*

[23] Beyond Nuclear's Brief on Appeal of LBP-19-07 (Sept. 17, 2019), at 11 (Beyond Nuclear Appeal).

[24] *Id.* at 12.

[25] *Id.* at 2, 16.

ensure its operating funds.[26] Moreover, granting a license to ISP would not effect or allow a change of spent fuel ownership as between two parties unrelated to ISP (the nuclear plant owners and the DOE). Similarly, issuing a license to ISP would not grant any rights to DOE. We therefore are not persuaded by Beyond Nuclear's arguments that the proposed license would authorize illegal activity.

Beyond Nuclear also asserts that issuance of the license would violate the Administrative Procedure Act's prohibition against agencies acting unlawfully, because "the license application contains provisions which, if implemented, would violate the NWPA."[27]

Similarly, it argues that issuing the license would exceed our statutory authority because we have no statutory authority to violate the NWPA.[28] It argues that its challenge to the license was dismissed based on the hope for a change in the law or an expectation that DOE and ISP would not violate the law.[29] But as we have explained above, the proposed license would not authorize ISP to enter storage contracts with DOE and the proposed license is not premised on illegal activity because there is a lawful option by which ISP could fulfil the proposed license condition.

Beyond Nuclear has not shown error in the Board's interpretation of the legal force of the disputed license condition. The Board's conclusion that Beyond Nuclear had raised no genuine dispute with the application was reasonable. We therefore affirm its decision to dismiss this contention.

### C. Fasken's Appeal

Fasken appeals the Board's determinations regarding three of its six proposed contentions.[30]

#### *1. Fasken's Contention 2 (Abandoned Oil and Gas Wells) and SUNSI Access Request*

In Contention 2, Fasken argued that the application failed to account for "unstable geological characteristics" and "soil stability problems" of the site attributable to abandoned and "orphan" oil and gas wells in the region.[31] Fasken supported this contention with the declaration of a geologist, Aaron Pachlhofer,

---

[26] *See, e.g., Kaiser Steel Corp. v. Mullins,* 455 U.S. 72, 77-78 (1982).

[27] Beyond Nuclear Appeal at 13-14 (citing 5 U.S.C. § 706(2)(A), (C)).

[28] *Id.* at 13.

[29] *Id.* at 13-16.

[30] Fasken and PBLRO's Brief on Appeal of LBP-19-07 (Sept. 17, 2019) (Fasken Appeal).

[31] *See* Petition of Permian Basin Land and Royalty Organization and Fasken Land and Minerals for Intervention and Request for Hearing, at 15-17 (Oct. 29, 2018) (Fasken Petition).

who described the hydrogeology of the region and oil development in the area.[32] Fasken asserted that there were 4,579 well bores within a ten-mile radius of the proposed site.[33] Fasken further claimed that the abandoned wells could provide a path for contaminants to reach the groundwater.[34] It argued that the application did not address this information and therefore "failed to analyze regional geography" and could not meet the requirements of 10 C.F.R. § 72.103(a)(1).[35]

ISP opposed the contention in its entirety, but the Staff initially supported its admission in part.[36] In its response to Fasken's hearing request, the Staff acknowledged that Fasken had raised an issue of whether the presence of a large number of improperly abandoned wells could impact site stability.[37] The Staff changed its position and considered the issue moot after ISP's response to a Staff Request for Additional Information (RAI) confirmed that the proposed site itself contains only a single dry hole, which has been properly plugged and abandoned.[38]

The Board dismissed the contention because it was factually unsupported and did not address portions of the application that discuss site stability matters.[39] In particular, the Board pointed out that ISP's safety evaluation acknowledged that oil and gas wells are in the general vicinity of the site and addressed soil stability, induced seismicity, and vibratory ground motion.[40] The Board found that unless Fasken could show some reason why the offsite wells would cause "unstable geological characteristics, soil stability problems or potential for vibratory ground motion at the site," ISP was not required to provide more information.[41] The Board further found that the claims that the wells could provide a conduit for contaminants to the groundwater did not dispute relevant portions of the

---

[32] Fasken Petition, Ex. 3, Declaration of Aaron Pachlhofer (Oct. 29, 2018), at 4-7 (Pachlhofer Declaration).

[33] *See* Fasken Petition at 16; Tr. at 324 (Mr. Laughlin) (providing revised figure for number of wells).

[34] Fasken Petition at 17; *see also* Pachlhofer Declaration at 3-5.

[35] Fasken Petition at 15-17.

[36] Interim Storage Partners LLC's Answer Opposing Hearing Request and Petition to Intervene filed by Permian Basin Land and Royalty Organization and Fasken Land and Minerals (Nov. 20, 2018), at 34-41 (ISP Answer to Fasken Petition); NRC Staff's Response to Petitions to Intervene and Requests for Hearing Filed by Permian Basin Land and Royalty Organization and Fasken Land and Minerals (Nov. 23, 2018), at 15-16 (Staff Answer to Fasken Petition).

[37] Staff Answer to Fasken Petition at 16.

[38] *See* Letter from Jeffery D. Isakson, ISP, to NRC Document Control Desk, "Submittal of Partial Response to First RAI" (May 31, 2019) (ML19156A048 (package)) (First RAI Response Package), Encl. 3, RAI Responses (Public Version), at 3 (First RAI Responses); *see* Tr. at 328 (Mr. Gillespie).

[39] LBP-19-7, 90 NRC at 112-13 (citing SAR §§ 2.1, 2.6.2; SAR, Attach. D § 4.3 (proprietary)).

[40] *Id.* at 112 & n.544.

[41] *Id.* at 112 (quoting 10 C.F.R. § 72.103(a)(1)).

application, which explained why groundwater contamination from spent fuel dry storage is unlikely at the site.[42] The Board concluded that Fasken had shown no plausible impact from the existence of wells up to ten miles from the site when there is only a single dry hole within the site's boundary.[43] It therefore dismissed the contention because it did not present a genuine dispute with the application and for lack of factual support.

We defer to the Board's finding that the contention is not supported in fact. Fasken's appeal renews its critique that the application does not adequately discuss the presence of nearby wells, but the appeal does not address the Board's ruling that its contention did not show how abandoned or orphaned wells outside the boundary of the site and up to ten miles away could affect the soil stability of the site.[44] Mr. Pachlhofer's declaration does not contend that abandoned or active wells five, ten, or even one mile from the proposed CISF would cause soil subsidence at the site.[45]

On appeal, Fasken also argues that the plain language of 10 C.F.R. § 72.103(a)(1) requires ISP to analyze the entire region in which the proposed site is located for "unstable geological characteristics."[46] But Fasken's suggestion that ISP must discuss soil stability throughout the entire region of the facility without regard to the potential impacts to the proposed facility is unpersuasive. The regulation Fasken cites lists several investigative methods to ensure site stability, only one of which mentions the region: sites east of the Rocky Mountains such as the proposed site "will be acceptable if the results from onsite foundation and geological investigation, literature review, and regional geological reconnaissance show no unstable geological characteristics, soil stability problems, or potential for [excessive] vibratory ground motions *at the site*."[47] Although the regulation directs "regional geological reconnaissance," it is clear that the purpose of all these investigative methods is to determine the stability of the proposed site, not the region in general.[48] We therefore affirm the Board's interpretation of 10 C.F.R. § 72.103(a)(1).

---

[42] *Id.* at 113 (citing SAR § 2.7 ("The method of storage (dry cask), the nature of the storage casks, the extremely low permeability of the red bed clay and the depth to groundwater beneath the CISF preclude the possibility of groundwater contamination from the operation of the WCS CISF.")).

[43] *Id.*

[44] Fasken Petition at 4-12.

[45] *See* Pachlhofer Declaration at 6-7.

[46] Fasken Appeal at 5-6.

[47] 10 C.F.R. § 72.103(a)(1) (emphasis added).

[48] Fasken additionally challenges the Board's ruling that it failed to dispute relevant portions of the application because it did cite portions of the SAR in its petition. Fasken Appeal at 5-6. But given that the contention lacked factual support, whether it provided cites to certain SAR sections is irrelevant. We additionally find no merit to Fasken's argument that the Staff should not have changed its position concerning the contention's admissibility.

On January 16, 2020, Fasken submitted to the NRC Staff a request for access to the non-publicly available portion of an RAI response released on January 6, 2020. Fasken stated that it needed the information to support Contention 2.[49] The Staff denied the request on January 27, 2020, and Fasken submitted an appeal on February 12, 2020.[50]

Fasken argues that it needs the information in order to participate meaningfully in the licensing proceeding. The information Fasken requests is detailed information about the location, type, and status of oil, gas, and water wells within a 10-kilometer radius of the proposed CISF site, which Fasken argues is relevant to its Contention 2. But as described above, the Board found Contention 2 inadmissible principally because Fasken did not show that wells located away from the site could affect soil stability on the site. Nothing in Fasken's SUNSI appeal contravenes that analysis. We therefore deny Fasken's request for access to the non-public portions of ISP's RAI response.

### *2. Fasken's Contention 3 (Airplane Crash)*

In Contention 3, Fasken claimed that ISP's emergency response plan for the facility was deficient in failing to account for aircraft crashes and other hazards: "The Applicant's Emergency Response Plan (ERP) fails to address how licensee will protect the facility from credible fire and explosion effects including those that are caused by aircraft crashes."[51] Fasken argued that the ERP does not conform to the requirements of 10 C.F.R. § 72.122(c), which requires that structures, systems, and components important to safety (SSCs) "must be designed and located so that they can continue to 'perform their safety functions effectively under credible fire and explosion exposure conditions'" or to 10 C.F.R. § 72.24(d)(2), which requires that the application evaluate SSCs designed to prevent and mitigate accidents.[52] Fasken reasoned that ISP had identified an airplane crash as a "credible accident" because it is listed in the ERP.[53] Fasken further argued that the ERP must take into account the "size, velocity,

[49] Fasken SUNSI Request at 3.

[50] Letter from Sara Kirkwood, NRC, to Timothy Laughlin, Counsel for Fasken (Jan. 27, 2020) (Denial of Fasken SUNSI Request) (ML20024D860); *see also* Fasken SUNSI Appeal.

[51] Fasken Petition at 18; *see* Consolidated Emergency Response Plan (Mar. 15, 2017) (ML17082-A054) (ERP).

[52] Fasken Petition at 18-26 (quoting Final Report, Standard Review Plan for Spent Fuel Dry Storage Facilities," NUREG-1567 (Mar. 2000), § 6.4.5 (ML003686776) (Dry Storage SRP) (emphasis removed)).

[53] *Id.* at 19; *see* ERP, app. C, Facility Emergency Action Levels.

weight and fuel loads" of various aircraft "when assessing the hazards" of such a crash.[54]

The Board held that the contention did not dispute relevant portions of the application and therefore did not raise a genuine issue of material fact concerning emergency planning.[55] The Board found that the contention mistakes matters that are to be addressed in the emergency plan with matters that are addressed elsewhere in the application. The Board explained that § 72.122(c) is a design requirement, compliance with which is addressed in the SAR, chapter 12, "Accident Analysis," rather than in the emergency plan.[56] The Board further found that air crash accidents are not among the credible events listed.[57] Indeed, the emergency response plan explicitly states that it discusses responses to various posited scenarios, including those that have not been found to be credible.[58]

On appeal, Fasken argues that the Board should have admitted its contention. First, it argues that aircraft crashes are credible accidents because there are three airports within fifty miles of the proposed facility.[59] Second, Fasken asserts that the Standard Review Plan for dry storage facilities requires an assessment of aircraft crashes regardless of whether such crashes are deemed "credible."[60] Third, Fasken argues that the Board abused its discretion because it was inconsistent in its use of staff guidance documents in evaluating contention admissibility.[61]

With respect to Fasken's argument that an aircraft crash is credible because the facility is within fifty miles of three airports, we first observe that Fasken offers no factual or expert support for this argument. This argument is new

---

[54] Fasken Petition at 22 (citing Dry Storage SRP § 2.5.2). Fasken further claimed in Contention 3 that the ERP "relies on outside assistance to handle catastrophic fires and explosions and does not specify how their current suppression systems will effectively mitigate fires and explosions until help arrives." *Id.* at 19, 22-23. It argued that emergency responders are located many miles from the site although "time is of the essence" in mitigating radiation exposure. *Id.* at 22-25. These arguments appear to have been abandoned on appeal.

[55] LBP-19-7, 90 NRC at 114-15.

[56] *Id.* at 114.

[57] *Id.* at 115. The Board observed that Fasken "appears to assume that all events that could trigger an emergency alert are necessarily credible events for which the facility must be designed to survive with its safety functions intact." *Id.*

[58] SAR § 13.5, "Emergency Response Planning," provides: "The [ERP] planning basis includes credible events as well as hypothetical accidents whose occurrence is not considered credible, so as not to limit the scope of Emergency Response Planning."

[59] Fasken Appeal at 13.

[60] *Id.* at 13 (citing Dry Storage SRP § 2.5.2). The quoted section directs staff reviewers to "review potential hazards associated with nearby facilities [including airports and consider] aircraft size, velocity, weight and fuel load in assessing the hazards of aircraft crashes on an installation near an airport."

[61] *Id.* at 13-14.

on appeal.[62] In addition, Fasken does not address the analysis ISP provided regarding the probability of such an accident, namely, that it is less than one in a million per year.[63] Fasken does not question ISP's analysis specifically or support its contention factually with anything other than the claim that airports are located within a fifty mile radius.

We also disagree with Fasken's argument that the Standard Review Plan for spent fuel facilities, § 2.5.2, requires an analysis of aircraft crash impacts without regard to whether such a crash is credible. Section 2.5.2, by its own terms, directs the Staff reviewer to ensure that the "methods used by the applicant to quantify offsite hazards are consistent with the guidance in chapter 15," which in turn directs that the reviewer ensure that credible events have been analyzed.[64] A facility need not be designed to withstand "every conceivable accident," but it must be designed to withstand those found to be credible.[65]

We find unavailing Fasken's argument that the Board applied Staff guidance documents inconsistently in its analysis because the Board treated guidance documents as controlling in rejecting other contentions.[66] Regulatory Guides describe approaches to compliance that have been deemed acceptable by the Staff in the past, but they do not create new regulatory requirements.[67] Where an applicant follows an applicable guidance document, the burden is on the petitioner to show that the application nonetheless falls short of regulatory requirements. Fasken, however, has not identified an inconsistency in the Board's ruling on

---

[62] We do not permit a participant to raise new arguments on appeal. *See Crow Butte Resources, Inc.* (North Trend Expansion Project), CLI-09-12, 69 NRC 535, 546 (2009).

[63] *See* First RAI Responses at 1; First RAI Response Package, Encl. 6, SAR Changed Pages (rev. 3 interim), at 4-12 (unnumbered). According to its RAI response, ISP used guidance in the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," NUREG-0800, rev. 4 (Mar. 2010) § 3.5.1.6 (ML100331298).

[64] *See* Dry Storage SRP § 15.5.

[65] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 259 (2001). In *Private Fuel Storage,* we ruled that the threshold probability for a design basis event (that is, whether an event is credible) should be one in one million for a spent fuel storage installation. *Id.* at 265. The *Private Fuel Storage* decision specifically addressed the probability of an aircraft crash into the facility. *Id.* at 263.

[66] Fasken Appeal at 13-14. Fasken specifically cites the Board's rejection of Sierra Club's proposed Contention 15. But the Board did not find that the guidance document was legally binding; it found that Sierra Club did not show how ISP had violated NEPA or NRC regulations in its environmental justice analysis. *See* LBP-19-7, 90 NRC at 84; *see also* "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (Final Report), NUREG-1748 (Aug. 2003), at 6-25 (ML032450279).

[67] *See Private Fuel Storage,* CLI-01-22, 54 NRC at 264; *International Uranium (USA) Corp.* (Request for Materials License Amendment), CLI-00-1, 51 NRC 9, 19 (2000) ("NRC Guidance Documents are routine agency policy pronouncements that do not carry the binding effect of regulations.").

Contention 3 or an abuse of discretion by the Board in its application of the guidance documents.

We therefore affirm the Board's decision to dismiss Fasken Contention 3.

### *3. Fasken's Contention 4 (Groundwater and Aquifers); Motion to Reopen; Motion to Amend Contention 4 Based on New Information*

In its proposed Contention 4, Fasken argued that both the Environmental Report and SAR failed to consider the adverse effect the CISF will have on groundwater.[68] Specifically, Fasken argued that the Environmental Report did not comply with 10 C.F.R. § 51.45 and that the SAR did not "contain 'adequate information for an independent review of all subsurface hydrology-related design bases and compliance with dose radiological exposure standards'" to ensure compliance with 10 C.F.R. § 72.122(b)(4).[69] Fasken's expert Mr. Pachlhofer asserted that four aquifers are in Andrews county at or near the WCS site.[70] Fasken also claimed that water within one of these, the Antler Formation, is used for drinking and the formation is present within a few feet of the surface on the WCS site.[71] However, the only support Fasken supplied for the claim that the proposed CISF could contaminate the groundwater was the assertion that ISP has conceded that an airplane crash into the facility is a credible event that could cause the release of radionuclides.[72]

On January 21, 2020, Fasken filed a motion to reopen the proceeding and to admit an amended Contention 4 based on ISP's response to an RAI from the Staff.[73] Fasken's motion argues that ISP's RAI response provided a materially different description of the subsurface environment at the site.

---

[68] Fasken Petition at 26-31.

[69] *Id.* at 27 (quoting Dry Storage SRP § 2.4.5).

[70] Pachlhofer Declaration at 4.

[71] Fasken Petition at 30, Pachlhofer Declaration at 4.

[72] Fasken Petition at 27-28.

[73] Fasken Oil and Ranch, LTD and Permian Basin Land and Royalty Owners Motion to Reopen the Record for Purposes of Considering and Admitting an Amended Contention Based on New Information Provided by Interim Storage Partners in Response to NRC Requests for Additional Information (Jan. 21, 2020) (Fasken Motion to Reopen); Fasken Oil and Ranch, LTD and Permian Basin Land and Royalty Owners Motion for Leave to Amend Contention Four Regarding Interim Storage Partner's New Description of Groundwater Located below the Site and the Potential Impact the Site Will Have on the Groundwater (Jan. 21, 2020) (Fasken Motion to Amend Contention 4); *see also* Letter from Jeffery D. Isakson, ISP, to NRC Document Control Desk, "Submission of ISP Responses for RAIs and Associated Document Markups from First Request For Additional Information, Part 3" (Nov. 21, 2019), Encl. 3 (ML19337B502 (package)) (Part 3 RAI Response). Although the documents were received in November 2019, they were not publicly released until January 6, 2020.

The Board dismissed the original contention because Fasken had not raised a material dispute identifying a plausible pathway to the groundwater from the CISF. For the reasons it provided in analyzing Fasken Contention 3, the Board was unpersuaded by the argument that an aircraft accident presented a credible scenario that could result in a contamination release.[74] It found that Fasken did not challenge the finding in the SAR that four factors "preclude the possibility of groundwater contamination": the canister design, the method of storage, the extremely low permeability of the red clay underlying the site, and the depth to the groundwater beneath the facility — about 225 feet to the shallowest water bearing zone.[75] In addition, the Board found that because the only portions of the application Fasken specifically challenged were in the SAR, not the Environmental Report, the contention failed as an environmental contention.[76]

Fasken's appeal challenges the Board's ruling rejecting its claim concerning aircraft crashes.[77] For the reasons the Board explained and as described above, ISP never conceded that an aircraft crash was a credible event, and Fasken has not challenged ISP's analysis concluding that such a crash is not a credible event.[78] Fasken's petition provided no other theory by which the canisters could release radionuclides to the environment. In addition, Fasken did not challenge the Environmental Report's conclusion that the proposed facility provides "no potential for a liquid pathway because the spent fuel contains no liquid component and the casks are sealed to prevent any liquids from contacting the spent fuel assemblies."[79]

Fasken next argues that it presented a genuine dispute "regarding the presence, location, and permeability of aquifers and formations below the proposed site."[80] Fasken's proposed amendment to Contention 4 also pertains to a claimed mischaracterization of the site. But neither Fasken's original nor its amended Contention 4 identifies a significant disparity between the information in the SAR and the information in Mr. Pachlhofer's declaration and the report on which he primarily relies.[81] The report on which Mr. Pachlhofer relies acknowl-

---

[74] LBP-19-7, 90 NRC at 116.

[75] *Id.*; *see* SAR § 2.5, at 2-21.

[76] LBP-19-7, 90 NRC at 116.

[77] Fasken Appeal at 15-16. On appeal, Fasken also argues that its failure to cite portions of the Environmental Report should not preclude the contention's admission as an environmental contention because the hydrology sections of the Environmental Report are repeated verbatim in the hydrology sections of the SAR. *Id.* at 15. However, Fasken's challenge to the SAR was also unsupported.

[78] *See supra* Section II.C.2; LBP-19-7, 90 NRC at 115.

[79] *See* Environmental Report § 6.2, at 6-1.

[80] Fasken Appeal at 16.

[81] *See* Fasken Petition, Ex. 4, Thomas M. Lehman & Ken Rainwater, "Geology of the WCS–Flying

*(Continued)*

edges that groundwater "is not present continuously beneath" the WCS site.[82] Moreover, Fasken's argument does not acknowledge the difference between a geologic formation and a water-saturated aquifer. While Mr. Pachlhofer's declaration states that the Antlers Formation underlies the site and contains groundwater used for drinking water in Midland Texas, it does not claim that the Antlers Formation is saturated beneath the CISF site.[83] ISP's application acknowledges that the Antlers Formation is under its site.[84] Moreover, even if there are minor disagreements between the SAR and Fasken's materials, Fasken does not show how these relate to the underlying premise of its contention that the CISF would cause groundwater contamination.

Fasken's proposed amendment to Contention 4 focuses on the argument that the application misrepresented the depth of groundwater at the site. In its proposed Amended Contention 4, Fasken argues that ISP has acknowledged in its RAI response that groundwater exists at the site only "a few inches to a few feet" below the surface.[85] But Fasken's argument for amending Contention 4 is based on a misreading of ISP's RAI response.

In RAI WR-11, the Staff asked ISP to identify the shallowest groundwater located beneath the "proposed CISF footprint." ISP responded:

> The shallowest groundwater beneath the proposed CISF footprint is a few inches to a few feet of saturation in the undifferentiated Antlers/Ogallala sediments starting at the northern fence line of the Protected Area boundary in the northeast corner. The sands and gravels containing the water at a 90- to 100-foot depth are part of a hydrostratigraphic unit termed the Antlers/Ogallala/Gatuňa (OAG) by ISP joint venture member Waste Control Specialists.[86]

Therefore, the RAI response did not state that groundwater was present a few feet or a few inches below the surface. Instead, it states that the depth of the groundwater is 90 to 100 feet below the surface and the saturated thickness is a few inches to a few feet. Fasken misinterprets the response.

The remainder of Fasken's proposed amended argument turns on the claim

---

'W' Ranch, Andrews County, Texas" (April 2000) (Lehman and Rainwater Report). The Lehman and Rainwater Report focused on the Flying "W" Ranch area, immediately south of the proposed CISF, where there is currently a hazardous waste disposal site.

[82] *See* Lehman and Rainwater Report at 16; *see also id.* at 30 (Fig. 10).

[83] Pachlhofer Declaration at 4; *see also* Fasken Appeal at 18.

[84] SAR at 2-22 to 2-23.

[85] *See* Fasken Motion to Reopen at 8; Fasken Motion to Amend Contention 4 at 7-8.

[86] Part 3 RAI Response at 59. ISP also acknowledged in its response that the SAR's statement that the shallowest water bearing zone was at a depth of 225 feet and was measured at the neighboring WCS facility. *Id.*

that groundwater is present on the site no more than a few feet underground.[87] For example, Fasken argues that the Board erred in finding that the red clay layer under the site would form a natural barrier to the spread of any contamination.[88] Fasken reasons that the red clay layer cannot possibly overlie the shallowest aquifer because the Environmental Report states that the red clay layer is overlain by twenty-two to fifty-four feet of sand, gravel and alluvium, and "the red bed clays will not provide a natural barrier to the groundwater located inches below the site."[89] Because there is no basis to conclude that groundwater exists "inches" below the surface, this argument is without merit.[90]

We deny Fasken's request to amend Contention 4 because it lacks factual support. We therefore do not consider whether Fasken has satisfied the standards necessary to prevail on a motion to reopen. We affirm the Board's ruling on Fasken Contention 4.

### D. Joint Petitioners' Appeal

The Board found that only one of the Joint Petitioners had demonstrated standing based on the standing of SEED Coalition and SEED Coalition's member Beatrice Gardiner-Aguilar.[91] But the Board did not admit any of Joint Petitioners' fifteen proposed contentions, and Joint Petitioners have appealed its decision with respect to seven of them.[92] Joint Petitioners have additionally ap-

---

[87] Fasken Motion to Amend Contention 4 at 3, 7-8, 13 n.40, 16, 19, 21. Fasken also argues that the RAI response "admits that previous descriptions of groundwater were 'not based on sufficient boring data.'" Fasken Motion to Amend at 14, 19 (citing Part 3 RAI Response at 45). But the Part 3 RAI Response makes a different point when it states that the Lehman and Rainwater Report, which Mr. Pachlhofer cites in his declaration, "was not based on sufficient boring data to distinguish the contacts between the Antlers and the Ogallala in the proposed CISF area." Part 3 RAI Response at 45.

[88] Fasken Motion to Amend Contention 4 at 16, 21; *see also* LBP-19-7, 90 NRC at 116.

[89] Fasken Motion to Amend Contention 4 at 21 (citing Environmental Report § 4.3, at 4-28).

[90] *See also* NRC Staff's Answer in Opposition to Fasken Oil and Ranch, Ltd and Permian Basin Land and Royalty Owners' Amended Contention 4 and Accompanying Motion to Reopen the Record, at 7-8 (Feb. 13, 2020); Interim Storage Partners, LLC's Answer Opposing Fasken's and PBLRO's Motion to Reopen the Record and Motion for Leave to Amend Contention Four, at 13-14 (Feb. 18, 2020). Fasken submitted a reply to ISP's answer. See Fasken Oil and Ranch, Ltd.'s and Permian Basin Land and Royalty Owners' Reply to Interim Storage Partners, LLC's Answer Opposing Motion of Leave to Reopen the Record and Associated Motion for Leave to Amend Contention Four (Feb. 25, 2020). However, NRC regulations do not provide a right to reply to answers to a motion without prior permission from the Secretary of the Commission, and therefore Fasken's reply has not been considered. *See* 10 C.F.R. § 2.323(c).

[91] LBP-19-7, 90 NRC at 50-51.

[92] Notice of Appeal of LBP-19-07 by Petitioners Don't Waste Michigan, Citizens' Environmental

*(Continued)*

pealed the Board's finding that its other members did not demonstrate standing.[93] Because we find the Board properly rejected the appealed contentions, we do not reach the standing issue.

### *1. Joint Petitioners' Contention 1 (NEPA Analysis of Transportation Impacts)*

Joint Petitioners argued in proposed Contention 1 that the environmental impacts of waste transportation and storage at the proposed CISF must be assessed together as part of a "single, integrated project" under NEPA.[94] Joint Petitioners asserted that ISP's Environmental Report is lacking because it did not include "details and environmental impacts of a planned [twenty-year] shipping campaign involving at least 3,000 deliveries of SNF and GTCC waste to ISP."[95] Specifically, they claimed that the Environmental Report did not include "complete disclosure of all probable transportation routes, along with quantities of SNF and the likely radioisotopic contents" to be shipped.[96]

The Board ruled that proposed Contention 1 was inadmissible because it did not raise a genuine dispute of material fact or law with the application, was outside the scope of this proceeding, and amounted to an impermissible attack on the NRC's licensing regulations in 10 C.F.R. Parts 51 and 72.[97] The Board found that ISP's application included an evaluation of the environmental impacts of waste transportation to the proposed CISF along several representative routes and that Joint Petitioners had not disputed any part of that evaluation.[98] The Board also noted that the actual routes that may one day be used to transport waste to the proposed CISF are not currently known and are not the subject of any NRC approval in this proceeding. According to the Board, Joint Petitioners

---

Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, and Brief in Support of Appeal (Sept. 17, 2019) (Joint Petitioners Appeal).

[93] *Id.* at 4-18.

[94] Petition of Don't Waste Michigan, Citizens' Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition, and Leona Morgan, Individually, to Intervene, and Request for an Adjudicatory Hearing (Nov. 13, 2018), at 4 (Joint Petitioners Petition).

[95] *Id.* at 41.

[96] *Id.* at 43.

[97] LBP-19-7, 90 NRC at 88-89.

[98] *Id.* (citing Environmental Report § 4.2, at 4-3 to 4-28).

did not provide legal authority to suggest additional or unknown routes must be evaluated now.[99]

On appeal, Joint Petitioners reiterate their claim that ISP's application did not sufficiently address the environmental impacts of transporting waste to the proposed CISF.[100] But as the Board found, this proceeding does not include NRC review and approval of waste transportation routes; rather, its scope is confined to ISP's application for a license to build and operate a proposed CISF. Further, ISP's application includes an evaluation of the environmental impacts that would be expected along representative waste transportation routes to the proposed CISF from twelve different potential facilities; the Board found Joint Petitioners did not dispute any part of that evaluation.[101] Joint Petitioners did not claim error in the Board's findings or reasoning and we see none. Accordingly, we affirm the Board's dismissal of Contention 1.

### *2. Joint Petitioners' Contention 4 (Underestimation of LLRW Volume)*

Joint Petitioners argued in proposed Contention 4 that ISP's application underestimated the volume of LLRW that will be generated by the proposed CISF.[102] They claim that the application does not account for LLRW that would be generated during repackaging of spent fuel from the casks and canisters at the CISF into "uniformly-constructed transportation, aging, and disposal canisters" that DOE may one day deploy to move waste from the proposed CISF to a permanent repository.[103] They argued that the application also "omit[s] mention of disposal of radioactively activated and radioactively contaminated concrete" resulting from decommissioning of "the concrete and subgrade materials that will be bombarded for from 60 to 100 years with neutron radiation" at the

---

[99] *Id.*

[100] Joint Petitioners Appeal at 19-20.

[101] *See* LBP-19-7, 90 NRC at 89; *see also* Environmental Report § 4.2.7 (identifying twelve decommissioned reactor sites from which waste shipment impacts were analyzed). The use of representative routes to evaluate transportation impacts where actual routes are unknown is well-established under our regulatory framework and consistent with NEPA's "rule of reason." *See, e.g.,* "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," NUREG-2157, vol. 1, at 5-52 (ML14196A105) (Continued Storage GEIS); "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah," NUREG-1714, vol. 1, at 5-39 (ML020150217); *see also* 10 C.F.R. § 51.52, Table S-4 (deriving generic effects of transportation and fuel waste for one power reactor based on a survey of then-existing power plants).

[102] Joint Petitioners Petition at 64-76.

[103] *Id.* at 66-69.

proposed CISF.[104] As a result, Joint Petitioners claimed, "there is a significant underestimate of the quantities of LLRW to be generated by long-term operations and of the associated price tag."[105]

The Board ruled proposed Contention 4 inadmissible because it raised issues outside the scope of this proceeding.[106] The Board found the environmental impacts of spent fuel repackaging beyond the scope of this proceeding because ISP has not requested authorization to repackage spent fuel from its waste canisters into other packages.[107] The Board also found the impacts of repackaging resulting from any separate, future DOE waste disposal campaign "necessarily outside the scope of this proceeding as well."[108]

Further, the Board determined that proposed Contention 4 impermissibly challenged the Continued Storage Rule, 10 C.F.R. § 51.23, insofar as it would have ISP describe the impacts of spent fuel repackaging in its Environmental Report. The Board found that spent fuel repackaging is not an activity that would be authorized during the initial license term, and the Continued Storage Rule explicitly excuses an applicant from providing a site-specific description of environmental impacts related to spent fuel storage that may occur after the initial forty-year license term.[109]

The Board also rejected Joint Petitioners' argument that ISP had grossly underestimated the volume of concrete LLRW that the proposed CISF would generate. The Board found that the environmental impacts resulting from disposal of concrete casks and storage pads from an ISFSI are generically described in the Continued Storage GEIS, which is incorporated into the Continued Storage Rule.[110] The Board ruled that Joint Petitioners' claim that ISP underestimated the volume of LLRW at the proposed CISF was therefore an impermissible attack on that rule.[111]

On appeal, Joint Petitioners argue that the Board's decision wrongly excluded from environmental-impact consideration any future planned expansions of the proposed CISF as well as decommissioning activities that would occur beyond the initial license term.[112] We disagree. The Continued Storage Rule provides that the environmental impacts of an ISFSI beyond the term of its initial li-

---

[104] *Id.* at 72-73.
[105] *Id.* at 75.
[106] LBP-19-7, 90 NRC at 91-93.
[107] *See id.* at 92.
[108] *Id.*
[109] *Id.*; 10 C.F.R. § 51.23(b).
[110] *See* LBP-19-7, 90 NRC at 92-93; Continued Storage GEIS; 10 C.F.R. § 51.23.
[111] *See* LBP-19-7, 90 NRC at 92 (citing 10 C.F.R. § 2.335).
[112] Joint Petitioners Appeal at 23.

cense are described generically in the Continued Storage GEIS.[113] The Continued Storage GEIS describes the environmental impacts associated with spent fuel repackaging, concrete disposal, and facility decommissioning for spent fuel storage facilities.[114] The Board recognized that the environmental impacts associated with the continued storage of spent fuel had already been generically determined by the Commission through the rulemaking process. Accordingly, we affirm the Board's dismissal of proposed Contention 4.

### *3. Joint Petitioners' Proposed Contention 5 (Environmental Justice Effects of Transportation)*

Joint Petitioners argued in Proposed Contention 5 that ISP, by stating that transportation of waste from reactors to the proposed CISF is not part of the license application, improperly "segmented" evaluation of the environmental effects of transportation from the environmental effects of waste storage.[115] As a result, Joint Petitioners claim, "Environmental Justice . . . compliance" will not be possible because "identification and analysis of potentially affected populations along the anticipated rail, truck and barge routes will be improperly excluded from disclosure in the NEPA document."[116]

The Board ruled that proposed Contention 5 did not raise a material dispute with the application. The Board found the proposed action is construction and operation of the proposed CISF and that the area for assessment of environmental justice impacts is based on the location of the proposed facility, not the location of possible transportation routes.[117] Although the Board agreed with the petitioners that "transportation routes will eventually need to be established, and impacts from those routes will need to be analyzed, should ISP's proposed facility be licensed and become operational," it held that the proposed action is for a license to build and operate a facility to store waste, not transport it.[118] Therefore, by asserting that ISP's Environmental Report omits environmental justice information regarding as-yet-unknown transportation routes, the Board explained, "Joint Petitioners have not raised an issue that is material to the findings the NRC must make in this proceeding."[119]

On appeal, Joint Petitioners cite no authority to suggest the Board erred or abused its discretion in finding that proposed Contention 5 did not raise a ma-

---

[113] 10 C.F.R. § 51.23(b).
[114] *See* Continued Storage GEIS, chs. 4-6.
[115] Joint Petitioners Petition at 76.
[116] *Id.* at 76-77.
[117] LBP-19-7, 90 NRC at 94.
[118] *Id.* at 94.
[119] *Id.*

terial issue. Joint Petitioners argue that the Board's ruling would improperly segment evaluation of the environmental impacts of waste transportation from environmental impacts of waste storage. As the Board found, actual waste transportation routes are not under review in this licensing proceeding. We see no merit to Joint Petitioners' claim that reviewing the impacts that may result from the proposed action in this case — construction and operation of the proposed CISF — also requires an environmental justice evaluation of communities along as-yet-unknown transportation routes. Accordingly, we affirm the Board's dismissal of proposed Contention 5.

#### *4. Joint Petitioners' Proposed Contention 6 (Effects of Oil and Gas Drilling)*

In proposed Contention 6, Joint Petitioners asserted that fracking is occurring nearby the proposed CISF site but that "[t]here is no indication in the Environmental Report or Safety Analysis Report of legal controls over present or potential oil and gas drilling directly beneath the site."[120] Joint Petitioners further asserted that "the realistic prospects for mineral development immediately surrounding and underneath the WCS site" are unknown.[121] As a result, Joint Petitioners asserted, there are unknown "seismic, groundwater flow, and water consumption implications" posed by potential fracking that have not been addressed in the application.[122]

The Board found that Joint Petitioners "fail[ed] to acknowledge (much less dispute) relevant portions of ISP's application that address their concerns."[123] The Board noted, for example, that the SAR includes a proprietary analysis of seismic hazards, to which Joint Petitioners did not seek access and which they did not review.[124] Having found that Joint Petitioners had not met their burden to review the application and point out specific sections that were deficient, the Board dismissed proposed Contention 6 because it did not raise a genuine dispute with the application.[125] The Board also rejected Joint Petitioners' argument, raised for the first time in a reply brief, that the application should consider fu-

[120] Joint Petitioners Petition at 98.
[121] *Id.*
[122] *Id.*
[123] LBP-19-7, 90 NRC at 96.
[124] *Id.*
[125] *Id.*

ture, possibly "intensified" fracking.[126] The Board found that this argument was not supported by any authority.[127]

On appeal, Joint Petitioners repeat their argument that "there must be an accounting of prospective drilling trends and density in the immediate region of the CISF" or otherwise there will be a "failure to investigate, project and disclose prospective geological changes" that will occur during the expected operations of the facility.[128] They further argue that the Board "missed Joint Petitioners' point" that the "omission of information about legal title to subsurface mineral rights . . . means that there is no certainty that fracking and possibly waste well injection activities will be prohibited underneath the WCS site."[129]

Joint Petitioners have shown no error in the Board's decision that proposed Contention 6 did not raise a material dispute with the license application. As required by our regulations, the license application includes information about site geology and seismology, including induced seismicity related to petroleum recovery.[130] The application discusses the corrosive properties of site soils, analyzes the potential for and severity of human-induced events at the site, and investigates other site characteristics. Joint Petitioners' assertion that additional analysis of prospective drilling trends is required is neither supported by legal authority nor explained as a specific deficiency in any of the analyses already provided. We therefore agree with the Board that Joint Petitioners did not meet their burden to identify sections of the application that they believed to be inadequate and provide supporting law, facts, or expert opinion to explain each asserted inadequacy described in proposed Contention 6. Accordingly, we affirm the Board's dismissal of proposed Contention 6.

### *5. Joint Petitioners' Proposed Contention 8 (Inadequate Consideration of Alternatives)*

In proposed Contention 8, Joint Petitioners asserted that ISP's Environmental Report is inadequate because there are "alternatives to the proposed CISF project which are neither recognized nor addressed in the Environmental Report, contrary to NEPA requirements."[131] They argued that these alternatives

---

[126] *Id.*; *see also* Combined Reply of Don't Waste Michigan, Citizen's Environmental Coalition, Citizens for Alternatives to Chemical Contamination, Nuclear Energy Information Service, Public Citizen, Inc., San Luis Obispo Mothers for Peace, Sustainable Energy and Economic Development Coalition and Leona Morgan to ISP/WCS and NRC Answers (Dec. 17, 2018), at 38.

[127] LBP-19-7, 90 NRC at 96.

[128] Joint Petitioners Appeal at 26.

[129] *Id.* at 25.

[130] *See* 10 C.F.R. § 72.103.

[131] Joint Petitioners Petition at 107.

include variants on the proposed facility.[132] Joint Petitioners also asserted that ISP's evaluation of the no-action alternative was deficient because ISP made "no demonstration of the overall benefits and costs of leaving the waste at the reactor site compared to the benefits and costs of sending waste from many reactors" to the proposed CISF.[133]

The Board ruled the contention inadmissible because it did not raise a genuine dispute on a material issue of fact or law.[134] The Board found that Joint Petitioners had identified five potential alternatives to the proposed action but had not explained what authority required ISP to evaluate any of them.[135] It noted that of the five alternatives suggested by Joint Petitioners, four "do not appear to be alternatives to constructing ISP's proposed facility at all, but rather suggestions for how to improve it" and the fifth alternative — hardened storage of spent fuel at existing reactor sites — has not been licensed or implemented.[136] The Board found that Joint Petitioners had not shown why hardened on-site storage of spent fuel at existing reactors would be necessary to an evaluation of the no-action alternative.[137] The Board also rejected Joint Petitioners' claim that a cost-benefit analysis of the no-action alternative was omitted because "the alleged missing information" was provided in Chapter 7 of the Environmental Report.[138]

On appeal, Joint Petitioners argue that the Board was wrong to require further explanation of why the five project alternatives they propose are required to be addressed by ISP. Those five alternatives include "(1) establishment of a dry transfer system; (2) modification of ISP's emergency response plan to include preparations for emissions mitigation; (3) CISF design modification to prevent 'malevolent' acts; (4) Federal Government control of the ISP facility; and (5) implementation of hardened onsite storage . . . at reactor sites."[139] Joint Petitioners, citing the decision of the United States Court of Appeals for the First Circuit in *Dubois v. U.S. Department of Agriculture,* assert that they "do not have to explain" why these alternatives must be considered because "the existence of reasonable but unexamined alternatives renders an EIS inadequate."[140]

In *Dubois,* the First Circuit found that the United States Forest Service failed to meet its NEPA obligations because it did not address *at all* a reasonable alter-

---

[132] *Id.* at 107-08, 111.
[133] *Id.* at 111.
[134] LBP-19-7, 90 NRC at 98.
[135] *Id.*
[136] *Id.*
[137] *Id.*
[138] *Id.* at 99. Joint Petitioners do not pursue this claim on appeal.
[139] Joint Petitioners Appeal at 26-27.
[140] *Id.* at 27 (citing *Dubois v. USDA,* 102 F.3d 1273, 1287 (1st Cir. 1996)).

native identified by commenters on its draft environmental impact statement.[141] The U.S. Environmental Protection Agency had judged that the permitted option would have serious adverse environmental consequences to an "outstanding" water resource, and the alternative urged by the commenters would involve an option that had been approved in other similar situations.[142] But the Forest Service did not respond to the suggested alternative.[143] The Court found that NEPA required the Forest Service, faced with evidence of serious adverse consequences associated with the proposed action, to consider the "reasonably thoughtful" alternative proposal "and to explain its reasoning if it rejected the proposal."[144] But this decision does not require an agency to conduct an environmental analysis of every suggestion proposed by a commenter.

Here, unlike in *Dubois,* Joint Petitioners have not shown that their proposed alternatives are reasonable, and the Board sufficiently explained its rejection of them. Two of the proposed alternatives — Federal ownership of the proposed CISF and implementation of hardened, on-site storage of spent fuel at current reactor sites — would not meet the applicant's purpose to construct a privately-owned, centralized storage facility.[145] The other three alternatives call for design and procedure changes at the proposed facility — including consideration of design features not required by our safety regulations — without explaining why those changes would be needed to avoid or mitigate an environmental impact.

Under our contention-pleading rules, it is the petitioner's burden to explain why a contention should be admitted. As the Board found, Joint Petitioners have not met that burden in their proposal of project alternatives. We therefore affirm the Board's dismissal of proposed Contention 8.

---

[141] The Forest Service had granted a permit to allow a ski resort to increase its withdrawal of water from an unusually pristine mountain pond for artificial snowmaking. The permit allowed a fifteen-foot drop in the pond's water level from the resort's water use, which was far greater than the previously approved limit of eighteen inches. The alternative presented by commenters was to build artificial water storage ponds. *Dubois,* 102 F.3d at 1278-79.

[142] *Id.* at 1277-78.

[143] *Id.* at 1279.

[144] *Id.* at 1288-89.

[145] As a licensing agency charged with enabling the safe and secure use of nuclear materials, we "accord substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project." *In re Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 55 (2001) (quoting *Citizens Against Burlington v. Busey,* 938 F.2d 190, 197 (D.C. Cir. 1991)). We may also legitimately consider the "economic goals of the project's sponsor." *Id.* (quoting *City of Grapevine v. DOT,* 17 F.3d 1502, 1506 (D.C. Cir. 1994)).

### *6. Joint Petitioners' Proposed Contention 11 (Lack of a Dry Transfer System)*

Joint Petitioners asserted in proposed Contention 11 that ISP's application must include plans for a dry transfer system — a facility that could be used to repackage spent fuel — or "other technological means of handling problems with damaged, leaking or externally contaminated SNF canisters or damaged fuel in the canisters."[146] The omission, according to Joint Petitioners, "contradicts the expectations of the Continued Storage GEIS" and indicates that "[t]here is no plan for radiation emissions mitigation or radioactive releases at the CISF site."[147] Joint Petitioners asserted the omission "violates the Atomic Energy Act obligation to protect the public" and that the "unanalyzed risks . . . must be addressed in the Environmental Impact Statement."[148]

The Board found the contention inadmissible for three independent reasons. First, Joint Petitioners focused on the possibility that canisters would be damaged and a dry transfer system would be required. But contrary to our requirements, Joint Petitioners did not address ISP's relevant safety analyses, aging management plans, and quality assurance programs.[149] Second, under our prior decision in *Private Fuel Storage,* several safety evaluations for waste packages have led the NRC to conclude that accidental canister breaches are not credible scenarios.[150] Therefore Joint Petitioners' claim that canister damage could somehow occur "fail[ed] to raise a plausible scenario."[151] Third, contrary to Joint Petitioners' characterizations, "neither the GEIS nor NRC regulations require ISP to construct a dry storage system during the initial 40-year license for its proposed facility," and "the Continued Storage Rule makes clear that ISP's Environmental Report is not required to evaluate the impacts of storage beyond the term of the license it is requesting."[152]

On appeal, Joint Petitioners do not dispute the Board's rulings directly but again assert that it would be better to have a dry transfer system in place at the start of CISF operations, rather than in the long-term and indefinite timeframes contemplated by the Continued Storage GEIS.[153] Joint Petitioners also assert that,

---

[146] Joint Petitioners Petition at 118.

[147] *Id.*

[148] *Id.* at 118-19.

[149] LBP-19-7, 90 NRC at 102.

[150] *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125, 136-37 (2004)).

[151] LBP-19-7, 90 NRC at 102-03 (citing *Private Fuel Storage,* 60 NRC at 136-37).

[152] *Id.* at 103.

[153] *See* Joint Petitioners Appeal at 29; *see also* Continued Storage GEIS § 2.1.4 (reflecting the assumption that a dry transfer system would be constructed not during the period of facility operations

*(Continued)*

if DOE at some future time begins a campaign to move spent fuel from existing sites to a permanent repository, repackaging will be required, given "the current posture of the DOE's canister repackaging policy."[154] The Board considered and rejected these arguments, and we see no basis in Joint Petitioners' appeal to disturb the Board's decision.[155]

We agree with the Board that NRC regulations do not require a dry transfer system to be in place during the period of licensed operation. Moreover, NRC regulations do not require a license applicant to describe in its Environmental Report the impacts of building and operating a dry transfer system after the period of licensed operation. Rather, the impacts of continued spent fuel storage after the period of licensed operation — including the impacts associated with construction and operation of a dry transfer system — are already described generically in the Continued Storage GEIS, which is incorporated by reference into the Continued Storage Rule.[156] Accordingly, we affirm the Board's dismissal of proposed Contention 11.

### *7. Joint Petitioners' Proposed Contention 14 (NEPA Analysis of Security Risks)*

Joint Petitioners asserted in proposed Contention 14 that ISP's application should include an analysis of the environmental impacts resulting from (among other things) a terrorist attack on spent nuclear fuel shipments to the proposed CISF.[157] The Board found the contention inadmissible based on our precedent, which was upheld by the United States Court of Appeals for the Third Circuit.[158] In *AmerGen Energy,* we held that terrorist attacks are too far removed from the natural or expected consequences of agency action to require environmental analysis in an NRC licensing proceeding.[159]

On appeal, Joint Petitioners argue that the Board's rejection of proposed Contention 14 rested "on the unlawful segmenting of the CISF from the transportation component" and that "[w]ere transportation properly included within the scope of the project, the hundreds of SNF cargoes coming from states within

---

but in the long-term and indefinite timeframes of continued waste storage following the operating license term).

[154] Joint Petitioners Appeal at 29.

[155] *See* LBP-19-7, 90 NRC at 103.

[156] *See* Continued Storage GEIS § 2.2.2, at 2-31 to 2-35, chs. 4-5; 10 C.F.R. § 51.23.

[157] Joint Petitioners Petition at 142-43.

[158] LBP-19-7, 90 NRC at 108; *see AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124 (2007), *review denied, N.J. Dep't of Envtl. Prot. v. NRC,* 561 F.3d 132 (3d Cir. 2009).

[159] *AmerGen Energy,* CLI-07-8, 65 NRC at 129.

the geographical Ninth Circuit, as part of the project, would have to be analyzed" under the Ninth Circuit's ruling in *San Luis Obispo Mothers for Peace v. NRC.*[160] The Board explicitly considered and rejected this argument and noted that in *AmerGen Energy,* we declined to apply the ruling in *San Luis Obispo Mothers for Peace* outside of the Ninth Circuit.[161] The Board found that because the proposed CISF would be in Texas — outside the Ninth Circuit — no terrorist-attack analysis under NEPA is required.[162]

Joint Petitioners have shown no error in the Board's decision. As the Board addressed in its rulings on proposed Contentions 1 and 5, which we affirmed above, actual waste transportation routes are not currently known and have not been proposed. Thus, review and approval of actual transportation routes to the proposed CISF is an issue outside the scope of this proceeding.[163] And Joint Petitioners have offered no argument persuading us that the likelihood of a terrorist attack is a reasonably foreseeable consequence of licensing this facility. The Board correctly applied our prior ruling in *AmerGen Energy,* and we affirm its decision to deny admission of proposed Contention 14.

### E. Fasken's Motion for New Contention

On July 6, 2020, Fasken filed a motion to reopen the record of this proceeding and admit a new contention challenging the discussion of transportation impacts in the Staff's draft Environmental Impact Statement.[164] Although we have jurisdiction to consider whether to reopen this proceeding and admit the contention, we refer Fasken's motion to the Board for consideration of these matters initially.[165] We remand Fasken's Proposed Contention 5 to the Board for consideration of the contention's admissibility, good cause for filing after the deadline, and ability to meet the reopening standards, consistent with our ruling here with respect to the similar issues raised in Joint Petitioners' Contention 1.[166]

---

[160] 449 F.3d 1016, 1032 (9th Cir. 2006).

[161] LBP-19-7, 90 NRC at 108.

[162] *Id.*

[163] *See supra* Sections II.D.1, II.D.3.

[164] *See* Fasken Motion for Contention 5; *see also* "Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas" (Draft Report for Comment), NUREG-2239 (May 2020) (ML20122A220).

[165] *See, e.g., Holtec,* CLI-20-4, 91 NRC at 191, 211; *Virginia Electric and Power Co.* (North Anna Power Station, Unit 3), CLI-12-14, 75 NRC 692, 701-02 (2012).

[166] The motion was timely under 10 C.F.R. § 2.326(a)(1) based on an order by the Secretary extending the deadline for filing new contentions based on the draft environmental impact statement. *See* Order (May 22, 2020).

## III. CONCLUSION

For the foregoing reasons, we *affirm* the Board's decision denying the hearing requests and *remand* Fasken's Contention 5 to the Board for consideration.

IT IS SO ORDERED.

For the Commission

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 17th day of December 2020.

# Tab 27

Cite as 92 NRC 491 (2020) **CLI-20-15**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**COMMISSIONERS:**

**Kristine L. Svinicki,** Chairman
**Jeff Baran**
**Annie Caputo**
**David A. Wright**
**Christopher T. Hanson**

**In the Matter of** **Docket No. 72-1050-ISFSI**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim Storage Facility)** **December 17, 2020**

**STANDING**

In materials licensing, a Board determines standing on a case-by-case basis taking into consideration the nature of the proposed action and the significance of the radioactive source.

**STANDING**

Standing and contention admissibility are "separate issues with distinct requirements." See *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), CLI-09-9, 69 NRC 331, 338 n.34 (2009).

**STANDING**

Board reasonably rejected argument that no petitioner could show standing unless he resided within the "emergency planning zone" of a facility. The Board reasonably found that a petitioner could base standing on concerns about the potential long-term adverse effects that have nothing to do with a sudden emergency.

**APPEALS**

An appeal must point to a Board error; it is not enough for an appellant to simply repeat the arguments it made before the Board and hope for a different result from the Commission. *Florida Power & Light Co.* (Turkey Point Nuclear Generating Units 6 and 7), CLI-17-12, 86 NRC 215, 219 (2017).

**CONTENTIONS**

Petitioner who did not see or request to see non-public portions of an application could not reasonably argue that it could offer an admissible contention on those portions of the application.

## MEMORANDUM AND ORDER

This order addresses Sierra Club's appeal of two Board decisions in this matter: LBP-19-7, which dismissed sixteen of seventeen proposed Sierra Club contentions, and LBP-19-9, which dismissed Sierra Club's sole admitted contention as moot.[1] For the reasons described below, we *dismiss as moot* Sierra Club's appeal of Contention 9 and *affirm* the Board with respect to the other contentions.

### I. BACKGROUND

This proceeding involves the application of Interim Storage Partners LLC (ISP) for a license to construct and operate a consolidated interim storage facility (CISF) in Andrews County, Texas. ISP is a joint venture between Waste Control Specialists LLC (WCS) and Orano CIS LLC formed to design, build, and operate the WCS CISF.[2] The proposed CISF would be located within the owner-controlled area of the existing WCS site, which currently includes two separate low-level radioactive waste (LLRW) disposal facilities.[3] ISP has applied for a forty-year license to store 5,000 metric tons (MTU) of spent nuclear fuel (SNF), mixed oxide fuel, and Greater-than-Class-C LLRW in the proposed

[1] Sierra Club's Brief in Support of Appeal from Atomic Safety and Licensing Board Rulings Denying Admissibility of Contentions in Licensing Proceeding (Dec. 13, 2019) (Sierra Club Appeal); *see* LBP-19-7, 90 NRC 31 (2019); LBP-19-9, 90 NRC 181 (2019).

[2] WCS Consolidated Interim Storage Facility System Safety Analysis Report, rev. 2 (July 19, 2018), at 1-2 (SAR) (ADAMS accession no. ML18221A408 (package)).

[3] *Id.*

CISF.[4] ISP anticipates that, if the license is granted, it will subsequently request license amendments for seven expansion phases over the next twenty years and ultimately store up to 40,000 MTU.[5]

Sierra Club petitioned to intervene and proposed seventeen contentions.[6] In LBP-19-7, the Board found that Sierra Club had established standing and had proposed one admissible contention, Contention 13.[7] In Contention 13, Sierra Club challenged the Environmental Report's conclusion that the project will have small effects on two species of concern. Because Sierra Club was granted a hearing on one contention, any appeal of the Board's rejection of its other contentions would be considered interlocutory.[8]

ISP appealed the Board's finding that Sierra Club had standing and its admission of Sierra Club Contention 13.[9] ISP's appeal with respect to Contention 13 became moot, however, after ISP cured the deficiencies identified in the contention. The Board denied Sierra Club's motion to amend Contention 13, and the Board dismissed the contention in LBP-19-9.[10] At that point, the proceeding ended for Sierra Club, and its appeal of both Board decisions became ripe.[11]

Sierra Club has appealed the Board's rejection of eight contentions at the outset of the proceeding as well as the Board's denial of its motion to amend Contention 13. The NRC Staff and ISP oppose the appeal.[12]

---

[4] WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, rev. 2 (July 19, 2018), at 1-1 (Environmental Report) (ML18221A405).

[5] *Id.*

[6] Petition to Intervene and Request for Adjudicatory Hearing by Sierra Club (Nov. 13, 2018) (Sierra Club Petition); *see also* Sierra Club's Reply to Answers filed by Interim Storage Partners and NRC Staff (Dec. 17, 2018) (Sierra Club Reply).

[7] LBP-19-7, 90 NRC at 39, 50, 78-80.

[8] *See* 10 C.F.R. § 2.311(a), (c).

[9] Interim Storage Partners LLC's Notice of Appeal of LBP-19-7 (Sept. 17, 2019); Brief in Support of Appeal of Interim Storage Partners LLC's Appeal of LBP-19-7 (Sept. 17, 2019) (ISP Appeal); *see* 10 C.F.R. § 2.311(d)(1).

[10] *See* LBP-19-9, 90 NRC at 184-85.

[11] Shortly after dismissing Sierra Club's last contention, the Board rejected a proposed late-filed contention introduced by a different petitioner and terminated the proceeding altogether. *See* LBP-19-11, 90 NRC 258 (2019).

[12] NRC Staff's Answer in Opposition to Sierra Club's Appeal of LBP-19-7 and LBP-19-9 (Jan. 7, 2020) (Staff Answer); Interim Storage Partners LLC's Answer Opposing Sierra Club's Appeal of LBP-19-7 and LBP-19-9 (Jan. 7, 2020) (ISP Answer). We note that, because the Board granted Sierra Club's petition to intervene, its appeal comes to us not under 10 C.F.R. § 2.311(c) (as the Board apparently suggested, *see* LBP-19-9, 90 NRC at 192, but, rather, under 10 C.F.R. § 2.341.

## II. DISCUSSION

We give substantial deference to a Board's ruling on standing, and we will defer to that ruling absent an error of law or abuse of discretion.[13] We defer to the Board's ruling on contention admissibility in the absence of clear error, mistake of law, or abuse of discretion.[14]

### A. Sierra Club's Standing

The Board found that Sierra Club had established standing based on the proximity to the proposed CISF site of one of its members, Shirley Henson, who lives about six miles away.[15] In her standing declaration, Ms. Henson stated that she lives in Eunice, New Mexico, which is also on a rail line on which SNF potentially will be shipped.[16] Ms. Henson asserted that she is concerned about accidents at the storage site or on the rail line potentially releasing radioactive material into the air or groundwater.[17]

The Board explained in its discussion that standing requires a showing that an intervenor "might suffer a concrete and particularized injury that is (1) fairly traceable to the challenged action; (2) likely redressable by a favorable decision; and (3) arguably within the zone of interests protected by the governing statutes" including the Atomic Energy Act of 1954, as amended (AEA) and the National Environmental Policy Act (NEPA).[18] It further explained that the NRC recognizes proximity-based presumptions of standing. The Board explained that where an application concerns issuing a license for a nuclear power plant, we presume that persons who reside or have frequent contacts within a fifty-mile radius of a plant can establish standing under the above criteria.[19] Where an application concerns other types of facilities, we use a "proximity plus" standard, which will find standing on a "case-by-case basis, taking into account the nature of the proposed action and the significance of the radioactive source."[20] The

---

[13] *Strata Energy, Inc.* (Ross In Situ Uranium Recovery Project), CLI-12-12, 75 NRC 603, 608 (2012); *Nuclear Fuel Services, Inc.* (Erwin, Tennessee), CLI-04-13, 59 NRC 244, 248 (2004) (citing *International Uranium (USA) Corp.* (White Mesa Uranium Mill), CLI-01-21, 54 NRC 247, 252 (2001)).

[14] *See Crow Butte Resources, Inc.* (Marsland Expansion Area), CLI-14-2, 79 NRC 11, 26 (2014).

[15] LBP-19-7, 90 NRC at 50; *see also id.* at 47-49.

[16] Sierra Club Petition, Attach., Declaration of Shirley Henson (Oct. 23, 2018).

[17] *Id.* at 1 (unnumbered).

[18] LBP-19-7, 90 NRC at 47.

[19] *Id.*; *see also Calvert Cliffs 3 Nuclear Project, LLC, and UniStar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), CLI-09-20, 70 NRC 911, 914-18 (2009).

[20] LBP-19-7, 90 NRC at 47-48 (citing *Georgia Institute of Technology* (Georgia Tech Research Reactor, Atlanta, Georgia), CLI-95-12, 42 NRC 111, 116-17 (1995)).

Board also observed that because the CISF is a passive structure, the distance it takes to be "realistically threatened" is less than that for a power reactor. But the Board noted that Ms. Henson's residence six miles from the proposed site was well within the distance for which standing has been found at similar (and much smaller) materials facilities.[21]

On appeal, ISP argues that the Board did not "articulate a factual basis" for Sierra Club's standing.[22] ISP asserts that the Board erroneously based standing solely on the large quantity of spent fuel that would be stored at the facility and that "quantity alone does not create an obvious potential for offsite consequences."[23] It argues that the Board's ruling does not constitute the "case-by-case" analysis that we use in materials facilities cases. The Staff opposes ISP's appeal and argues that the Board's standing analysis was correct.[24] We agree that the Board's standing analysis was consistent with our case law and was reasonable.

The Board specifically considered both the nature of the proposed action and the significance of the radioactive source. The nature of the proposed action is to build and operate a facility to hold up to 40,000 tons of nuclear waste, which must be brought to the facility. It is quite unlike the situation in *Schofield Barracks,* which ISP cites, where we upheld a board's determination that a petitioner had shown no "obvious potential for offsite consequences" or "plausible means by which he could be harmed by the possession-only license that the Army [was] seeking."[25] The petitioner in *Schofield Barracks* lived nineteen miles away from a site contaminated with low radioactivity depleted uranium (DU) left over from spotting ammunition used on a military gun range.[26] There, not only was the radioactive source small but the nature of the proposed action (that is, leaving DU on a controlled-access facility where it was already present) cut against petitioner's standing. These circumstances are not present here.

ISP further argues that, because the Board found Sierra Club's assertions of radiological harm insufficient to support an admissible contention, the Board's "uncritical acceptance" of Sierra Club's "conclusory" standing statements constitutes legal error.[27] We disagree. ISP conflates the contention admissibility standards with the standing analysis. Commission case law holds that standing

---

[21] *Id.* at 50.

[22] ISP Appeal at 5-14.

[23] *Id.* at 9.

[24] NRC Staff's Answer in Opposition to Interim Storage Partners LLC's Appeal of LBP-19-7 (Oct. 15, 2019), at 7-11 (Staff Answer to ISP).

[25] ISP Appeal at 9; *U.S. Army Installation Command* (Schofield Barracks, Oahu, Hawaii, and Pohakuloa Training Area, Island of Hawaii, Hawaii), CLI-10-20, 72 NRC 185, 189 (2010).

[26] *See Schofield Barracks,* CLI-10-20, 72 NRC at 187.

[27] ISP Appeal at 12.

and contention admissibility are "separate issues with distinct requirements."[28] And whereas assertions of standing are construed in favor of the petitioners, a petitioner has the burden of establishing each element of contention admissibility.[29]

ISP argues that because there is no emergency planning requirement for away-from-reactor independent spent fuel storage installations (ISFSIs), the "Commission determined that there simply is no objective basis for a claim that offsite radiological harm can accrue from facilities such as the WCS CISF."[30] The Board rejected ISP's argument that standing should not be presumed unless a petitioner resides within a facility's emergency planning zone.[31] The Board observed that under ISP's reasoning, a petitioner who lived across the street from the proposed CISF would not have standing.[32] In its discussion of standing of another petitioner, the Board declined to accept the argument that standing can be based on nothing short of "the level of risk necessary to trigger emergency planning requirements."[33] Rather, the Board held that a petitioner can base standing on "potential long-term effects that have nothing to do with a sudden emergency."[34]

We find the Board's determination to be reasonable. The Commission has not held that there can be no offsite radiological consequences from an ISFSI. We therefore affirm the Board's finding that Sierra Club has standing.

### B. Sierra Club's Appeal

#### *1. Contention 13: Wildlife Impacts*

In Contention 13, Sierra Club argued that ISP's Environmental Report provided insufficient factual support for its assertion that the proposed CISF would not affect two species of concern that may be present at the site.[35] Sierra Club argued that although the Environmental Report identified the two species, the Dunes Sagebrush Lizard and the Texas Horned Lizard, it did not provide studies or surveys that could determine whether the species are present or could be adversely impacted by the proposed project.[36]

---

[28] *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), CLI-09-9, 69 NRC 331, 338 n.34 (2009).

[29] *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 215-16 (2003).

[30] ISP Appeal at 10-11.

[31] LBP-19-7, 90 NRC at 49.

[32] *Id.*

[33] *Id.*

[34] *Id.*

[35] Sierra Club Petition at 78-79.

[36] *Id.*

The Board admitted the contention because none of the five sources cited in ISP's analysis of these species were publicly available, and therefore no interested member of the public would be able to assess their reliability.[37] It admitted the contention solely as a contention of omission "insofar as none of the five references in section 3.5.16 of ISP's Environmental Report is either sufficiently described to judge its technical adequacy or made publicly available."[38]

Thereafter, ISP supplemented its Environmental Report with copies of or ADAMS accession numbers for the materials cited in section 3.5.16 and moved to dismiss Contention 13 as moot.[39] Shortly thereafter, Sierra Club moved to amend Contention 13.[40] In its amended Contention 13, Sierra Club argued that the sources cited all referred to the adjacent WCS LLRW site and did not apply directly to the CISF site, and, further, that they were eleven to twenty-two years out of date.[41]

The Board rejected the amended contention because it did not raise a genuine dispute "as to whether the recently available studies adequately support[ed] the factual description of the affected environment in ISP's Environmental Report" or as to whether the report's characterization of the project's environmental impact is reasonable.[42] The Board found that there were no significant discrepancies between the information in the newly available studies and the Environmental Report.[43] The Board further found that the Sierra Club had not asserted that the Environmental Report's conclusions were unreasonable.[44] The Board pointed out, for example, that ISP's Environmental Report asserts that impacts on the two species would be "small." The Board also found factual support for the Environmental Report's conclusions that the CISF site is only a small percentage of the suitable habitat for the affected species in the region and neither of the two species is federally listed as endangered or threatened.[45] Further, the Board credited ISP's rationale in the Environmental Report that the two species will not be greatly affected by construction at the site because they

---

[37] LBP-19-7, 90 NRC at 78-79.

[38] *Id.* at 80.

[39] Letter from Jack Boshoven, ISP, to Document Control Desk, NRC (Sept. 4, 2019) (ML19248-C915) (ISP Letter Providing Supplemental References); Interim Storage Partners LLC's Motion to Dismiss Sierra Club's Contention 13 as Moot and Terminate this Proceeding (Sept. 9, 2019), at 1.

[40] Sierra Club Motion to Amend Contention 13 (Sept. 13, 2019) (Motion to Amend); Amended Contention 13 (Sept. 13, 2019) (Amended Contention 13).

[41] Amended Contention 13 at 2-3.

[42] LBP-19-9, 90 NRC at 187-88. A majority of the Board rejected arguments that the amended contention was not timely under the factors set forth in 10 C.F.R. § 2.309(c)(1). *Id.* at 185-87.

[43] *Id.* at 188-90.

[44] *Id.* at 190-91.

[45] *Id.* The Environmental Report acknowledges that the Texas Horned Lizard is state-listed as threatened in Texas. *See* Environmental Report at 3-34, Tbl. 3.5-1.

either are not present or are "highly adaptable" — meaning they would be able to move away from construction activities.[46] Moreover, the Board concluded that proposed facility site was within the survey area of the studies.[47]

The Board also rejected Sierra Club's claim that the studies cited in the Environmental Report are outdated. The Board noted that this aspect of the amended contention was untimely, given that the Environmental Report provided the dates of the studies at the outset.[48] The Board further stated that Sierra Club cited no factual or legal reason why ISP must use more recent studies.

On appeal, Sierra Club does not identify a clear Board error or an abuse of discretion. Instead, it reiterates the same arguments it raised before the Board without addressing the Board's reasons for rejecting them. An appeal must point to a Board error; it is not enough for an appellant to simply repeat the arguments it made before the Board and hope for a different result from the Commission.[49] We see no reason to disturb the Board's decision, and we affirm its ruling.

### *2. Contentions Dismissed at the Outset (LBP-19-7)*

#### *a. Contention 1: The NWPA Prohibits Licensing the Proposed CISF*

The focus of Sierra Club's Contention 1 argument before the Board — and its exclusive argument on appeal — is that the license cannot be issued because the "project might be illegal."[50] Specifically, Sierra Club argued before the Board that the license would allow ISP to enter into a contract with the Department of Energy (DOE) for storage of spent fuel, whereas the NWPA prohibits the Department of Energy from taking title to SNF before it has constructed a permanent repository.[51]

The Board found that the contention did not raise a genuine dispute with the application because the proposed license includes the option of contracting directly with the power plant owners (an option which Sierra Club does not

---

[46] *See* LBP-19-9, 90 NRC at 191 (citing Environmental Report at 4-38).

[47] *Id.* at 188.

[48] *Id.* at 187 n.39.

[49] *Florida Power & Light Co.* (Turkey Point Nuclear Generating Units 6 and 7), CLI-17-12, 86 NRC 215, 219 (2017).

[50] Sierra Club Appeal at 8. Sierra Club's proposed Contention 1 included an argument that neither the AEA nor the Nuclear Waste Policy Act (NWPA) gives the NRC authority to license the facility. Sierra Club Petition at 14, 17, 20-23. The Board rejected Sierra Club's argument as an impermissible challenge to NRC regulations, which expressly allow such storage. LBP-19-7, 90 NRC at 60; *see also* 10 C.F.R. § 2.335 (precluding challenges to NRC regulations in individual adjudications without a waiver). Sierra Club appears to have abandoned this specific argument on appeal.

[51] Sierra Club Petition at 14-20.

claim would be illegal).[52] The Board explained that whether ISP finds that option commercially viable in the future is not an issue material to the license proceeding.[53]

On appeal, Sierra Club reiterates its argument before the Board that the license cannot be issued because we lack the authority to approve "a project that might be illegal." We disagree for the reasons explained by the Board as well as for the reasons we discussed in our recent decisions on appeals of similar contentions.[54]

We further note that Sierra Club's argument misconstrues the purpose and effect of the proposed license condition that discusses DOE. The application contemplates that ISP will raise its operating costs through disposal contracts with the owners of the SNF — either power plant operators who currently own the fuel or DOE, which is responsible for the ultimate disposal of SNF. Proposed license condition 23 provides, "Prior to commencement of operation, the Licensee shall have an executed contract with the U.S. Department of Energy (DOE) *or other SNF Title Holder(s)* stipulating that the DOE or the other SNF Title Holder(s) is/are responsible for funding operations required for storing the SNF."[55]

ISP acknowledges that under the NWPA as currently drafted, DOE cannot take title to SNF until after it has commenced operations at a permanent repository and that the CISF license, until granted, would not authorize DOE to do so.[56] The license condition, as written, would allow ISP to take advantage of a future change in the law to bid on a DOE disposal contract without first amending its license. Nothing in the proposed condition purports to authorize ISP or the DOE to enter into the contracts. Rather, it expresses a limitation on ISP's operating authority: ISP could not begin operations until it entered a valid contract with either DOE or power plant owners. We therefore affirm the Board's decision dismissing this claim.

---

[52] *Id.* at 60.

[53] *Id.*

[54] *See* CLI-20-14, 92 NRC 463 (2020); *Holtec International* (HI-STORE Consolidated Interim Storage Facility), CLI-20-4, 91 NRC 167, 173-76 (2020).

[55] *See* Interim Storage Partners, LLC, License Application, rev. 2 (July 19, 2018) (ML18221A397 (package)) (Application), Attach. A, Proposed License, at 3 (Proposed License).

[56] *See* 42 U.S.C. §§ 10143, 10222(a)(5)(A); Interim Storage Partners LLC's Response to the Atomic Safety and Licensing Board's Questions Regarding the U.S. Department of Energy's Authority Under the Nuclear Waste Policy Act (June 28, 2019); *see also* Tr. at 43-44 (Mr. Matthews) ("[T]he license that . . . we seek here does nothing to authorize DOE to use the facility. There's nothing that the NRC Staff, this Board, or the Commission can do to change the DOE's authority under the Nuclear Waste Policy Act.").

*b. Contention 4: Transportation Risks*

Sierra Club argued in proposed Contention 4 that ISP's Environmental Report does not adequately evaluate the risks of transporting SNF from across the country.[57] Sierra Club referred to a 2001 report prepared by Matthew Lamb and Dr. Marvin Resnikoff, "Worst Case Credible Nuclear Transportation Accidents: Analysis for Rural and Urban Nevada," which was prepared in support of a challenge to the DOE's Yucca Mountain repository application.[58] Sierra Club provided a declaration of Dr. Resnikoff, who stated that he had read the contention and agreed with it, but the declaration provided no further information.[59] Sierra Club also proffered the testimony of Dr. Gordon Thompson, who described various scenarios that he argued could result in canister breach and release of radiation.[60]

The Board rejected the contention because it failed to raise a genuine dispute with the application. With respect to the impacts of accidents, the Board pointed out that the estimated doses from accidents were contained in section 4.2.8 of the application, and it noted that Sierra Club did not address these estimates or "explain why they are inadequate or unreasonable."[61] According to the Board, Sierra Club merely proffered an eighteen-year-old report and pointed out that its analysis had much higher accident consequence estimates than those contained in the application.[62] However, the Board found that the report was admittedly a worst-case analysis.[63] It held that under NEPA, Sierra Club would have to show that ISP's analysis was unreasonable or that Sierra Club's proposed methodology would be more appropriate.[64] The Board found that Sierra Club "*assumes* that

[57] Sierra Club Petition at 31-43.

[58] Matthew Lamb, Marvin Resnikoff and Richard Moore, Worst Case Credible Nuclear Transportation Accidents: Analysis for Urban and Rural Nevada (Aug. 2001) (RWMA Report). Sierra Club did not attach the RWMA Report to its petition but provided a web address, www.state.nv.us/nucwaste/trans//rwma0108.pdf (last visited Feb. 20, 2020).

[59] Sierra Club Petition, Attach., Declaration of Dr. Marvin Resnikoff (Nov. 9, 2018). Sierra Club's appeal claims that Dr. Resnikoff "cited recent information about rail fires and expanded traffic of oil tanker cars," but that information is not in Dr. Resnikoff's declaration. *See id.*; Sierra Club Appeal at 9. Sierra Club's Petition listed thirteen oil tanker train car derailment accidents that have occurred since 2013 and resulted in fires. Sierra Club Petition at 39-40.

[60] Sierra Club Petition, Attach., Declaration of 12 November 2018 by Gordon R. Thompson, at 9-13.

[61] LBP-19-7, 90 NRC at 64.

[62] *Id.*

[63] *Id.*

[64] *Id.* (citing *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-5, 75 NRC 301, 323 (2012)).

ISP's analysis is inadequate solely because it produced estimated doses that are smaller than the 'worst case' results in [the report Sierra Club provided]."[65]

On appeal, Sierra Club does not demonstrate any Board error. Its only mention of the Board's ruling is to claim that the Board erred in holding that Sierra Club had failed to dispute the information in the Environmental Report's section 4.2.8, when Sierra Club "was disputing the adequacy of section 4.2.6."[66] But the Board pointed out that impacts from transportation accidents — the subject of Sierra Club's contention — were discussed in section 4.2.8. And the Board was correct that simply presenting an alternative analysis is not enough to raise an admissible contention unless the petitioner also shows that the application's analysis is inadequate or unreasonable.[67]

The remainder of Sierra Club's argument on appeal contains a brief summary of the claims it made in Contention 4. But an appeal cannot simply repeat the same arguments it raised before the Board; it must show that the Board's ruling was in error.[68] We see no Board error, and we affirm its ruling with respect to Contention 4.

*c. Contention 6: Earthquakes*

Sierra Club argued in Contention 6 that the application's discussion of the potential impacts from earthquakes — particularly induced earthquakes from oil and gas activities — was inadequate.[69]

The Board considered the contention as both an environmental and safety challenge. The Board found that the contention failed to dispute the relevant portions of the Environmental Report, which discusses seismicity, including induced seismicity from oil and gas activities.[70] The Board observed that the studies on which Sierra Club relied to support its contention simply reviewed historic instances of induced seismicity, which the application acknowledged.[71]

The Board further rejected the contention as a safety contention because Sierra Club did not dispute the material in SAR Attachment D, which analyzes the ground motions of likely earthquakes.[72] Attachment D contains non-public,

---

[65] *Id.*
[66] Sierra Club Appeal at 10.
[67] *See Seabrook,* CLI-12-5, 75 NRC at 323.
[68] *Turkey Point,* CLI-17-12, 86 NRC at 219.
[69] Sierra Club Petition at 49-53.
[70] LBP-19-7, 90 NRC at 68-69 (citing Environmental Report §§ 3.3.2, 3.3.3, 3.3.4).
[71] *Id.* at 69.
[72] *Id.*

proprietary information, to which Sierra Club did not seek access. The Board rejected Sierra Club's claim that the analysis it had not seen was inadequate.[73]

On appeal, Sierra Club argues that it presented evidence of seismic activity in an area that was not addressed by the Environmental Report.[74] However, the Environmental Report discusses induced seismicity in section 3.3.3 and concludes that there is low risk to the facility. We see no clear error in the Board's finding that, as an environmental contention, this contention lacked factual support and failed to dispute the application.

Further, we are not persuaded by Sierra Club's argument in support of the safety aspects of its contention that the SAR is inadequate. Although Sierra Club readily acknowledges that it never saw ISP's seismic analysis — because it never sought access to the analysis — it argues that there is "no indication . . . that ISP adequately evaluated the earthquake potential as required by 10 C.F.R. § 72.103(f)(1)."[75] Sierra Club cannot reasonably argue that it can proffer an admissible contention disputing portions of a license application that it has not reviewed. Therefore, Sierra Club has not demonstrated Board error, and we affirm the Board's ruling with respect to Contention 6.

*d. Contention 9: Decommissioning Costs*

In Contention 9, Sierra Club argued that the applicant had not provided reasonable assurance that it will have the necessary funds for decommissioning when the time comes, as required by 10 C.F.R. § 72.30(e).[76] Sierra Club also challenged ISP's decommissioning cost estimates and ISP's request for an exemption from decommissioning cost financial assurance requirements.[77]

The Board found that Sierra Club's challenge to the cost estimate did not raise a genuine dispute with the application because the contention did not explain what was wrong with the cost estimate ISP provided.[78] The Board also found the portion of the contention referring to the exemption request to be moot because ISP withdrew the request after the petitions to intervene were filed.[79] Sierra Club does not raise either of these claims on appeal, but it reasserts its claim that ISP failed to provide a financial assurance method that complies with NRC regulations.[80]

---

[73] *Id.*

[74] Sierra Club Appeal at 11.

[75] *Id.*

[76] Sierra Club Petition at 60-63; *see* LBP-19-7, 90 NRC at 71.

[77] Sierra Club Petition at 60-62.

[78] LBP-19-7, 90 NRC at 71.

[79] *Id.*

[80] Sierra Club Appeal at 12.

Our regulations require a license application to provide financial assurance for decommissioning through (1) prepayment; (2) a surety, insurance, or other guarantee method; or (3) an external sinking fund.[81] Sierra Club argued in Contention 9 that ISP could not qualify for an exemption from § 72.30(e).[82] Therefore, it argued that there was no assurance that these costs would be funded and that ISP had "completely failed to comply with 10 C.F.R. § 72.30."[83]

However, on November 5, 2019, the Staff sent ISP a request for additional information (RAI) seeking clarity concerning how ISP will assure decommissioning funding in compliance with the regulation.[84] On April 7, 2020, ISP amended its Application to provide that:

> ISP *will* use a surety bond combined with a conformity external sinking fund as authorized by 10 CFR 72.30(e)(3). Payments from storage operations *will* be deposited into the external sinking fund as waste is received. A surety bond *will* be used to assure the difference in the decommissioning cost estimate and the value of the sinking fund until the sinking fund is fully funded. *Proposed License Condition 24 ensures that ISP will have funding in place before [waste] is received on site.*[85]

The revised language renders moot Sierra Club's claim that ISP's application does not provide adequate decommissioning funding assurance as required in 10 C.F.R. § 72.30(e). We therefore dismiss Sierra Club's appeal with respect to Contention 9.

*e. Contention 10: Groundwater Impacts*

In Contention 10, Sierra Club argued that the application does not "accurately and adequately evaluate and consider impacts" to the Ogallala aquifer from the proposed CISF.[86] Sierra Club argued that the proposed CISF site is directly above the Ogallala Aquifer and the application erroneously states that it is not.[87] It offered testimony from a geologist, Dr. Patricia Bobeck, that the

---

[81] *See* 10 C.F.R. § 72.30(e).

[82] Sierra Club Petition at 62.

[83] *Id.* at 62-63.

[84] *See* Letter from John-Chau Nguyen, NRC, to Jeffrey Isakson, ISP (Nov. 5, 2019), Encl. at 2 (ML19309E913).

[85] *See* Letter from Jeffery Isakson, ISP, to NRC Document Control Desk (Apr. 7, 2020) (ML20105-A133 (package)); Encl. 3, RAIs and Responses, at 27; Encl. 5, LA Changed Pages, at 1-10.

[86] Sierra Club Petition at 63.

[87] *Id.*

Environmental Report did not adequately define the geologic units at the site.[88] It further argued that various factors could cause a release of contamination into groundwater. In particular, Sierra Club argued that casks could rupture because high burnup fuel would cause damage and weaken the fuel cladding.[89]

The Board dismissed this contention because Sierra Club had not presented a material dispute with the application. The Board stated that "[a]ny disagreement concerning the location of the Ogallala Aquifer or the water saturation point at the CISF site is only material to the findings the NRC must make if it is possible for groundwater to be contaminated from a cracked or ruptured cask."[90] Moreover, the Board found that Sierra Club's claims regarding the storage of high burnup fuel and its claims that seismic events in the area would be sufficient to crack a canister were essentially challenges to the certified design of the licensed canisters.[91] The Board held that such claims pose an impermissible challenge to NRC regulations and are therefore outside the scope of the proceeding.[92]

On appeal, Sierra Club repeats the claims it made before the Board without asserting that the Board erred. Sierra Club reiterates arguments that the Environmental Report and SAR fail to acknowledge that the site is above the Ogallala aquifer but does not address the Board's explanation that the depth of the water table is not relevant absent a showing that contamination could plausibly get into the groundwater.[93] In addition, we agree with the Board that Sierra Club's claims that high burnup fuel could rupture the licensed casks was an impermissible challenge to the certified design of the casks. We therefore affirm the Board with respect to Contention 10.

*f. Contention 11: Site-Selection Process*

In Contention 11, Sierra Club challenged ISP's site-selection process and argued that the fifteen site-selection criteria ISP used "bear little or no relationship to any criteria in the statutes or regulations."[94] Sierra Club argued that

---

[88] *Id.* at 65; *see also id.,* Attach., Declaration of Dr. Patricia Bobeck, Geologic Review of Interim Storage Partners LLC WCS Consolidated Interim Storage Facility Environmental Report (Oct. 25, 2018), at 3-6.

[89] Sierra Club Petition at 65-67. Sierra Club also argued that the CISF site is prone to earthquakes and could cause the containers to crack, allowing "radioactive leakage that . . . would find its way into the groundwater." *Id.* at 67.

[90] LBP-19-7, 90 NRC at 73.

[91] *Id.* at 74.

[92] *Id.*

[93] Sierra Club Appeal at 12-13.

[94] Sierra Club Petition at 68.

many of the criteria used "have nothing to do with the environmental impacts of reasonable alternatives."[95]

In its Environmental Report, ISP explained that it focused on a seven-state region of interest that included sparsely-populated, arid areas where there is support for such a facility.[96] The Environmental Report included analyses of four sites — two in Texas and two in New Mexico — using fifteen criteria.[97] The report further broke down the fifteen general criteria into subcategories and included an explanation of why the criteria were important to ISP in selecting a site.[98] ISP's siting criterion 11 provided (among other things) that candidate sites should have no existing contamination, should not be located within the 500-year floodplain, should have a "low probability of containing archeological/cultural resources," and "should have a low probability of disproportionate, adverse impacts to low-income or minority communities."[99]

The Board found that ISP's site selection criteria need only be reasonable. It pointed out that there are no site selection criteria described in 10 C.F.R. Part 51 and that the NRC accords "'substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project' so long as the application is not [so] artificially narrow as to circumvent the requirement that reasonable alternatives must be considered."[100] The Board concluded that Sierra Club had not shown that ISP's site selection process contravened NEPA or any other statutory or regulatory requirement.[101]

On appeal, Sierra Club does not show the Board erred. It reasserts three arguments against ISP's siting criteria, but it does not show that any of ISP's criteria are either unreasonable or contrary to law. First, Sierra Club disputes ISP's statement that the proposed CISF site has not been contaminated by the neighboring WCS LLRW site and calls that claim both unsupported and irrelevant.[102] But as ISP argued before the Board, its assessment is well-founded because the WCS LLRW has been under a monitoring plan to detect radiological or hazardous releases since it was licensed in 1997.[103] And Sierra Club provides no reason why a lack of existing contamination is an unreasonable factor to

---

[95] *Id.* at 71.

[96] Environmental Report § 2.3.1, at 2-10.

[97] *Id.* §§ 2.3.4 to 2.3.7.

[98] *Id.* § 2.3.3.

[99] *See id.* § 2.3.2, at 2-16 to 2-17.

[100] LBP-19-7, 90 NRC at 75-76 (quoting *Hydro Resources, Inc.* (P. O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 55 (2001), and citing *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-90-8, 32 NRC 201, 206 (1991)).

[101] *Id.* at 76.

[102] Sierra Club Appeal at 17; *see* Sierra Club Petition at 71-72.

[103] *See* ISP Opposition to Hearing Request at 95 (citing Environmental Report at 2-23).

consider in choosing a site. Next, Sierra Club argues that ISP should not have used a location outside the 500-year floodplain as a siting criterion.[104] Sierra Club argued before the Board that ISP should have evaluated the impacts of the proposed facility being in the 100-year floodplain as required by 10 C.F.R. § 72.90(f).[105] But as the application states, the site is neither in the 100-year floodplain nor in the 500-year floodplain.[106] In any case, Sierra Club has not shown why low flooding risk would be an inappropriate siting criterion.

Finally, Sierra Club argues that ISP's environmental justice and archeological analyses of the selected site were inadequate.[107] But these claims do not address whether it was inappropriate or contrary to law for ISP to consider in its site selection criteria whether the candidate sites contain archeological resources or present environmental justice concerns. Therefore, the arguments do not support proposed Contention 11 and we affirm the Board's decision to dismiss it.[108]

*g. Contention 14: Impacts of Storage Containers Used Beyond Their Licensing Period*

Sierra Club argued in proposed Contention 14 that ISP should evaluate the environmental effects of the SNF containers being used beyond their licensing period. Sierra Club argued that the canisters that will hold the SNF during transportation and storage are only licensed for twenty years, whereas the proposed CISF will be licensed for forty years, and ISP acknowledges that it expects to extend its license for a total of 100 years.[109] Sierra Club also claimed that ISP has no plan for handling canisters that may arrive at the CISF damaged or leaking or that may develop a crack during storage.[110]

The Board dismissed the contention as factually unsupported and raising matters outside the scope of the proceeding. First, it cited our *Private Fuel Storage* decision, in which we noted that the NRC has determined, through several safety evaluations for waste packages, that accidental canister breach during shipping or storage was not a credible scenario.[111] Next, it observed that

---

[104] Sierra Club Appeal at 17; *see* Sierra Club Petition at 72 (citing 10 C.F.R. §§ 72.3, 72.90(f)).

[105] Sierra Club Petition at 72.

[106] *See* Environmental Report at 3-20; SAR, ch. 2, Attach. B at 77.

[107] Sierra Club Appeal at 17-18, *see also* Sierra Club Petition at 73-75.

[108] We observe that Sierra Club also proposed a contention on environmental justice, which the Board rejected and which Sierra Club does not appeal. *See* LBP-19-7, 90 NRC at 82-84.

[109] Sierra Club Petition at 79-81.

[110] *Id.* at 81-83.

[111] *See* LBP-19-7, 90 NRC at 80-81 (citing *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125, 136-37 (2004)). In *Private Fuel Storage,* we held

*(Continued)*

the NRC has approved and issued certificates of compliance for all the canisters that are proposed for use at the CISF and that the certificates of compliance have been codified through the rulemaking process.[112] Therefore, the Board held that any challenge to the certificates of compliance are outside the scope of this proceeding.[113] Similarly, it held that challenges to the safety of the transportation of spent fuel canisters would be an impermissible challenge to NRC's Part 71 regulations. Finally, it ruled that Sierra Club's challenge to the lack of a dry transfer system was an impermissible challenge to the Continued Storage Rule and the Continued Storage Generic Environmental Impact Statement (GEIS).[114]

On appeal, Sierra Club focuses on a single argument: that the application is based on the fallacy that renewal of the certificates of compliance for the SNF containers will be automatic and that the Board did not address this issue.[115] Sierra Club's argument assumes that the certificates of compliance define the boundary of the useful life of the containers and that ISP will be unable to renew the certificates of compliance. However, our regulations allow the licensee to apply to renew a certificate if the certificate holder does not seek renewal.[116] Any renewal application will necessarily require a safety analysis report that includes design basis information, a description of the aging management program for issues related to structures, systems and components important to safety, as well as time-limited aging analysis that demonstrates that those same systems will continue to perform their intended function for the requested period.[117] Moreover, the aging management of the canisters is addressed in the SAR, which Sierra Club did not address in its contention as originally stated or as phrased on appeal.[118] Specifically, the SAR discusses stress corrosion cracking

---

that to challenge the factual determinations on which a regulation rests in the context of NEPA, a petitioner would have to present "specific, fact-based claims to the contrary, not mere allegations." CLI-04-22, 60 NRC at 134.

[112] LBP-19-7, 90 NRC at 81.

[113] *Id.*

[114] *Id.*; *see* 10 C.F.R. § 50.23 (Continued Storage Rule); "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," NUREG-2157, vol. 1, at 5-52 (ML14196A105) (Continued Storage GEIS).

[115] Sierra Club Appeal at 21. ISP argues that this argument is new on appeal. ISP Answer at 22. If the argument were truly new on appeal, that would be sufficient grounds for us to reject it. *USEC Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 433, 458 (2006). But we see a connection between the original contention's apparent assumption that the containers would begin to decay after the original certificates expire and its current argument that there is no guarantee that the certificates will be renewed.

[116] *See* 10 C.F.R. § 72.240(a).

[117] *See id.* § 72.240(c).

[118] *See, e.g.,* SAR § 5.1.3.2 ("Surveillance of the Storage Overpacks"); *id.* § 5.1.3.5 ("Maintenance Operations").

as a factor considered in selecting material for the storage system, as well as surveillance activities and routine maintenance of the casks for identification and resolution of any issues.[119]

Sierra Club establishes no Board error and we therefore affirm the Board's decision to dismiss Contention 14.

*h. Contention 16: High Burnup Fuel Risks*

Sierra Club argued in its proposed Contention 16 that the Environmental Report and the SAR failed to account for the effects of storing high-burnup fuel at the proposed CISF.[120] Sierra Club argued that high-burnup fuel causes the cladding of the fuel rods to become thinner and more brittle, which increases the risk of release of radioactive material. It also claimed that the SAR misleadingly stated that no high-burnup fuel would be transported and stored at the CISF, which is unlikely because most nuclear fuel used in this country since 1999 — and all of it since 2012 — has been high-burnup fuel.[121] In a reply brief, Sierra Club challenged the Environmental Report's dose modeling using the RADTRAN computer model and argued that the model does not indicate whether it accounted for high-burnup fuel.[122]

The Board found that the issues Sierra Club raised were out of scope and failed to challenge the information in the application.[123] The Board found that the challenge to the safety of transporting high-burnup fuel to be an out of scope challenge to our Part 71 regulations and Department of Transportation regulations.[124] To the extent that the contention challenged the safety of storing high-burnup fuel, the Board found that the application states that only NRC-approved storage systems will be used at the CISF and the SAR incorporates the technical specifications for those designs.[125] Therefore, Sierra Club's claim that the certified storage systems would not be suitable to store fuel as allowed by their design certifications was barred by 10 C.F.R. § 72.46(e).[126]

---

[119] *See, e.g.,* SAR at A.3-9 (NUHOMS-MP187 Cask System), B.3-9 (NUHOMS Horizontal Modular Storage System), C.3-9 (NUHOMS 61BT System), D.3-9 (NUHOMS-61BTH Type 1 System), E.3-9 (La Crosse MPC storage system); *see also* SAR at 5-5 (Section 5.1.3.2, "Surveillance of the Storage Overpacks"); 5-5 to 5-6 (Section 5.1.3.5, "Maintenance Operation"); 5-7 (Section 5.1.5.5, "Maintenance Techniques").

[120] Sierra Club Petition at 91-95.

[121] *Id.* at 92.

[122] Sierra Club Reply at 44.

[123] LBP-19-7, 90 NRC at 85-87.

[124] *Id.* at 85-86.

[125] *Id.* at 86 (citing SAR at 1-6 to 1-10).

[126] *Id.* Section 72.46(e) provides that, to the extent that an application under Part 72 "incorporates

*(Continued)*

The Board also found that the contention failed to challenge the Environmental Report, which discusses both the effects of transportation and storage of high-burnup fuel.[127] With respect to the probability that the CISF will store high-burnup fuel, the Board observed that Sierra Club misconstrued the application.[128] The application states that the facility will not accept uncanned high-burnup fuel, not that it will not accept any high-burnup fuel.[129] The Board also rejected Sierra Club's challenge to ISP's dose modeling because that model encompasses spent fuel of any burnup level.[130]

Further, Sierra Club's appeal repeats its arguments that the Environmental Report does not discuss the impacts of transporting high-burnup fuel. It also argues, without identifying any factual or expert support, that transportation of high-burnup fuel would have different doses to the public, transportation modes, and treatment and packaging procedures than other SNF.[131] This challenge is unsupported, and we dismiss it.

Finally, Sierra Club asserts that it does not challenge the certified design of the casks, but rather the "storage of the radioactive waste with respect to the design of the CIS facility."[132] However, Sierra Club's contention does not identify a characteristic of the CISF facility's design that would make otherwise safe storage systems unsafe.

We find no error in the Board's dismissal of this contention, and we affirm its ruling.

---

by reference information on the design of a spent fuel storage cask for which NRC approval . . . has been issued . . . , the scope of and public hearing held to consider the application will not include any cask design issues."

[127] LBP-19-7, 90 NRC at 86-87.

[128] *Id.*

[129] *Id.* at 86 (citing Proposed License at unnumbered A-3, ¶9). Canning provides an alternative means for confinement of fuel material and replaces the function of cladding.

> The purpose of canning is to confine gross fuel particles to a known, subcritical volume during off-normal and accident conditions, and to facilitate handling and ready retrieval of contents. Canning of damaged fuel also provides geometry control of the SNF to avoid relocation, concentration, or both, of radiation sources that may create problems for radiation shielding.

"Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities (Draft Report for Comment)," NUREG-2215 (Nov. 2017), at 1-8.

[130] LBP-19-7, 90 NRC at 86.

[131] Sierra Club Appeal at 21-22.

[132] *Id.* at 22.

## III. CONCLUSION

For the reasons described above, we *dismiss as moot* Sierra Club's appeal of Contention 9 and *affirm* the Board with respect to the other contentions.

IT IS SO ORDERED.

For the Commission

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 17th day of December 2020.

# Tab 28

Cite as 93 NRC 104 (2021) **LBP-21-2**

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**ATOMIC SAFETY AND LICENSING BOARD**

**Before Administrative Judges:**

**Paul S. Ryerson,** Chairman
**Nicholas G. Trikouros**
**Dr. Gary S. Arnold**

**In the Matter of** **Docket No. 72-1050-ISFSI**
**(ASLBP No. 19-959-01-ISFSI-BD01)**

**INTERIM STORAGE PARTNERS LLC**
**(WCS Consolidated Interim**
**Storage Facility)** **January 29, 2021**

This proceeding concerns ISP's application for a license to construct and operate a consolidated interim storage facility for spent nuclear fuel in Andrews County, Texas. The Board considered two motions by Fasken Land and Minerals, Ltd. and Permian Basin Land and Royalty Owners (collectively "Fasken"): (1) to reopen the record; and (2) for leave to file a new contention out of time. In LBP-21-2, the Board denied both motions and determined that Fasken did not proffer an admissible contention.

## RULES OF PRACTICE: REOPENING OF RECORD

To reopen a closed record, a petitioner must file a motion demonstrating that its new contention (1) is timely; (2) addresses a significant safety or environmental issue; and (3) demonstrates that a materially different result would be or would have been likely had the newly proffered evidence been considered initially. The petitioner must attach an affidavit that separately addresses each of these criteria, with a specific explanation of why each criterion has been

satisfied. An exceptionally grave issue may be considered in the discretion of the presiding officer even if untimely presented.

**RULES OF PRACTICE: MOTIONS TO REOPEN THE RECORD**

The Commission considers reopening a closed record to be an extraordinary action and places an intentionally heavy burden on parties seeking to reopen the record. The Commission mandates that the standard for admitting a new contention after the record is closed is higher than for an ordinary late-filed contention.

**RULES OF PRACTICE: MOTIONS TO REOPEN THE RECORD (ACCOMPANYING AFFIDAVIT(S))**

The supporting affidavit or affidavits must be from experts in the disciplines appropriate to the issues raised or from competent individuals with knowledge of the facts alleged.

**RULES OF PRACTICE: MOTIONS TO REOPEN THE RECORD (TIMELINESS)**

Contentions must be based on documents or other information available at the time the petition is to be filed. On issues arising under the National Environmental Policy Act, participants shall file contentions based on the applicant's environmental report.

**RULES OF PRACTICE: CONTENTIONS (ADMISSIBILITY)**

The contention admissibility requirements are strict by design and result from the Commission's decision to raise the threshold bar for what is admissible. An admissible contention must (1) demonstrate that the issue raised in the contention is within the scope of the proceeding; (2) demonstrate that the issue is material to the findings the NRC must make to support the action involved in the proceeding; and (3) provide sufficient information to show that a genuine dispute exists with the applicant or licensee on a material issue of law or fact.

**RULES OF PRACTICE: AMENDMENT OF CONTENTIONS**

Licensing Boards do not entertain arguments that are advanced for the first time in a reply brief.

# MEMORANDUM AND ORDER
**(Denying Motions to Reopen and for Leave to File)**

Before the Board in this closed proceeding are two motions by Fasken Land and Minerals, Ltd. and Permian Basin Land and Royalty Owners (collectively, "Fasken"): (1) to reopen the record;[1] and (2) for leave to file a new contention out of time.[2] Interim Storage Partners LLC (ISP) and the NRC Staff oppose.[3]

We deny the motions.

## I. BACKGROUND

This proceeding concerns ISP's application for a license to construct and operate a consolidated interim storage facility for spent nuclear fuel in Andrews County, Texas. The factual background and prior proceedings before this Licensing Board are set forth in our Memoranda and Orders of August 23, 2019 (LBP-19-7), November 18, 2019 (LBP-19-9), and December 13, 2019 (LBP-19-11),[4] in which the Board ultimately denied all hearing requests.

After the Board closed the record, and while appeals of the Board's rulings were pending before the Commission, Fasken submitted three new filings:

First, on January 21, 2020, Fasken moved to reopen the record to amend its Contention 4, which the Board had ruled inadmissible in LBP-19-7.[5]

Second, on February 12, 2020, Fasken appealed the NRC Staff's denial of its request for access to certain non-public information.[6] Fasken claimed it needed

[1] Fasken Motion to Reopen the Record (July 6, 2020) [hereinafter Motion to Reopen].

[2] Fasken Motion for Leave to File New and/or Amended Contention (July 6, 2020) [hereinafter Motion for Leave].

[3] ISP's Answer Opposing Fasken's Second Motion to Reopen the Record and Motion for Leave to File New Contention "5" (July 31, 2020) [hereinafter ISP Answer]; NRC Staff Answer in Opposition to Fasken's Motions to Reopen the Record and File New Contention (July 31, 2020) [hereinafter NRC Staff Answer]. Fasken also submitted a combined reply. Fasken Combined Reply to NRC Staff's and ISP's Oppositions to Motion for Leave to File New Contention and Motion to Reopen the Record (Aug. 7, 2020) [hereinafter Combined Reply].

[4] LBP-19-7, 90 NRC 31, 32 (2019); LBP-19-9, 90 NRC 181, 185-86 (2019); LBP-19-11, 90 NRC 358, 367-68 (2019).

[5] *See* LBP-19-7, 90 NRC at 93; Fasken Motion to Reopen the Record for Purposes of Considering and Admitting an Amended Contention Based on New Information Provided by ISP in Response to NRC Requests for Additional Information (Jan. 21, 2020).

[6] Appeal of Staff Denial of Petitioners Request for SUNSI Information Related to ISP's Responses to RAIs (Feb. 12, 2020).

the non-public information to decide whether to try to amend a second contention that the Board had ruled inadmissible.[7]

Third, on July 6, 2020, Fasken again moved to reopen the record, this time to assert a new contention (Fasken New Contention 5) challenging aspects of the NRC Staff's Draft Environmental Impact Statement (DEIS).[8]

On December 4, 2020 (in CLI-20-13) and December 17, 2020 (in CLI-20-14 and CLI-20-15), the Commission affirmed the Board's rulings.[9] In CLI-20-14, the Commission also considered and denied the first two submissions that Fasken had filed after the Board denied its hearing request.[10] The Commission referred, for the Board's initial consideration, Fasken's third such submission: that is, Fasken's motions to reopen the record and for leave to file New Contention 5.[11]

## II. FASKEN NEW CONTENTION 5

On May 4, 2020, the NRC made the DEIS for ISP's license application publicly available.[12] On May 22, 2020, at Fasken's request, the Secretary of the Commission extended the deadline for filing new or amended contentions based on the DEIS until July 6, 2020.[13]

Hence, on July 7, 2020 at 12:01 a.m. (technically one minute after the deadline), Fasken filed a second motion to reopen the record, together with a motion for leave to file Fasken New Contention 5.[14] New Contention 5 states:

> ISP's application fails to adequately, accurately, completely and consistently consider the cumulative impacts of transporting high-level radioactive waste and spent nuclear fuel to and the socioeconomic benefits of the proposed . . . project, which precludes a proper analysis under NEPA, and further nullifies ISP's ability to satisfy NRC's siting evaluation factors now and anticipated in the future and is in further violation of NRC regulations.[15]

---

[7] *See id.* at 3.

[8] Motion to Reopen at 4-6.

[9] CLI-20-13, 92 NRC 457, 458, 462 (2020); CLI-20-14, 92 NRC 463, 490 (2020); CLI-20-15, 92 NRC 491, 510 (2020). In CLI-20-14, the Commission dismissed the appeal of one ruling without reaching the merits; *see* CLI-20-14, 92 NRC at 466 n.10.

[10] CLI-20-14, 92 NRC at 472, 478.

[11] *Id.* at 465, 489.

[12] "Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas" (Draft Report for Comment) (May 2020) (ADAMS Accession No. ML20122A220) [hereinafter DEIS].

[13] Commission Order (May 22, 2020) at 1 (unpublished) [hereinafter Commission Extension].

[14] Motion to Reopen at 1; Motion for Leave at 1.

[15] Motion for Leave at 11.

## III. MOTION TO REOPEN THE RECORD

To reopen a closed record, a petitioner must file a motion that demonstrates (1) its new contention is timely based upon the availability of new information; (2) the contention addresses a significant safety or environmental issue; and (3) a materially different result would be or would have been likely had the newly proffered evidence been considered initially.[16] The petitioner must attach an affidavit from "experts in the disciplines appropriate to the issues raised" or from "competent individuals with knowledge of the facts alleged" that separately addresses each of these criteria, explaining how each criterion has been satisfied.[17] Moreover, the evidence in any such affidavit must meet the admissibility standards in 10 C.F.R. § 2.337.[18] In other words, the affidavit must be of such quality as to be admissible into evidence at an evidentiary hearing.

The Commission considers "reopening the record for any reason to be 'an extraordinary' action,"[19] and places "an intentionally heavy burden on parties seeking to reopen the record."[20] The Commission's rules mandate that "the standard for admitting a new contention after the record is closed is higher than for an ordinary late-filed contention."[21] Fasken fails to carry this intentionally heavy burden.

Both ISP and the NRC Staff assert that Fasken has not satisfied a threshold requirement. They claim that Fasken's motion to reopen the record is not accompanied by an appropriate affidavit.[22]

To support its motion, Fasken attaches an affidavit by its lawyer, Mr. Kanner.[23] But 10 C.F.R. § 2.326(b) does not generally call for the affidavit of a petitioner's lawyer. On the contrary, when the rules for reopening a closed record were proposed, commentators expressed concern that "affidavits of lawyers repeating allegations of undisclosed principals should not be sufficient."[24] In response, the Commission codified the requirement that the supporting affidavit

---

[16] 10 C.F.R. § 2.326(a)(1)-(3). An "exceptionally grave" issue may be considered at the discretion of the presiding officer even if untimely presented. *Id.* § 2.326(a)(1).

[17] *Id.* § 2.326(b).

[18] *Id.*

[19] *Tennessee Valley Authority* (Watts Bar Nuclear Plant, Unit 2), CLI-15-19, 82 NRC 151, 156 (2015) (quoting Final Rule, Criteria for Reopening Records in Formal Licensing Proceedings, 51 Fed. Reg. 19,535, 19,538 (May 30, 1986)).

[20] *Id.* at 155.

[21] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-05-12, 61 NRC 345, 350 (2005).

[22] NRC Staff Answer at 30; ISP Answer at 11-12.

[23] Motion to Reopen, attach. 1, Aff. of Allan Kanner (July 6, 2020) [hereinafter Kanner Affidavit].

[24] Final Rule, Criteria for Reopening Records in Formal Licensing Proceedings, 51 Fed. Reg. 19,535, 19,537 (May 30, 1986).

must be from either "competent individuals with knowledge of the facts alleged" or "experts in the disciplines appropriate to the issues raised."[25]

For the most part, Mr. Kanner claims no personal knowledge. Rather, he summarizes an affidavit submitted by Mr. Taylor, Fasken's vice president, and purports to incorporate by reference the arguments in Fasken's Motion for Leave.[26] Neither affidavit separately addresses each criterion in 10 C.F.R. § 2.326(a), as required by 10 C.F.R. § 2.326(b).

We do not question whether Mr. Kanner is a qualified lawyer. But, because Mr. Kanner claims neither technical expertise nor personal knowledge of critical facts, we likely would not admit most or all of Mr. Kanner's affidavit as evidence at an evidentiary hearing under 10 C.F.R. § 2.337. It is questionable, therefore, whether Mr. Kanner's affidavit can properly support a motion to reopen the record under 10 C.F.R. § 2.326(b).

We need not rely on this possible pleading defect to deny Fasken's motion, however, because Fasken fails to carry the heavy burden to reopen a closed record for more substantial reasons.

Most importantly, Fasken's motion is not timely. Fasken submitted its new contention challenging the DEIS essentially within the extended deadline permitted by the Commission.[27] But New Contention 5 and Fasken's associated motion to reopen the record are based on statements in the DEIS that do not differ materially from information that was publicly available in ISP's application materials much earlier.[28] This precludes granting Fasken's motion.

Under 10 C.F.R. § 2.309(f)(2), "[o]n issues arising under the National Environmental Policy Act, participants shall file contentions based on the applicant's environmental report."[29] Petitioners such as Fasken have "an ironclad obligation"[30] to examine the relevant application documents to uncover information that might prompt a contention.

Also under 10 C.F.R. § 2.309(f)(2), the NRC expects a petitioner "to evaluate all available information at the earliest possible time to identify the potential basis for contentions and preserve their admissibility."[31] Fasken may not seize

---

[25] *Id.*; 10 C.F.R. § 2.326(b).

[26] Kanner Affidavit at 8.

[27] *See* Commission Extension at 1.

[28] In Exhibit 2 to its Motion for Leave, Fasken lists excerpts from the Environmental Report and the DEIS but fails to explain how they support any of the claims raised in New Contention 5. *See* Motion for Leave at 14.

[29] 10 C.F.R. § 2.309(f)(2).

[30] *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 338 (1999).

[31] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-99-43, 50 NRC

*(Continued)*

upon publication of the NRC staff's DEIS as an excuse to raise challenges to ISP's license application that Fasken could have timely raised in 2018, but did not.[32]

Fasken's fundamental claim is that the DEIS fails to adequately consider "the cumulative impacts of transporting high-level radioactive waste and spent nuclear fuel to and the socioeconomic benefits" of ISP's proposed storage facility.[33] For example, Fasken claims that the DEIS contains insufficient information concerning "transportation routes, safety risks[,] and environmental impacts and potential legal issues involving liabilities and responsibilities for risk in transporting the nuclear waste across the nation via rails, barges and/or heavy-haul trucks."[34]

But Fasken fails to show that its claims are based on new and materially different information. On the contrary, the representative route utilized in the DEIS is comparable to one of the routes analyzed in ISP's Environmental Report[35] and is identical to one of the representative routes analyzed in NUREG-2125, the study relied upon in the DEIS.[36] Indeed, other petitioners challenged the use of representative transportation routes in their 2018 hearing requests,[37] but Fasken did not.[38]

Fasken also claims that the DEIS "for the first time relies on and cites to data in the [Department of Energy (DOE)] Yucca 2008 transportation analysis" concerning the evaluation of the use of barges for spent nuclear fuel.[39] But Fasken does not show how the information and conclusions in the DEIS are different from the information and conclusions presented in ISP's Environmental Report. ISP's Environmental Report analyzes barge shipments as part of the evaluation of the radiological impacts of transportation and concludes that "barge and heavy haul shipments were not major contributors to overall collective dose."[40]

---

306, 313 (1999) (citing *Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), CLI-83-19, 17 NRC 1041, 1050 (1983)).

[32] Hearing requests concerning ISP's license application were due October 29, 2018. LBP-19-7, 90 NRC at 43.

[33] Motion for Leave at 11.

[34] Motion to Reopen at 5.

[35] WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050 (rev. 3 Nov. 2019) at 1-1, 4-11 (ADAMS Accession No. ML20052E152 (package)) [hereinafter Environmental Report].

[36] DEIS at 4-13 (citing NUREG-2125, Spent Fuel Transportation Risk Assessment (Jan. 2014) (ADAMS Accession No. ML14031A323)).

[37] *See* LBP-19-7, 90 NRC at 87-89.

[38] Petition of Permian Basin Land and Royal Organization and Fasken Land and Minerals for Intervention and Request for Hearing (Oct. 29, 2018).

[39] Motion for Leave at 6, 18.

[40] Environmental Report at 4-11; § 4.2.6.

Likewise, Fasken claims that the DEIS's cumulative transportation impact analyses fail to adequately consider (as relevant to potential accidents) the regional characteristics within a fifty-mile radius of the proposed facility and the occurrence of earthquakes in the area.[41] But Fasken fails to show how the analysis of accidents in ISP's Environmental Report[42] differs materially from the analysis in the DEIS.[43]

Purportedly in support of New Contention 5, Fasken makes some related (and some perhaps marginally related) additional claims. All are premised on information that was available to Fasken long before publication of the DEIS.

For example, Fasken claims that the DEIS improperly omits an analysis of "the responsibility and costs for coordinating transportation, payments for needed infrastructure improvements and providing necessary emergency training for first responders along the unknown transportation routes."[44] But ISP's Environmental Report did not present such an analysis either. Fasken could have asserted this claim at the outset of the proceeding, but did not.

Similarly, Fasken's claim that the DEIS fails to consider the potential impacts of terrorist attacks and sabotage[45] is untimely because ISP's Environmental Report did not consider them either (because the NRC requires no such analysis for facilities outside the Ninth Circuit[46]). And Fasken does not attempt to explain how its criticism of ISP's site selection process[47] could be premised on new information. Again, Fasken asserts claims that other petitioners made at the outset of this proceeding, but Fasken did not.[48]

In short, Fasken fails to demonstrate that any information supporting New Contention 5 is materially new. For this reason alone, we must deny Fasken's motion to reopen the record.[49]

---

[41] Motion for Leave at 19-21.

[42] Environmental Report at 4-12 to 4-22.

[43] DEIS at 4-17 to 4-24.

[44] Motion for Leave at 15.

[45] *Id.* at 21-22.

[46] *AmerGen Energy Co.* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124, 129 (2007) (upheld by *N.J. Dep't of Envtl. Prot. v. NRC,* 561 F.3d 132, 140-43 (3d Cir. 2009)).

[47] Motion for Leave at 22.

[48] *See* Petition of [Joint Petitioners] to Intervene, and Request for an Adjudicatory Hearing (Nov. 13, 2018) at 118 [hereinafter Joint Petition].

[49] Under 10 C.F.R. § 2.326(a)(1), the Board has discretion to consider an "exceptionally grave" issue even if untimely presented. We do not exercise that discretion here. Although, in its Combined Reply, for the first time Fasken makes passing reference to New Contention 5 presenting an exceptionally grave issue (*see* Combined Reply at 3, 10), it never supports that characterization. We do not entertain arguments advanced for the first time in a reply brief. *Nuclear Management Co.* (Palisades Nuclear Plant), CLI-06-17, 63 NRC 727, 732 (2006). Moreover, the Commission

*(Continued)*

Moreover, we conclude that Fasken's motion does not address a significant safety or environmental issue. As explained *infra,* in our discussion of contention admissibility, New Contention 5 does not raise a genuine dispute on *any* material issue of fact or law. Thus, these same claims cannot possibly meet the higher standard of presenting a *significant* issue that must be adjudicated by reopening this closed proceeding.

Finally, Fasken does not demonstrate that, if its motion to reopen the record were granted, a materially different result would be likely. Because Fasken's New Contention 5 is not admissible, as explained *infra,* no materially different result would have occurred had it been considered initially.

## IV. MOTION FOR LEAVE TO FILE CONTENTION OUT OF TIME

Even if we were to allow Fasken to reopen the record, we would necessarily deny its motion for leave to file New Contention 5 out of time. Fasken's motion for leave fails for the same reasons as Fasken's motion to reopen the record: it is not based on new information. Additionally, we conclude that Fasken New Contention 5 is not admissible.

Again, we agree that Fasken New Contention 5 was timely submitted in the sense that (for all practical purposes) it was filed within the timeframe prescribed by the Secretary for contentions challenging the DEIS.[50] But the Secretary's extension did not alter Fasken's obligation to show that New Contention 5 is based on new, previously unavailable information that differs materially from information that was previously available.[51] As explained *supra,* Fasken makes no such showing.

## V. ADMISSIBILITY OF FASKEN NEW CONTENTION 5

Fasken's failure to satisfy either the requirements for reopening a closed record or for proffering a contention out of time, without more, necessarily requires us to reject Fasken New Contention 5.[52] In addition, the contention does

---

considers the exception a narrow one, to be granted rarely and only in extraordinary circumstances. *See, e.g, Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-12-21, 76 NRC 491, 500-01 (2012).

[50] We decline to deny Fasken's motion because it was one minute late, as ISP urges. *See* ISP Answer at 25. We remind counsel, however, that generally NRC filing deadlines are strictly enforced.

[51] 10 C.F.R. § 2.309(c).

[52] *See Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Unit 3), CLI-09-5, 69 NRC 115, 124 (2009).

not satisfy the admissibility requirements in 10 C.F.R. § 2.309(f)(1).[53] Fasken urges that we not attach importance to "procedural issues,"[54] but the Commission instructs otherwise.

Although the NRC's contention admissibility requirements are not intended to be a "fortress to deny intervention,"[55] they are "strict by design."[56] These requirements are intended to "focus litigation on concrete issues and result in a clearer and more focused record for decision."[57] They arise from the Commission's "conscious effort to raise the threshold bar for an admissible contention."[58] Rather than expend agency time and resources on litigating vague and unsupported claims, the Commission chose to provide evidentiary hearings only to those who "proffer at least some minimal factual and legal foundation in support of their contentions."[59] Failure to satisfy any of the NRC's pleading requirements requires a licensing board to reject a contention.[60]

Although a petitioner need not prove its contention at this stage, mere notice pleading of proffered contentions is insufficient.[61] A petitioner must read the relevant portions of the license application or amendment request, state the applicant's or licensee's position and the petitioner's opposing view, and explain why it disagrees with the applicant or licensee.[62]

Among other things, an admissible contention must (1) demonstrate that the issue raised in the contention is within the scope of the proceeding;[63] (2) demonstrate that the issue is material to the findings the NRC must make to support the action involved in the proceeding;[64] and (3) provide sufficient information to show that a genuine dispute exists with the applicant or licensee on a material issue of law or fact.[65] This must include references to specific portions of the

---

[53] 10 C.F.R. § 2.309(f)(1)(i)-(vi).

[54] Combined Reply at 10.

[55] *Oconee,* CLI-99-11, 49 NRC at 335.

[56] *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001).

[57] Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2,182, 2,202 (Jan. 14, 2004).

[58] *Oconee,* CLI-99-11, 49 NRC at 334.

[59] *Id.*

[60] *See Entergy Nuclear Operations, Inc.* (Indian Point, Unit 2), CLI-16-5, 83 NRC 131, 136 (2016).

[61] *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003).

[62] Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,170-71 (Aug. 11, 1989).

[63] 10 C.F.R. § 2.309(f)(1)(iii).

[64] *Id.* § 2.309(f)(1)(iv). To show that a dispute is "material," a petitioner must show that its resolution would make a difference in the outcome of the proceeding. *See Oconee,* CLI-99-11, 49 NRC at 333-34.

[65] 10 C.F.R. § 2.309(f)(1)(vi).

disputed document and the supporting reasons for each dispute.[66] If a petitioner claims that a document fails to contain relevant information that is legally required, it must identify each such alleged failure and the reason why the missing information is needed.[67]

Fasken New Contention 5 does not satisfy these requirements.

Fasken's principal and overarching claim is that the DEIS should identify specific transportation routes. Fasken claims that "the use of 'representative routes' simply will not do."[68]

Fasken argues that "the transportation of nuclear waste to the proposed [facility] has a clear physical, functional, and temporal nexus to the project"[69] and that storage and transportation are inextricably linked actions.[70] Fasken contends that an analysis of the "exact number of shipments to [the proposed facility]; expected numbers of start clean/stay clean shipments (return to sender) and the number of shipments from [the facility] to a permanent repository based on [the] operational lifespan of [the facility] is necessary to make a best estimate of risks to communities in the transportation corridor."[71]

According to Fasken, the DEIS "materially mislead[s] the public as to the ownership and responsibility, as well as the radiological risks and socioeconomic impacts, of transporting nuclear waste from decommissioned sites to the proposed ISP site."[72] As a result, according to Fasken, "extrapolations based on prior facilities and the use of 'representative routes'. . . prevent[s] a proper assessment of cost and benefit scenarios in the ISP DEIS."[73]

However, Fasken does not explain why, under NEPA or the NRC's environmental regulations, the DEIS must provide a more thorough analysis of hypothetical future shipping routes. Admissible contentions must identify a deficiency in the environmental analysis and may not merely offer "suggestions" of other ways the analysis could have been done.[74]

Most importantly, Fasken does not explain — or even address — why the Board should reach a different result than we reached with respect to a virtually identical claim in this very proceeding, and which the Commission affirmed in CLI-20-14. In LBP-19-7, we ruled inadmissible Joint Petitioners Contention 1,

---

[66] *Id.*

[67] *Id.*

[68] Motion for Leave at 14.

[69] *Id.*

[70] *Id.*

[71] *Id.* at 25.

[72] *Id.* at 12.

[73] *Id.* at 14.

[74] *See NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-5, 75 NRC 301, 323 (2012) (citation omitted).

which claimed that ISP's Environmental Report's transportation impact analysis was inadequate because it used representative routes and failed to divulge and analyze specific transportation routes.[75] Much like Fasken, Joint Petitioners contended that there must be "complete disclosure of all probable transportation routes, along with quantities of [spent nuclear fuel] and the likely radioisotopic contents" to be shipped.[76]

In LBP-19-7, we rejected Joint Petitioners' claim that there must be complete disclosure of all probable transportation routes because petitioners failed to raise a genuine dispute concerning the adequacy of ISP's analysis of representative routes.[77] Moreover, we concluded that — whenever actual routes might be chosen in the future — their selection would be the responsibility of the spent fuel owners, not ISP.[78] We further concluded that any more specific analysis would properly be the subject of an application for a transportation license, not ISP's application to construct a storage facility.[79]

In CLI-20-14, the Commission affirmed our ruling. The Commission agreed with the Board that "the actual routes that may one day be used to transport waste to the proposed [facility] are not currently known and are not the subject of an NRC approval in this proceeding."[80] Fasken's demand for an analysis of actual transportation routes is not admissible for the same reasons.

Fasken's related claims all depend on acceptance of its fundamental and mistaken claim that hypothetical future transportation routes must be more fully disclosed and analyzed. Some are inadmissible for other reasons as well.

For example, Fasken claims that adequate socioeconomic and cost-benefit analyses "hinge on the responsibility and costs for coordinating transportation, payments for needed infrastructure improvements and providing necessary emergency training for first responders" along actual transportation routes.[81] However, evaluation of the costs of emergency response and infrastructure upgrades is not even within the scope of this Part 72 proceeding, as required by 10 C.F.R. § 2.309(f)(1)(iii). Identifying actual transportation routes will eventually require separate reviews and approvals by the NRC, the Department of Transportation, and applicable States or Tribes.[82] ISP will also need to coordinate with local law enforcement and emergency responders. Such coordination is not relevant at this point in the licensing process.

---

[75] LBP-19-7, 90 NRC at 87-89 (ruling Joint Petitioners Contention 1 inadmissible).
[76] Joint Petition at 43.
[77] LBP-19-7, 90 NRC at 88-89.
[78] *Id.* at 60-61, 91.
[79] *Id.* at 88-89.
[80] CLI-20-14, 92 NRC at 479.
[81] Motion for Leave at 15.
[82] *See* 10 C.F.R. Parts 71, 73; 49 C.F.R. Parts 107, 171-80, 390-97.

Likewise, to the extent that Fasken contends that the DEIS transportation impacts analysis must consider the possibility of "terrorist attacks" and "sabotage," the Commission has held that, except for licensing actions within the Ninth Circuit, the NRC is not required to consider terrorism in its NEPA analysis.[83] Fasken's claims concerning the possibility of a terrorist attack are therefore outside the scope of this proceeding.

Finally, Fasken's belated claims concerning ISP's site selection process ignore our discussion in LBP-19-7 of similar claims that were made in Sierra Club Contention 11 and fail to anticipate the Commission's affirmance (in CLI-20-15) of our ruling that Sierra Club Contention 11 was not admissible.[84] As we ruled in LBP-19-7 (and as the Commission affirmed), Part 51 sets forth no specific site selection criteria.[85] The criteria need only be reasonable, and it is permissible for the NRC to accord substantial weight to the preference of the applicant.[86] Sierra Club's criticisms of ISP's site selection process did not raise a genuine dispute under these standards,[87] and Fasken's do not either.

The various claims set forth in Fasken New Contention 5 fail to satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(iii), (iv), and (vi). Fasken New Contention 5 is not admitted.

## VI. ORDER

For the reasons stated:

A. Fasken's motion to reopen the record is *denied.*

B. Fasken's motion for leave to file its Contention 5 is *denied.*

C. Fasken Contention 5 is *not admitted.*

D. No contention having been admitted, and no proffered contention pending, this adjudicatory proceeding remains *terminated.*

---

[83] CLI-20-14, 92 NRC at 488-89; *Oyster Creek,* CLI-07-8, 65 NRC at 129, *petition for review denied, N.J. Dep't of Envtl. Prot.,* 561 F.3d at 140-43.

[84] Motion for Leave at 22.

[85] LBP-19-7, 90 NRC at 75.

[86] *Id.*

[87] *Id.* at 76.

It is so ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Paul S. Ryerson, Chairman
ADMINISTRATIVE JUDGE

Nicholas G. Trikouros
ADMINISTRATIVE JUDGE

Dr. Gary S. Arnold
ADMINISTRATIVE JUDGE

Rockville, Maryland
January 29, 2021