

Blount, Barbara

Subject:

FW: Public Comments by Beyond Nuclear Re: NRC-2017-0211, Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities, Draft Report for Comment (Date Published, November 2017)

Re: NRC-2017-0211, Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities, Draft Report for Comment (Date Published, November 2017)

Dear NRC,

I would like to make the following public comments, on behalf of our members and supporters across the United States of America, in regards to the risks of dry cask storage, both on-site, and away-from-reactor. Please note that comments re: risks re: transport containers for irradiated nuclear fuel ARE relevant -- as re: Holtec containers, which are NRC certified for both storage AND transport.

How does your SRP stand up to the blistering conclusions contained in the book *Forevermore: Radioactive Waste in American*, written by investigative reporters Donald L. Barlett and James B. Steele more than three decades ago?

Beyond the risk of seiches at Palisades, and other Great Lakes reactors, what about the risks of Great Lakes shoreline located nuclear power plants to Great Lakes tsunamis?

See

<http://michiganradio.org/post/ever-heard-great-lakes-tsunami-scientist-says-they-happen-about-100-times-year>

and

<http://michiganradio.org/post/scientists-want-create-warning-system-freshwater-tsunamis>

which mention nuclear power plants, and the radioactive wastes stored there, as in dry casks, as of particular concern.

Similarly, what about the risks of tsunamis at coastal located reactors? What about the risks of rising seas over time, given global warming?

What about the risk of "inland tsunamis," as at certain inland located reactors on river banks, especially those downstream of major dams, such as Fort Calhoun, Nebraska, and Oconee, South Carolina?

Please note all relevant passages to dry cask storage risks contained in my public comments to NRC on Dec. 20, 2013 in the context of its Nuclear Waste Confidence policy public comment proceeding, to whit:

Dec. 20, 2013

(149) 82 FR 52944
11/15/2017

Dear NRC Nuclear Waste Confidence Directorate,

SUNSI Review Complete
Template = ADM - 013
E-RIDS= ADM-03

Add= Jeremy Smith (Jussi)

I do not share your confidence, expressed in your Waste Confidence Draft Generic Environmental Impact Statement (WC DGEIS, NUREG-2157), that dry cask storage of irradiated nuclear fuel is currently safe and sound, and will remain so not only for up to 80 years of reactor operations, up to 60 years beyond reactor operations during so-called "short-term storage," up to 100 years beyond that during so-called "long-term storage," and up to forevermore beyond that, during so-called "indefinite storage" (infinite storage?!).

Nor do I share your confidence about the safety and soundness of irradiated nuclear fuel transport, which would be required to go from on-site/at-reactor storage to away-from-reactor/centralized interim storage (what we prefer to call *de facto* permanent parking lot dumps) or final repositories.

One reason I do not share your confidence is because of what I learned from Commonwealth Edison/Exelon whistleblower Oscar Shirani, about the quality assurance (QA) violations involving Holtec casks. A "Summary of Oscar Shirani's Allegations of Quality Assurance Violations Against Holtec Storage/Transport Casks" is pasted in below. This Summary is also posted online at: <http://www.nirs.org/radwaste//atreactorstorage/shiranialleg04.htm>.

Although dated July 2004, to the best of my knowledge, NRC has never taken action on Oscar Shirani's revelations. In fact, quite to the contrary, NRC instead rubber-stamped the Private Fuel Storage, LLC construction and operating license in 2005-2006. Targeted at the Skull Valley Goshute Indian Reservation, a very serious environmental justice violation, PFS LLC would have deployed a whopping 4,000 Holtec casks onto the roads, rails, and/or waterways -- more shipments of high-level radioactive waste than have yet been carried out in the U.S., since the beginning of the Atomic Age in 1945. The 4,000 Holtecs that would have been *de facto* permanently parked on Skull Valley Goshute land would have been more than twice as many dry casks as are currently parked at U.S. atomic reactor sites presently (some 1,700). That is how flippantly NRC took Oscar Shirani's dire warnings. Fortunately, PFS LLC pulled the plug a year ago today, and will not be happening, despite NRC's ready rubber-stamp.

Oscar Shirani was made to pay dearly for his integrity, and outspoken refusal to simply shut up about the Holtec QA violations. He endeavored to get Exelon to place a Stop Work Order on the manufacture of Holtecs. Instead, Exelon subjected him to harrassment by his own supervisors, and eventually ran him out of the company, and Exelon, and the U.S. nuclear power industry, blacklisted him for the rest of his life. Oscar Shirani alleged that he never signed off on the audit form granting Holtecs a clean bill of health. Oscar Shirani alleged that his signature on that audit report was forged. Neither the U.S. NRC nor the U.S. Department of Labor provided any support, relief, or assistance to Oscar Shirani, abandoning him to his fate, to both agencies' eternal shame.

I attended, and bore witness at, a two-day NRC Office of Inspector General interview with Oscar Shirani, regarding his whistleblowing allegations concerning the Holtec casks. OIG's final report did not challenge Oscar Shirani's observations or conclusions, but it did find, incredibly, that NRC had done nothing wrong in the matter, and closed the case. Thus, no action was taken by NRC's OIG, nor by NRC itself, to defend or assist Oscar Shirani as a safety conscious whistleblower, nor to investigate the merits of his allegations against the Holtec casks, or take any safety enforcement action whatsoever.

Oscar Shirani's QA allegations against the Holtec casks are very safety significant. Oscar Shirani questioned the structural integrity of Holtecs sitting still, going zero miles per hour, in on-site/at-reactor storage. But NRC has certified Holtecs for transport. The destructive forces they would face, traveling 60 mph, or even faster, down the rail lines, and potentially subjected to severe, high-speed crashes; long-

duration, high-temperature fires; prolonged and/or deep underwater submersions; and perhaps even terrorist attacks; exacerbates the risks of Holtec QA violations even more.

The significance of Oscar Shirani's QA whistleblowing against the Holtecs is even more significant, considering how widely deployed they are. On November 20, 2013, Josh Jarrell, R&D Staff, Used Fuel Systems, Nuclear Fuels Storage and Transportation, Planning Project (NFST), Oak Ridge National Laboratory, presented at the U.S. Nuclear Waste Technical Review Board meeting held in Washington, D.C. During his presentation, entitled "Integrating Standardization into the Nuclear Waste Management System," Dr. Jarrell documented that Holtec has supplied a full 46% of the dry cask storage market in the U.S. up to the current point.

Thus, the risks inherent in the QA violations revealed by Oscar Shirani are widespread across the U.S., in dry cask storage ISFSIs located throughout the country. They will increase in significance as Holtecs are transported, by barge on waterways, by heavy haul trucks on roads, or by trains on the railways, during shipments to centralized interim storage facilities, or final repositories.

Thank you.

Sincerely,

Kevin Kamps
Radioactive Waste Watchdog, Beyond Nuclear
6930 Carroll Ave., Ste. 400
Takoma Park, MD 20912

Summary of Oscar Shirani's Allegations of Quality Assurance Violations Against Holtec Storage/Transport Casks.

Holtec storage/transport casks are the first dual purpose container for irradiated nuclear fuel certified by the U.S. Nuclear Regulatory Commission (NRC). According to Holtec International's website (<http://www.holtecinternational.com>), Holtec casks are already deployed at 33 U.S. nuclear power plants. Up to 4,000 rail-sized Holtec storage/transport casks would also be used at the proposed Private Fuel Storage interim storage facility in Utah. Given the U.S. Department of Energy's (DOE) recent decision to use "mostly rail" transport to the proposed Yucca Mountain repository, Holtec casks could very well become among the most used shipping containers for highly radioactive waste.

Exelon, the largest nuclear utility in U.S., uses Holtec casks for irradiated fuel storage at its reactor sites. In 1999 and 2000, Oscar Shirani, as a lead quality assurance (QA) auditor for Exelon, identified numerous "major design and fabrication issues" during a QA inspection of Holtec International (the cask designer), Omni Fabrication, and U.S. Tool & Die (the subcontractors responsible for manufacturing the casks). In fact, he identified a "major breakdown" in the QA program itself. The problems were so severe that Shirani sought a Stop Work Order against the manufacturer of the casks until the problems were addressed. Instead, he was run out of Exelon. According to Shirani, these design and manufacturing flaws mean that the structural integrity of the Holtec casks is indeterminate and unreliable, especially under heat-related stress such as during a severe transportation accident.

Although NRC has dismissed Shirani's concerns, NRC Region III (Chicago office) dry cask inspector Ross Landsman refused to sign and approve the NRC's resolution of Shirani's concerns, concluding that this same kind of thinking led to NASA's Space Shuttle disasters.^[1] He stated in September 2003, "Holtec, as far as I'm concerned, has a non-effective QA program, and U.S. Tool & Die has no QA program whatsoever."^[2] Landsman added that NRC's Nuclear Reactor Regulation division did a poor follow-up on the significant issues identified, and pre-maturely closed them.

Shirani alleges that all existing Holtec casks, some of which are already loaded with highly radioactive waste, as well as the casks under construction now, still flagrantly violate engineering codes (such as those of the American Society of Mechanical Engineers [ASME] and American National Standards Institute [ANSI]), as well as NRC regulations. He concludes that the Holtec casks are "nothing but garbage cans" if they are not made in accordance with government specifications.^[3]

Specific examples of the QA violations and related problems alleged by Shirani include:

- Welding problems, such improper "fast cooling" of hot cask welds and metal using fans and air conditioning equipment, which are in violation of ASME and ANSI codes and risk tearing and cracking of the unevenly cooling welds and metal, in order to meet production goals. Welds on the casks were also performed by unqualified welders. Even NRC has acknowledged that "weld quality records are not in agreement with the code requirements."^[4]
- Inadequate controls on the quality of materials used in the manufacturing process, risking brittleness and weakness in the casks.
- Holtec's failure to report holes in neutron shielding material (neutrons are especially hazardous emissions from highly radioactive waste).
- US Tool & Die's failure to use coupon (a small physical sample of metal) testing, and Post Weld Heat Treatment on a regular basis, as required by ASME code and in violation of the codes that were part of the license agreement with NRC.
- Holtec and U.S. Tool & Die quality control inspectors' bypass of hundreds of non-conforming conditions, departures from the original design during cask manufacture. The departures from the original design amount to design changes that require revised analysis to guarantee that manufactured casks actually live up to the structural integrity of the original design. The fact that this revised analysis was never done is in violation of ASME and ANSI codes, and thus NRC regulations, and means the actual manufactured casks' structural integrity is questionable, according to Shirani.
- Holtec's consent to allow U.S. Tool & Die to make design decisions and changes, despite the fact that U.S. Tool & Die does not have design control capability under its QA program.
- Failure to conduct a "root cause investigation" of Holtec's QA program, even though root causes are the main reason for repeated deficiencies.
- Exelon's obstruction of Shirani from performing any follow-up of the audit to confirm that problems had been solved, despite knowing that the fabrication issues identified would have a detrimental impact on the design.
- Exelon's falsified quality-assurance documents and the misleading of the NRC investigation, stating that Shirani's allegations of QA violations were resolved when in fact they were not.
- Lack of understanding in the NRC of the design control process and Holtec's QA program, relating to flaws in welding, design, manufacturing, and materials procurement control. NRC lacks a corrective action mechanism for repeated findings. Shirani alleges his audit findings embarrassed NRC because it had also audited the Holtec casks just a few months previously but found no problems whatsoever.

Shirani concludes that these numerous design and manufacturing flaws call into question the structural integrity of the Holtec casks, especially under heat-related stress such as during severe transportation accidents. He also warns that his eight-day audit showed him only a snap shot of problems, and that there could in fact be additional ones yet to be identified.

[1] Elizabeth Brackett, "Nuclear Controversy," "Chicago Tonight," WTTW Channel 11 Television, Chicago, Illinois, January 29, 2004.

[2] J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

[3]*Ibid.*

[4] April 2002 NRC review panel memo, cited in J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

- This summary was prepared by Kevin Kamps (202-328-0002 ext. 14; kevin@nirs.org), Nuclear Waste Specialist at Nuclear Information and Resource Service in Washington, D.C. July 22, 2004.

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Kevin Kamps <kevin@beyondnuclear.org>

Re: Docket ID No. NRC-2012-0246, public comments on NRC WC DGEIS

Kevin Kamps <kevin@beyondnuclear.org>
To: Rulemaking.Comments@nrc.gov

Fri, Dec 20, 2013 at 11:39 PM

Submitted by:

Kevin Kamps
Radioactive Waste Watchdog
Beyond Nuclear
6930 Carroll Ave., Ste. 400
Takoma Park, MD 20912

Beyond Nuclear aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abandon both to safeguard our future. Beyond Nuclear advocates for an energy future that is sustainable, benign and democratic.

[Please note: Exhibits A to O, mentioned below, are being submitted via FAX.]

Dec. 20, 2013

Re: Docket ID No. NRC-2012-0246 (Public Comment on NUREG-2157)

Comments on NRC's WC DGEIS ("Waste Confidence" Draft Generic Environmental Impact Statement

In the Executive Summary and Introduction, NRC speaks about 80 years of reactor operations – that is, two 20-year license extensions. For example, on Page 1-12, in Figure 1-1, "Continued Storage Timeframes" (line 17), NRC speaks of "Reactor Licensed Life" as "40 years of reactor operation on original license" and "Up to 40 years of additional renewed license (up to 2 license renewals)."

What is most significant about NRC's apparent plans – to someday grant rubberstamps for not just 20-years of extended operations, but an additional 20-years on top of that – is that this WC DGEIS

would grease the skids for just such license extension approvals. This, despite NRC's claims to the contrary.

For example, on Page xxvi in section ES.7 of the Executive Summary (lines 12-20, inset box), NRC states:

"The Waste Confidence rulemaking is *not* a licensing action. It does not permit a nuclear power plant or any other facility to operate or store spent fuel. Every nuclear power plant or specifically licensed spent fuel storage facility must undergo an environmental review as part of its site-specific licensing process." (emphasis in original)

This is very deceptive and misleading on NRC's part. Obviously, if this WC DGEIS is finalized into a WC FGEIS (Final Generic EIS), and a Record of Decision is issued, then that would serve as a pre-ordained license approval for all future licensing actions, at least insofar as the generation of irradiated nuclear fuel, its storage, and its ultimate disposition is concerned.

NRC admits as much, in Section 1.5, "Purpose of and Need for the Proposed Action," on Page 1-6, lines 2 to 10. NRC states:

"The purpose and need for the proposed action are threefold: (1) to improve the efficiency of the NRC's licensing process by generically addressing the environmental impacts of continued storage; (2) to prepare a single document that reflects the NRC's current understanding of these environmental impact statements; and (3) to respond to the issues identified in the remand by the Court in the *New York v. NRC* decision."

The NRC intends to codify the results of its analyses in this draft GEIS at 10 CFR 51.23. NRC licensing proceedings for nuclear reactors and ISFSIs will continue to rely on the generic determination in 10 CFR 51.23 to satisfy obligations under NEPA with respect to the environmental impacts of continued storage."

Thus, NRC would effectively block any future public or state government interventions, against old reactor license extensions, or new reactor combined license applications, raising challenges regarding the safety, security, cost, risk, etc. implications of the generation, storage or disposal of irradiated nuclear fuel. It is unacceptable for NRC to foreclose all such future challenges under NEPA, regarding the generation, storage, or disposal of irradiated nuclear fuel – one of the most hazardous materials humans have ever generated – based on such a shallow to non-existent NEPA analysis as is currently included in the WC DGEIS.

NRC has abused its "Waste Confidence" Decision, Rule, and Policy in just such a way for a long time. The very first time I ever heard the phrase "Nuclear Waste Confidence" was in March 2003 – right around the time the George W. Bush administration launched the invasion of Iraq -- at an Early Site Permit public meeting held at the public library in Clinton, IL, having to do with a proposed new Exelon reactor targeted at that town (since cancelled, thankfully!). An elder local farmer, sitting in the front row, raised his hand early on in the meeting. He asked how Exelon and NRC could even be considering building a new reactor in Clinton, IL, when the high-level radioactive waste from the first reactor already operating in Clinton had nowhere to go, and no solution in sight.

One after another, several NRC staff persons attempted an answer, all to no avail. Each punted to his or her NRC co-worker around the room. After a number of such punts, the last NRC staff person was about to punt the question to Exelon officials, several of whom were also in attendance. At this point, the NRC facilitator – Chip Cameron, who has also facilitated numerous of the WC DGEIS public comment meetings of recent months – intervened. “What about the **Nuclear Waste Confidence Rule**,” Chip Cameron – who has also long worked for NRC’s Office of General Counsel, in addition to its Office of Public Affairs -- prompted his colleagues, who then, having remembered their lines, cheerfully informed the concerned local resident that NRC has “Confidence” that a repository will be opened somewhere, somehow, someday, by someone, and in the meantime, the highly radioactive wastes are safe and sound right where they are in Clinton, IL. The farmer seemed a little less than convinced. I also did not share NRC’s “confidence.” It seemed very much a con game. (A con game is defined as: “any swindle in which the swindler, after gaining the confidence of the victim, robs the victim by cheating at a gambling game, appropriating funds entrusted for investment, or the like.”)

I was soon to be victimized by the NRC’s “nuke waste con game” myself. On August 8, 2005, Nuclear Information and Resource Service, for which I served as Nuclear Waste Specialist, as well as Don’t Waste Michigan, for which I served as a board of director member, representing my hometown of Kalamazoo, officially intervened against Consumers Energy’s application to NRC for a 20-year license extension at the Palisades atomic reactor in Covert, MI, on the Lake Michigan shoreline in southwest Michigan.

The following irradiated nuclear fuel-related contentions were filed by NIRS, Don’t Waste MI, and their organizational and concerned local resident allies (REQUEST FOR HEARING AND PETITION TO INTERVENE, pages 5 to 6):

“ENVIRONMENTAL CONTENTIONS

3.

The Palisades reactor has no place to store its overflowing irradiated nuclear fuel inventory within NRC regulations.

The indoor irradiated fuel storage pool reached capacity in 1993. But the outdoor dry cask storage pads at Palisades, both the older one nearer Lake Michigan and the newer one further inland, are in violation of NRC earthquake regulations. 10 CFR § 72.212(b)(2)(i)(B) requires that:

Cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion...

According to Petitioners’ anticipated expert, Dr. Ross Landsman, former U.S. Nuclear Regulatory Commission Region III dry cask storage inspector, the older pad violates the liquefaction portion of this regulation, and the new pad violates the amplification portion of the regulation. Petitioners contend that neither the older nor new dry cask storage pads at the Palisades plant were designed in consideration of the factors contained in the cited regulation.

4.

The unloadable, unmovable dry storage cask #4 at Palisades.

In 1993, Consumers Power (now Consumers Energy) assured a federal district judge that if it encountered problems with loaded dry casks at Palisades, it would simply reverse the loading procedure and return the high-level radioactive waste to the storage pools. But the fourth cask loaded at Palisades, in June 1994, was shortly thereafter admitted by Consumers Power to be defective, having faulty welds. However, eleven years on, Consumers has yet to unload the defective cask, because it cannot.

Petitioners state that Consumers perpetrated a fraud upon the court and the public, with the complicit support by the NRC, and has critically undermined its credibility as to any pledges about the safety of dry cask storage. The significance of this problem with cask #4 is considerable. For example, the configuration of the 18 to 19 dry casks currently stored on the older pad nearer Lake Michigan is such that the casks furthest back cannot be moved or unloaded until all other casks in front of them have been moved out of the way first. This configuration increases the risks, making it very difficult to address emergencies involving certain casks in the configuration in a timely manner.

[In a February 6, 1997, letter, Dr. Mary Sinclair, co-chair of Don't Waste Michigan, wrote to the five U.S. Nuclear Regulatory Commission Commissioners, highlighting possible perjury – as well as clearly established incompetence – by NRC staff when they assured a federal judge that dry storage casks at Palisades could be safely unloaded if the need arose. A copy of Dr. Sinclair's 8 page letter, preceded by an introductory note written by me, is posted online at:

<http://www.nirs.org/reactorwatch/licensing/sinclairtr020697.pdf>. I will also submit it as an exhibit, Exhibit A.

Dr. Sinclair worked closely with the State of Michigan's Attorney General, Frank Kelley, to argue the case against the loading of Palisades' dubious VSC-24 dry casks in federal court, to no avail. Consequently, a defective cask has remained, fully loaded with high-level radioactive waste, just 100 yards or so from the waters of Lake Michigan, for nearly 20 years now, despite the nuclear utility's assurances, backed by NRC, that problem casks could simply be unloaded back into the indoor storage pool by reversing the loading procedure. Lake Michigan is, of course, the drinking water supply for many tens of millions of people downstream.]

5.

There is no permanent repository for the nuclear waste which would be generated at Palisades after 2010.

Any waste generated at Palisades after 2010 would be excess to the capacity of the proposed national dump at Yucca Mountain, Nevada according to U.S. Department of Energy projections in its Yucca Mountain Final Environmental Impact Statement (Feb. 2002), as revealed in Tables A-7 and A-8 on pages A-15 and A-16 of Appendix A.

In fact, the waste generated at Palisades from 1971 to 2010 may also be excess to Yucca, in that the proposed dump may never open. The State of Nevada maintains that NRC's "Nuclear Waste Confidence Decision" is erroneous, in that it biases NRC to favor the Yucca Mountain dump license lest it be proven wrong in its assurance to the public that a high-level radioactive waste geologic

repository will open in the U.S. by 2025. Because so much uncertainty surrounds the Yucca Mountain dump proposal, as well as other high-level radioactive waste proposals, Petitioners-Intervenors contend that waste generated at Palisades during the 20 year license extension could very well be stored at Palisades ***indefinitely***, a scenario inadequately addressed by the applicant and NRC. [emphasis added; note that "Indefinite Storage" is exactly what NRC refers to in the WC DGEIS, on Page 1-12, as: "Assumes no repository becomes available; Indefinite storage and handling of spent fuel."]

6.

Intensifying sand erosion and avalanche risk around dry cask storage pads.

The more casks loaded on the storage pads at Palisades, the more risk of erosion to the sand supporting the pads, given the large weight of the casks themselves (well over 100 tons each), weather related erosion of the sand dunes, as well as the erosion that will occur due to more severe weather impacts from the global climate crisis and climate de-stabilization. Arresting erosion at both pads is important to safety and radiation containment over the long haul, given the proximity of the waters of Lake Michigan. The State of Michigan and the U.S. Army Corps of Engineers have designated the sand dunes upon which the older pad is located - so close to the waters of Lake Michigan - as a high-risk erosion zone.

The Lake Michigan dunes are subject to "blow outs" where entire dunes are blown out during wind storms and lighting strikes. See F. Nori, P. Sholtz, and M. Bretz (Department of Physics, The University of Michigan), "Sound-Producing Sand Avalanches," *Scientific American*, Vol. 277, No. 3 (September 1997).

At Warren Dunes, some 35 miles south of Palisades, sand blowouts have been estimated to travel as much as one-quarter mile per day, exposing 5,000-year-old trees that have long since turned to charcoal. "Some chilling facts about Dunes history," <http://www.nwitimes.com/articles/2005/07/25/news/region/0256d4c429632b30862570460062843b.txt>

The Palisades dunes could, in a wind storm or lightning strike, shift, blow and cover the dry cask storage area. As weather patterns intensify (as anticipated) this potential for erosion will increase.

Additionally, the dunes and shore line are geologically prone to sand avalanche. A sand avalanche coupled with a seismic event could compromise the integrity of one or more casks at Palisades."

(the entire REQUEST FOR HEARING AND PETITION TO INTERVENE is posted online at <http://www.nirs.org/reactorwatch/licensing/petition.pdf>)

The contention regarding Consumers Energy's Palisades dry cask storage (now owned and operated by Entergy Nuclear) violating NRC earthquake safety regulations was prompted by a warning from NRC dry cask storage inspector for the Midwest Region, Dr. Ross Landsman, dating back to February 17, 1994. Dr. Landsman wrote to NRC's Chairman, Ivan Selin, warning him about the risk at Palisades that an earthquake could result in high-level radioactive waste storage casks falling into Lake Michigan, or being buried in loose sand.

Dr. Landsman wrote: "Actually, [it's] the consequences that might occur from an earthquake that I'm concerned about. The casks can either fall into Lake Michigan or be buried in the loose sand because of liquefaction...It is apparent to me that NMSS [NRC's Nuclear Materials Safety and Safeguards department] doesn't realize the catastrophic consequences of their continued reliance on their current ideology."

The full text of Dr. Landsman's letter to Dr. Selin is posted online at:
<http://www.nirs.org/reactorwatch/licensing/021794rosslandsmanltrnrcchairmanselin.pdf>. I will also submit it as an exhibit, Exhibit B.

Underwater submersion could lead to inadvertent nuclear chain reactions in the fissile materials still present in the wastes; burial under sand could cause the wastes to dangerously overheat.

Although written as a warning about the risks of shipping high-level radioactive waste by barge on Lake Michigan, a backgrounder I wrote a decade ago provides specific, relevant information on how an inadvertent nuclear chain reaction, or accidental criticality, could be sparked by the underwater submersion of a Palisades dry cask (whether that were to occur by a barge shipment sinking, or Palisades' dry cask storage being plunged underwater by an earthquake):

"As part of its plan to transport high-level radioactive waste to Western Shoshone Indian land at Yucca Mountain, Nevada, the U.S. Department of Energy (DOE) proposes up to 453 barges carrying giant high-level radioactive waste containers onto the waters of Lake Michigan. See the second page of this fact sheet for a map of the proposed routes and a breakdown of shipment numbers by port.

Accidents happen. But what if high-level radioactive waste is involved? U.S. Nuclear Regulatory Commission (NRC) design criteria for atomic waste transport containers are woefully inadequate. Rather than full-scale physical safety testing, scale model tests and computer simulations are all that is required. The underwater immersion design criteria are meant to "test" (on paper, at least) the integrity of a slightly damaged container submerged under 3 feet of water for 8 hours. An undamaged cask is "tested" (on computers, at least) for a 1 hour submersion under 656 feet of water.

But if a cask were accidentally immersed under water, or sunk by terrorists, is it reasonable for NRC to assume that the cask would only be slightly damaged, or not damaged at all? Given that barge casks could weigh well over 100 tons (even up to 140 tons), how can NRC assume that they could be recovered from underwater within 1 hour, or even within 8 hours? Special cranes capable of lifting such heavy loads would have to be located, brought in, and set up. And what about the fact that Lake Michigan is deeper than 656 feet at locations not far from DOE's proposed barge shipment routes?

The dangers of nuclear waste cask submersion underwater are two fold. First, radioactivity could leak from the cask into the water. Each container would hold 200 times the long lasting radioactivity released by the Hiroshima atomic bomb. Given high-level atomic waste's deadliness, leakage of even a fraction of a cask's contents could spell unprecedented catastrophe in the source of drinking water for tens of millions of people – Lake Michigan. Second, enough fissile uranium-235 and plutonium is present in high-level atomic waste that water, with its neutron moderating properties, could actually cause a nuclear chain reaction to take place within the cask. Such an inadvertent criticality event in

Sept. 1999 at a nuclear fuel factory in Japan led to the deaths of two workers; many hundreds of nearby residents, including children, received radiation doses well above safety standards."

This fact sheet is posted online at <http://www.nirs.org/factsheets/mibargefactsheet92804.pdf>. I will also submit it as an exhibit, Exhibit C.

As woefully inadequate as NRC shipping container safety regulations are, NRC's storage-only container safety regulations are even worse. Thus, an earthquake plunging one or more storage-only casks underwater at Palisades is even more problematic a risk than a barge shipment sinking a transport cask, at least in terms of the safety standards applied to each type of container for survival of an underwater submersion, that is.

To drive the point home, I attended an NRC-industry technical meeting several years ago, regarding the risks of underwater submersion to the particular casks in use at Palisades (as well as at Point Beach nuclear power plant on the Wisconsin shoreline of Lake Michigan, as well as at Arkansas Nuclear One, ANO, nuclear power plant), namely, VSC-24s (for Ventilated Storage Casks holding 24 Pressurized Water Reactor irradiated nuclear fuel assemblies).

In fact, NRC's WC DGEIS, at Table G-4, "ISFSIs with General Licenses under Part 72," Pages G-9 to G-11, confirms that VSC-24s are in use at Palisades (as well as at Point Beach and ANO).

The industry representatives at the meeting represented cask vendor BNG Fuel Solutions (as confirmed in WC DGEIS Table G-4), which acquired ownership of the VSC-24 license from Sierra Nuclear. BNG Fuel Solutions is now a part of EnergySolutions of Salt Lake City, Utah.

NRC staff had 65 RAIs (Requests for Additional Information) for EnergySolutions regarding the risk of inadvertent criticality in VSC-24s due to underwater submersion. Thus, it became clear to me that the earthquake risk described by Dr. Landsman as early as 1994 is quite significant.

Dr. Landsman, now retired from NRC, served as NIRS and Don't Waste Michigan's expert witness in the Palisades license extension proceeding.

On September 15, 2005, Dr. Landsman submitted an expert witness Declaration, renewing his contentions that Palisades' dry cask storage pads violate NRC earthquake safety regulations. This expert witness Declaration is posted online at:

<http://www.nirs.org/reactorwatch/licensing/drrosslandsman0915005affidavit.pdf>. I will also submit it as an exhibit, Exhibit D.

Despite the merits of our contentions, the three-administrative judge NRC Atomic Safety and Licensing Board Panel made short shrift of all of our contentions, including those having to do with irradiated nuclear fuel (the ASLB ruling is posted online at:
<http://www.nirs.org/reactorwatch/licensing/contntnsruling030706.pdf>).

At Page 47 of its ruling, the ASLB cited NMC's (Nuclear Management Corporation, the operator of Palisades, arguing on behalf of the atomic reactor's then-owner, Consumers Energy) invocation of NRC's Nuclear Waste Confidence Decision, Rule, and Policy:

"Further, NMC avers, Contention 3 is barred by the Waste Confidence Rule, as stated at 10 C.F.R. § 51.23(a)."

The ASLB provided the following reference in footnote 183:

"Id. [NMC Answer] at 18. Section 51.23 states in relevant part that "[t]he Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations." 10 C.F.R. § 51.23(a)."

The ASLB went on to state "To the extent the Petitioners seek to raise a NEPA issue, Contention 3 challenges and runs afoul of both the Waste Confidence Rule...according to [Nuclear Management Corporation]," and then goes on, on Page 48, to state: "**NRC Staff Response to Contention 3**...The Staff asserts most of the same arguments offered by NMC," referencing, at footnote 186 "See Staff Answer at 15-16."

Thus, the NRC ASLB explicitly cited NRC's "Waste Confidence Rule, as stated at 10 C.F.R. [Part] 51.23(a)," in rejecting NIRS and Don't Waste Michigan's irradiated nuclear fuel-related contentions. The NRC ASLB went on to approve the 20-year license extension at Palisades, the 48th such reactor license extension granted up to that time. Currently, 73 such reactor license extensions have been granted by NRC.

Despite appealing to the five member NRC Commission, NIRS and Don't Waste Michigan did not prevail (our appeal is posted online at <http://www.nirs.org/reactorwatch/licensing/objections031706.pdf>).

The ASLB suggested, as an alternative to its now-rejected license extension intervention proceeding, that the environmental interveners instead file a 10 CFR Part 2.206 "emergency enforcement petition" with NRC. The environmental interveners did so, less than a month later, regarding the violation of NRC earthquake safety regulations by Palisades' dry cask storage pads.

The April 4, 2006 emergency enforcement petition is posted online at <http://www.nirs.org/reactorwatch/licensing/2.206.pdf>. I have submitted this as an exhibit, Exhibit E.

The environmental interveners simultaneously attached Dr. Landsman's expert witness Declaration of September 15, 2005, yet again (posted online at <http://www.nirs.org/reactorwatch/licensing/landsmandec.pdf>). [Submitted here as Exhibit D, above.]

In early 2007, NIRS and Don't Waste Michigan commented upon, and objected to, NRC's Director's Decision, which effectively rejected our emergency enforcement petition (posted online at <http://www.nirs.org/reactorwatch/licensing/020207finalcomments.pdf>). This appeal fell upon deaf ears. This is Exhibit F, submitted.

On June 28, 2007, the environmental coalition then appealed the NRC Commission decision to the D.C. Circuit Court of Appeals (see press release, posted online at <http://www.nirs.org/press/06-28-2007/1>). This is Exhibit G, submitted.

On August 2, 2007, NRC then moved to have the federal appeals case dismissed (see NRC filing, posted online, at <http://www.nirs.org/reactorwatch/licensing/finalmotiontodismiss080207.pdf>).

On August 17, 2007, NIRS and Don't Waste Michigan defended their appeal to the U.S. Circuit Court of Appeals for the District of Columbia, against NRC's motion to dismiss. The environmental coalition alleged that NRC had abdicated its duty to protect the public health and safety by failing to enforce its own earthquake safety regulations at the Palisades nuclear reactor's dry cask storage facility for high-level radioactive waste, located on sand dunes on the shoreline of Lake Michigan. This "Reply" is posted online at <http://www.nirs.org/reactorwatch/licensing/respdsmssreally.pdf>. This is Exhibit H, submitted.

The environmental coalition issued a press release about its appeals to the courts, and dire warning about the radioactive waste storage risks at Palisades: <http://www.nirs.org/press/08-23-2007/2>. This is Exhibit I, submitted.

Despite this, the courts ruled in NRC's favor. The courts grant huge deference to NRC's "technical expertise" in 10 CFR 2.206 matters, by the "strict by design" designs of the NRC itself. Unfortunately, they are largely, effectively, not appealable. Never mind that this leaves unresolved the clearly established earthquake safety violations at Palisades' dry cask storage pads.

NIRS and Don't Waste Michigan had endeavored, over the course of many long years, to get the risks of Palisades' dry cask storage pads and casks addressed by NRC, all to no avail. The environmental interveners had run head first into a brick wall labeled "Nuclear Waste Confidence."

Thus, it is deceptive and misleading for NRC to claim that "**The Waste Confidence rulemaking is not a licensing action.**" Not only was "Waste Confidence" invoked to silence the concerned local farmer's very legitimate, fundamental question at the Clinton, IL Early Site Permit public meeting in March 2003, it was also invoked by an NRC ASLB – backed by the NRC Commission itself – to reject irradiated nuclear fuel-related contentions in a legal proceeding regarding the 20-year license extension at Palisades atomic reactor. The "Waste Confidence Rule" was used to reject our official legal contentions, and instead rubberstamp a 20-year license extension at Palisades.

But NRC has not restricted itself to invoking "Waste Confidence" to defend new reactor licenses or old reactor license extensions at its own public meetings or in its own licensing proceedings. It has made such claims in the pages of the *New York Times*.

In a *New York Times* article by Matthew L. Wald, entitled "3 States Challenge Federal Policy on Storing Nuclear Waste," dated February 15, 2011 (posted online at <http://www.nytimes.com/2011/02/16/nyregion/16nuke.html>, submitted here as Exhibit J), it was reported:

"...David McIntyre, a spokesman for the Nuclear Regulatory Commission, said the lawsuit by the attorneys general had mischaracterized the nature of the December [2010 Nuclear Waste

Confidence] decision. He described it as a commission “opinion” on how long waste could be safely stored rather than a rule permitting any plant to store spent fuel.

But people who favor building new reactors said the adoption of the policy was important because it helped outline a legal basis for approving the construction of new reactors and long-range plans for handling their spent fuel...”.

Thus, the NRC’s “nuke waste con game,” and deceptive, misleading claims that NRC’s Nuclear Waste Confidence Decision, Rule, and Policy have nothing to do with new reactor licensing or old reactor license extensions, have been played in one of the major media outlets in the nation.

The U.S. Court of Appeals for the District of Columbia Circuit, however, in its *New York versus NRC* ruling of June 8, 2012, seems not to have agreed with Mr. McIntyre’s description of NRC’s “opinion.”

On Page 1-13, NRC states under “long-term storage,” that “one-time replacement of ISFSIs and spent fuel canisters and casks” will occur, as will “construction and operation of a DTS [dry transfer system] (including replacement).” It then goes on to state, under “indefinite storage,” that “replacement of ISFSIs and spent fuel cansiters and casks every 100 years...construction and operation of an away-from-reactor ISFSI (including replacement every 100 years)...construction and operation of a DTS (including replacement every 100 years)” will also take place.

NRC concludes Section 1.8.2, Timeframes Evaluated, by stating, under “indefinite storage,” that “These activities are the same as those that would occur for long-term storage, but without a repository, they would occur repeatedly.”

At a September 11, 2013 meeting with NRC Nuclear Waste Confidence Directorate Director, Keith McConnell, he confirmed that this assumption of safe and smooth, repeated replacements would continue forever into the future. In fact, beyond the one million year hazard the U.S. EPA has acknowledged, under court-order, for high-level radioactive waste, in the context of the Yucca Mountain dump licensing proceeding. In fact, even beyond the known hazardous persistence of the various radioactive isotopes constituting high-level radioactive waste, such as Iodine-129, with a half-life of 15.7 million years, and thus a hazardous persistence of 157 to 314 million years.

Replacing dry casks, canisters, pads, and dry transfer systems once every hundred years is not “too cheap to meter,” despite Lewis Strauss, Chair of the U.S. Atomic Energy Commission’s, infamous words to the contrary in 1954. He was speaking about nuclear power, but irradiated nuclear fuel is the inevitable byproduct of commercial nuclear power. In fact, electricity is but the fleeting byproduct. The actual product is forever deadly high-level radioactive waste.

(Nor can nuclear power even be considered a low carbon source of electricity, much less zero carbon, or “emissions-free,” electricity source, as nuclear power industry public relations campaigns like to claim. Replacing high-level radioactive waste dry cask storage systems, structures, and components, once every hundred years from now till the end of time, will require significant quantities of concrete, steel, energy, etc., and hence a large carbon footprint. Technically speaking, assuming forever replacement of dry cask storage would mean multiplying costs, as above, as well as

greenhouse gas emissions, by infinity – yielding infinite costs, and carbon emissions. These are NRC's absurd assumptions worked out, not mine!)

In fact, Dr. Mark Cooper of Vermont Law School, expert witness on behalf of a coalition of dozens of environmental groups, including Beyond Nuclear, has provided NRC expert comments on the costs of such repeated replacements of dry cask storage infrastructure over time. Dr. Cooper's analysis foresees staggering costs that future generations – which derived no benefit from the nuclear generated electricity that led to the production of the forever deadly radioactive waste – will be forced to pay, in order to isolate the irradiated nuclear fuel from the environment forevermore. Remarkably, NRC has neither estimated the costs of such activities, nor ventured a guess as to who would actually pay those costs, where that funding would come from.

As presented in Dr. Cooper's 12/19/13 press release (posted online at <http://www.beyondnuclear.org/storage/kk-links/121913%20WCR%20comments%20news%20release%20FINAL2.pdf>), the "staggering cost" of waste disposal and storage that NRC can no longer ignore tops \$210 to 350 billion, including \$100 billion per century for dry cask storage.

I have submitted this press release as Exhibit K.

Nor has NRC taken NEPA's requisite "hard look" at its mere assumption that such institutional controls will be maintained forevermore into the future. To the contrary, NRC has simply assumed it.

In Section 1.8.3, Analysis Assumptions, on Page 1-14 to 1-15, NRC states:

"Institutional controls, i.e., the continued regulation of spent nuclear fuel, will continue. This assumption avoids unreasonable speculation regarding what might happen in the future regarding Federal actions to provide for the safe storage of spent fuel. Although government agencies and regulatory approaches can be expected to change over long periods of time into the future, the history of radiation protection has generally been towards ensuring increased safety as knowledge of radiation and effectiveness of safety measures has improved. For the purpose of the analyses in this draft GEIS, the NRC assumes that regulatory control of radiation safety will remain at the same level of regulatory control as currently exists today."

This is a most convenient, and overly optimistic assumption, by NRC. History provides countless counter-examples regarding what NRC is now phrasing "institutional control."

Take the most relevant example, that of United States history. In the relatively short history of the United States (1776 to 2014, some 238 years, less than the hazardous persistence of reactor generated Cesium-137 or Strontium-90), a number of wars have ravaged the eastern part of the country: the American Revolutionary War; the War of 1812; the Civil War.

In fact, during the War of 1812, British troops sacked Washington, D.C., burning down the White House, the Capitol, and other federal institutions. The only reason that the famous White House portrait of George Washington, as well as original copies of the Declaration of Independence and U.S. Constitution, survived the flames was the hastily arranged evacuation organized by First Lady Dolley Madison. Paul Jennings, a young White House slave himself, wrote in his memoirs that it was his fellow White House slaves who carried Washington's portrait and the Founding Documents to safety in the woods.

Just one fateful battle of the Civil War underscores the precariousness of the U.S. federal government – or at least, the survival of its capital. Near Frederick, Maryland on July 9, 1864, less than 2,500 green troops (the figure comes from a historic sign near the site present day, at an auto rest area) under the command of U.S. General Lew Wallace faced a battle-hardened Confederate force several times its size under the command of C.S.A. General Jubal Early. No Union reinforcements were in place to prevent Early's army from simply rolling into Washington, D.C. Wallace spread his men along a five mile stretch of Monocacy Creek. The Union forces suffered a shocking nearly 1,300 losses, over a 50% casualty rate. But their sacrifice may have saved the Union – or at least its capital city. General Wallace honored his men's sacrifice by stating "These men died to save the National Capital, and they did save it." Thanks to the delay bought at such a high price, the Union was able to rush reinforcements into place to defend Washington, D.C. before the bulk of Early's army arrived at its perimeter forts.

These may be dramatic examples of the fragility of "institutional control." Perhaps less dramatic, but very relevant, and ironically so, was the U.S. federal government shutdown of October 2013. It threw this very NRC WC DGEIS public comment meeting schedule into chaos. A number of meetings had to be postponed to a later date, greatly complicating public participation. As was pointed out by David Kraft of NEIS at the Oak Park, IL on November 12, 2013, once that meeting was rescheduled from its original October 24th date: "NRC expects the public to accept that spent-fuel can be safely stored at reactor sites indefinitely under its supervision. One month ago, NRC could not even guarantee that it could put a workforce in the field due to the government shutdown."

The postponement of public meeting dates pushed the Minnetonka, MN date back to Dec. 4th – sure enough, just in time for severe winter weather, which dampened public turnout.

Countless examples of loss of institutional control can be cited throughout human history. What are the oldest human institutions? The Roman Catholic Church? It is only around two thousand years old. Buddhism? Around 2,500 years. Judaism? Less than 4,000 years old. Recorded history? A mere 8,600 years old, at most. Only 15 years ago, archeologists found Jiahu symbols in Henan, China, a form of proto-writing dating back to 6,600 BC. But even those remnants of proto-writing had been lost from "institutional control" for many millennia, and only now are we left to puzzle the pieces back together, to try to understand what they have to tell us about our early ancestors. Some Indigenous Peoples' cultures claim to date back even further in time. But even these pale before the long hazards contained in high-level radioactive waste. The artificial element Plutonium-239, for example, with a half-life of 24,400 years, and thus a hazardous persistence of 240,000 to 480,000 years. That is roughly the amount of time *homo sapiens sapiens* has existed as a species! Pu-239, along with other isotopes of plutonium, accounts for roughly 1% of the content of irradiated nuclear fuel (Pu-239 is about 0.5% of the content of irradiated nuclear fuel, other isotopes of Pu the other 0.5%, according to Dr. Arjun Makhijani of IEER's expert commentary submitted in this proceeding).

This fact alone will become highly significant over time. Pu-239 is weapons usable. In fact, that is why atomic reactors were built in the first place, to generate Pu-239 from Uranium-238, during the Manhattan Project in World War Two. Separating Pu-239 from high-level radioactive waste is not too difficult to do, through straightforward chemical separation. One of the biggest challenges is protecting workers against the deadly doses of gamma radiation being emitted by the fission products mixed in with the Pu-239 in high-level radioactive waste. (This assumes that certain non-state actors, such as Al Qaeda, won't attempt to steal plutonium; Al Qaeda specializes in suicide

missions, so would not be deterred by the gamma radiation poisoning deaths to be faced by its "martyrs" in the carrying out of their mission.) But as the centuries pass, that "self-protective" gamma ray field will dissipate with the radioactive decay of the fission products. Eventually, although the Pu-239 and other radioisotopes still present will represent a very serious biological hazard in terms of alpha particle hazards, the material will be approachable without special radiation shielding precautions, other than respiratory and body covering to prevent alpha-particle-bearing contaminants from being ingested, inhaled or absorbed through open wounds. NRC has not analyzed the security risks of such nuclear weapons usable substances as Pu-239 becoming ever more available, over time, in on-site or away-from-reactor dry cask storage – another showstopper shortcoming of this DGEIS, NRC's woefully inadequate treatment of nuclear weapons (as well as dirty bomb) proliferation risks.

NRC also makes an overly optimistic assumption that technological progress will advance as time goes on, or at the very least, our society will stay at the same level of civilizational advancement as it currently is at. NRC ignores the Dark Ages, at its, and all of our, peril. For several centuries in Europe, for example, previous cultural and technological advances were simply lost, forgotten about. The Dark Ages witnessed a reversion, a digression, to a previous, significantly lower technological stage in Europe, apart from the preservation of pockets of knowledge and culture in places like rural Irish monasteries (where the "dead" languages of Greek and Latin were kept alive, by St. Caoighgim's monks at Glendalough, for example). This one example – and there are countless more from various cultures and societies worldwide – shows that cultural and technological knowledge and capability cannot be assumed to remain at the same level, much less to advance over time. NRC's assumptions to the contrary are not defensible.

If the EPA's acknowledgement, that commercial irradiated nuclear fuel will remain hazardous for a million years, is the figure we use, that represents 10,000 replacements of dry cask storage under NRC's "indefinite storage" (which also could be dubbed "infinite storage") timeframe:

$$1,000,000 \text{ years} \times 1 \text{ replacement}/100 \text{ years} = 10,000 \text{ replacements.}$$

Dr. Mark Cooper has provided expert estimates as to what those staggering costs would be just for the first few replacements – around \$100 billion per century! But multiplying such price tags by 10,000 replacements boggles the mind in terms of costs future generations will face. Of course, it'll be worse than that, due to inflation (even in the first century!), not to mention worsening problems of fuel degradation, which could be quite significant and boost the price tag astronomically! Not to mention the "worker doses" (and downwind resident doses) for the poor soul unlucky enough to face the replacement work.

But if institutional control is lost, which is almost guaranteed over a long enough period of time, the radioactivity releases will be catastrophic—on the surface of the Earth!

The U.S. Department of Energy has admitted to as much, in its 2002 FEIS on the now cancelled Yucca Mountain dump proposal. Although DOE didn't delve into the catastrophic details, it observed that simply abandoning high-level radioactive wastes on-site at reactors would eventually result in the release of their radioactive contents into the environment over time, as the containers failed, with catastrophic consequences. DOE stated its preferred alternative was the Yucca dump, and examined the on-site releases of radioactivity no further. Dr. Makhihjani covers this issue in his expert commentary in this proceeding.

(DOE downplayed to the point of ignoring the catastrophic releases of radioactivity that would result if high-level radioactive wastes were actually buried at the Yucca site, the geologic unsuitability of which eventually caught up to itself, resulting in the proposal's cancellation.)

It is telling that NRC and DOE had a dispute about institutional controls over a decade ago, which seems not to have been resolved. NRC states on Page 1-15 (lines 6 to 15) that:

"The DOE analyzed a no-action alternative in their Final EIS for Yucca Mountain (DOE 2008) that considered the loss of institutional controls. In particular, the DOE considered a specific scenario in which spent fuel and high-level radioactive waste would remain in dry storage at commercial and DOE sites and would be under institutional controls for approximately 100 years, and beyond that time, it was assumed there would be no institutional controls. The NRC provided comments to the DOE related to their assumption about the loss of institutional controls (NRC 2000). The NRC stated that it did not consider the loss of institutional controls a reasonable assumption because the Federal government would continue to control licensed nuclear material under its authority for as long as necessary to protect public health and safety."

What does DOE know that NRC does not?! Perhaps DOE's own loss of institutional control over its own inventories of highly radioactive wastes, not after 100 years, but after just years and decades, has provided it with insights that NRC has chosen to blind itself to? Dr. Makhijani points out in his expert commentary in this proceeding that during the recent October 2013 government shutdown, active pumping of groundwater, at DOE's contaminated Fernald site in Ohio, was nearly interrupted due to lack of needed funding! And this after just a few years of active pumping thus far!

NRC's Section 1.8.3, **Analysis Assumptions**, goes on for several long pages (Pages 1-13 to 1-17).

On June 4, 2013, at a community forum in southern California concerning the dangerously botched San Onofre nuclear power plant steam generator replacements, alongside fellow panelists Naoto Kan (former Prime Minister of Japan, who served during the first several months of the Fukushima Daiichi nuclear catastrophe), Greg Jaczko (former NRC Chairman, who served for the first 15 months of the Fukushima Daiichi nuclear catastrophe), and Peter Bradford (former NRC Commissioner, who served during the Three Mile Island meltdown), Arnie Gundersen, Chief Engineer at Fairewinds Associates, Inc., and expert witness on behalf of Friends of the Earth, asked during his presentation "How BAD COULD IT BE?" He answered that question by saying "**The Secret Is In the Assumptions,**" and cited a Dilbert cartoon.

Gundersen said, "This is my favorite comic strip in the whole world. It's a Dilbert. **The secret is in the assumptions.** It's not in these gigantic super computers that the industry uses."

Sitting in his cubicle, intensely studying a document, Dilbert says to his Pointy-Haired Boss, "I CAN DO THIS FEASIBILITY ANALYSIS IN TWO MINUTES."

Dilbert adds, "IT'S THE WORST IDEA IN THE WORLD. NUMBERS DON'T LIE."

But the Pointy-Haired Boss points out "OUR CEO LOVES THE IDEA."

To which Dilbert responds, "LUCKILY, **ASSUMPTIONS DO LIE.**"

[taken from a video recording posted at the Fairewinds website, <http://fairewinds.org/media/in-the-news/live-naoto-kan-gregory-jaczko-peter-bradford-and-arnie-gundersen-speaking-in-san-diego>, starting at the 5:50 of 17:51 minute mark]

I have submitted this comic strip as Exhibit L.

Rather than analyze the risks of irradiated nuclear fuel generation, storage (on-site, in pools and dry casks; and away-from-reactor), and ultimate disposition, NRC has instead simply **assumed away all the risks**. Rather than analyze risks, NRC has simply **assumed safety**, at every turn. It has thus defied the court order in *New York v. NRC*. To all of our peril.

Whereas NRC assumes institutional control forever, on Pages 1-14 to 1-15, NRC and the commercial nuclear power industry NRC supposedly regulates has managed to lose institutional control in real time. Examples abound. Irradiated nuclear fuel has been “lost,” as at Vermont Yankee, Humboldt Bay (CA), and Millstone (CT) nuclear power plants, as but a few examples. As reported by GAO in its April 2005 report, *NUCLEAR REGULATORY COMMISSION: NRC Needs to Do More to Ensure that Power Plants Are Effectively Controlling Spent Nuclear Fuel*:

“Nuclear power plants’ performance in controlling and accounting for their spent fuel has been uneven. Most recently, three plants—Vermont Yankee and Humboldt Bay (California) in 2004 and Millstone (Connecticut) in 2000—have reported missing spent fuel. Earlier, several other plants also had missing or unaccounted for spent fuel rods or rod fragments.” [GAO-05-339, posted online at: <http://www.nirs.org/radwaste/atreactorstorage/gao04112005nrclostnwaste.pdf>]. I will submit the first two pages of this report as an exhibit, Exhibit M.

In the case of Vermont Yankee, NRC and industry eventually just assumed that the lost irradiated fuel was mistakenly shipped away, and buried in a ditch at Barnwell, South Carolina, mistaken for “low-level” radioactive waste, to dose workers, shippers, and residents downstream of the leaking dumpsite. At Humboldt Bay, NRC and industry eventually just assumed that the missing irradiated nuclear fuel was simply crushed beneath waste transfer casks weighing a hundred tons, and pulverized into particles which dissolved into the high-level radioactive waste storage pool cooling water, to clog filters and dose workers.

Far from the experience with the ancient pyramids in Egypt, where, despite the Pharaoh’s dire warnings that thieves would be cursed by the gods, the crypts were ransacked for their valuables within a century, NRC and industry managed to lose track of the “forever curse” of irradiated nuclear fuel within just years or decades, despite knowing that it is forever hazardous and needs to be carefully kept track of and kept out of the environment.

Far from losing track of the meaning of the ancient cave paintings in France and Spain, some tens of thousands of years old – and thus several times older than even the Jiahu symbols mentioned above – NRC and industry managed to lose track of irradiated nuclear fuel within years or decades.

The 2009 film “Into Eternity” by Danish filmmaker Michael Madsen makes many of these points. About the proposed geologic repository for just a few Finnish reactors’ irradiated nuclear fuel at Onkalo, immediately adjacent to the Olkiluoto nuclear power plant, the filmmaker interviews only Scandinavian proponents of geologic disposal, such as Finnish and Swedish industry and

government officials. No anti-nuclear activists are interviewed. But even the proponents of geologic disposal cannot agree amongst themselves on a number of very basic questions, such as, should the repository be marked, to warn future generations? For, what if future generations want to mine the plutonium in order to make nuclear weapons? If the repository is to be marked as a warning against inadvertent human intrusion, how should it be marked? Current languages will evolve, and/or go extinct, long before the radioactive waste loses its hazard. But even once the gamma hazard dissipates, the nuclear weapons proliferation risk will remain for a much longer period of time – as will the alpha-particle hazard associated with such radiotoxic elements as Pu-239. Madsen puts forth in the film that such unprecedented risks, as presented by high-level radioactive waste, take us into the realm of the mythological. Never before has a human civilization created a hazard that will haunt all future human generations. And for what? To boil water, to generate electricity.

Couldn't the electricity have been generated in some other way? Couldn't it be now?

During the decades-long struggle against the dangerous Yucca Mountain dump proposal, more than one comic episode has occurred. Judy Treichel of the Nevada Nuclear Waste Task Force, a long time watchdog on Yucca, recounts one of the best. At a DOE public meeting, DOE flashed an artist's rendition on the screen, of potential electricity supplies for running ventilation-cooling systems at the wickedly hot Yucca radioactive waste dump, reliably for centuries into the future. An atomic reactor? No. A coal burner? Natural gas? No. Rather, a mountain-side of solar panels, and a valley of wind turbines. It would be the world's first renewably-powered atomic waste dump! (Never mind that the solar panels were oriented in the wrong direction, but that could be fixed in the transition from artist's rendition to engineering plan.) Judy Treichel raised her hand and was called upon. "Couldn't the electricity generated by atomic reactors that produced the high-level radioactive waste have been made by renewables in the first place?" she asked. DOE didn't show that image of solar panels and wind turbines electrifying the Yucca's dump's ventilation-cooling systems any more after that, but the "institutional memory" of Yucca watchdogs keeps the story alive, many years later!

Even NRC's citation on Page 1-15 creates confusion. NRC cites DOE's "Final EIS for Yucca Mountain (DOE 2008)." But DOE's FEIS for Yucca is dated February 2002. Perhaps NRC is referring to a Supplement to the Yucca FEIS, of which there were a number? Yucca's Final EIS wasn't final, after all, as the resistance to the dangerous plan mounted over time, and as the site's hydrological, geological, seismological, volcanological, etc., risks could no longer be suppressed. NRC Chairwoman Dr. Allison Macfarlane's and U.S. Nuclear Waste Technical Review Board Chairman Dr. Rod Ewing's book, *Uncertainty Underground*, is one of the best treatments of the subject between two covers (<http://www.state.nv.us/nucwaste/news2006/pdf/nv060707macfarlane.pdf>).

In addition to the replacements described on Page 1-13, the "routine maintenance," for a million years or longer, would add to the on-site and/or away-from-reactor costs even more. Again, NRC has not described how much maintenance and replacement forevermore will cost, nor identified where those funds will come from.

Given that the U.S. Circuit Court for the District of Columbia last month ruled that DOE should ask Congress to end the collection of the Nuclear Waste Fund fee from nuclear electricity consumers, there will be even less money to work with in the future than there has been in decades past, concerning high-level radioactive waste management.

Re: Page 1-14's discussion of Dry Transfer Systems (DTS), has this ever been done anywhere? At such a scale? How much will that cost at each site? NRC describes a prototype DTS that was actually abandoned before completion at Idaho National Lab. How can NRC assume all will go swimmingly with DTSs, till the end of time, when the prototype DTS, at INL, did not even go well?

Given the power of fanciful assumptions, why did NRC not assume replacement pools at reactor sites? Because pools would cost more than DTSs? But NRC hasn't identified how much DTSs would cost, nor where the money would come from.

What are the risks with DTSs? Although NRC has described a stuck fuel assembly during a DTS operation, that could remain stuck for two weeks, it assumes the incident would be resolved (without explaining how), with no significant impacts. NRC has largely, again, assumed safety, rather than analyzing risks. In this way, the DGEIS is meaningless, and violates NEPA, as well as the Atomic Energy Act.

On Page 1-12, in Figure 1-1, NRC assumes up to 80 years of operations at commercial reactors. That is, two 20-year license extensions, in addition to 40 years of initial operations. But how much high-level radioactive waste would that amount to, if all currently operating U.S. reactors were to continue to generate irradiated nuclear fuel for 80 years?

Doesn't this conflict with DOE's assumption of 50 years of operations at commercial reactors, as assumed in its 2002 FEIS on Yucca? The DOE's Yucca FEIS, as at Table A-8 on Page A-16, assumes 105,414 Metric Tons of Heavy Metal in terms of quantities of irradiated nuclear fuel to be generated by the commercial nuclear power industry in the U.S. by 2046. Are NRC's assumptions in this DGEIS compatible with DOE's projections, or not? Wouldn't 80 years of commercial reactor operations result in significantly more irradiated nuclear fuel being generated than DOE assumed in its 2002 Yucca FEIS? Given that DOE has estimated Yucca's price tag, had it been constructed, opened, and operated, would have approached \$100 billion (for just the first 63,000 MTHM of commercial irradiated nuclear fuel, per the limit set in the Nuclear Waste Policy Act of 1983, as Amended), how much does NRC calculate future commercial irradiated nuclear fuel disposal will cost, all told? Where will that money come from? Who will pay it? These questions are not answered in NRC's DGEIS. How then, can NRC grant *carte blanche* to the nuclear utilities to generate as much irradiated nuclear fuel as they want, as it proposes to do by finalizing this DGEIS and issuing a Record of Decision?!

On Page 1-16, at lines 13-14, NRC states: "The spent fuel is moved from the spent fuel pool to dry cask storage within the short-term storage timeframe." By NRC definitions, this means that high-level radioactive waste could remain in the storage pool throughout the decommissioning period, for up to 60-years post reactor shutdown. The Atomic Age has given new, Orwellian meanings to words, such as "short-term storage timeframe" referring to up to 140 years of pool storage (including during up to 80 years of reactor operations, and up to an additional 60 years post-reactor shutdown), well over half as long in terms of years into the future, as our country has been independent from the British Empire in terms of years into the past (1776 to 2013, 238 years).

On Page 1-17, lines 16-20, NRC makes the flippant assumption that: "Sufficient low-level waste (LLW) disposal capacity will be made available when needed. Historically, the demand for LLW disposal capacity has been met by private industry. NRC expects that this trend will continue in the future. For example, in response to demand for LLW disposal capacity, Waste Control Specialists, LLC, opened a LLW disposal facility in Andrews County, Texas on April 27, 2012."

NRC neglected to mention that several career Texas state environmental protection agency officials resigned their jobs, and careers, in protest over the decision to open WCS, nor that WCS now threatens the Ogallala Aquifer – essential to numerous Great Plains States for drinking and irrigation water – with radiological contamination.

All the more ironic is the fact that NRC is essentially parroting itself here, claiming “Waste Confidence” vis a vis so-called “low-level” radioactive waste. For, in 2010, although it dared no longer give a “date certain” for the opening of a high-level radioactive waste repository, NRC nonetheless expressed its “confidence” that one would open “when needed.”

But, as reported by the *New York Times*, the D.C. Circuit Court of Appeals didn’t buy NRC’s “Waste Confidence” regarding such rosy prospects for the opening of a repository: ‘The commission apparently has no long-term plan other than hoping for a geologic repository,’ the appeals court wrote.’ (“Court Forces a Rethinking of Nuclear Fuel Storage,” by Matthew L. Wald, *New York Times*, June 8, 2012, posted online at <http://www.nytimes.com/2012/06/09/science/earth/court-says-nuclear-agency-must-rethink-fuel-storage.html?r=2>>). The article is submitted as Exhibit N.

At Page 1-17, lines 22 to 24, NRC states: “These analyses are not intended to be, and should not be interpreted as, representative of any specific storage facility or site in the United States where spent fuel is currently stored or could be stored in the future.”

This passage rings oddly legalistic in sound. That’s a very strange thing to say. So this entire DGEIS is essentially a fictitious, meaningless document? With no connection to reality?

Re: footnote 3 at the bottom of Page 1-17, it should be pointed out that 80 years of operations should just be assumed, as a given, if NRC’s granting of rubberstamps for 60 years of operations is any indication. Of 73 license extensions for 20 additional years of operations sought, all 73 have been approved by the Nuclear Rubberstamp Agency. Not one has been denied, no matter how age-degraded or problem-plagued the reactor, no matter how rogue the nuclear utility applying for the extension, nor how nonexistent the safety culture amongst the reactor’s management and workforce. The most painful such example, perhaps, was Vermont Yankee – NRC staff rubberstamped its 20-year license extension, despite deep, widespread opposition throughout Vermont and neighboring states, within days of the Fukushima triple-meltdown, at reactors of identical design and vintage to Vermont Yankee – GE Mark Is BWRs. If any applicant approaches NRC for approval for 80 years of operations, a rubberstamp is all but assured. NRC is itself a rogue, captured agency, captured by the industry it is supposed to regulate. This is very frightening, and dangerous. The Japanese Parliament concluded that the root cause of the Fukushima nuclear catastrophe was collusion between industry, regulator, and elected officials. We have that in spades here!

Re: Page 2-6, footnote 4 ,and its associated text, NRC needs to update the EIS by clarifying that Crystal River and Keweenaw have not just announced plans to permanently shutdown, but have in fact done so. In addition, so have San Onofre 2 & 3. Vermont Yankee has also announced that it will shutdown by the end of 2014. The good news from all this, of course, is that those five reactors will no longer generate irradiated nuclear fuel – the only real solution to the problem is to not generate it in the first place.

At Page 2-7 (lines 24-27) to 2-8 (lines 1-2), NRC states “For purposes of analysis in this draft GEIS, the NRC relies for impact analysis on the larger reactor lifetime amount of spent fuel discharged at low burnups (i.e. 1,600 MTU), unless otherwise stated in the description of environmental impacts. This is because many of the environmental impacts (e.g., land use, geology and soils, and terrestrial resources) will depend upon the greater amount of space needed to store the larger amounts of spent fuel that would be generated at low burnups.” The aspect that NRC seems to not comprehend is that high burnup

irradiated fuel very likely will require, as compared to low burnup fuel, more space and time in the storage pool for sufficient thermal cooling and radioactive decay; and/or more space and time in dry cask storage – perhaps with enhanced features, such as added cooling features, and/or radiation shielding; and/or more space in a repository setting. This, due to the added heat and radioactivity emanating from high burnup fuel.

Also on Page 2-8 (lines 14-16), NRC states “Because the MOX fuel is substantially similar to existing uranium oxide light water reactor fuel and was, in fact, used in existing light water reactors in the United States, it is within the scope of this draft GEIS.” (Similar text is stated at lines 24-27.)

While MOX irradiated nuclear fuel certainly should be within the scope of this GEIS, given that its use is still on the table in the U.S., despite opposition to such use by countless groups, including Beyond Nuclear, it must be pointed out, and the record set straight, that MOX irradiated fuel is not like “typical” irradiated nuclear fuel. MOX irradiated nuclear fuel would be thermally hotter, as well as significantly more radioactive, in terms of its added plutonium content. MOX irradiated fuel could require more space and time in storage pools for cooling and radioactive decay, as well as enhanced safeguards against inadvertent criticality; could require upgrades to typical dry cask storage; and could require more space within a repository setting.

On Page 2-11, NRC speaks confidently about high-level radioactive waste storage pools’ robust design and structure, including “leak-detection systems.” This begs the question, how then did so many pools, as are listed in Table E-4 on Page E-20, leak into the environment, sometimes for years, or even decades on end, without the nuclear utility nor even the NRC knowing about it? In short, NRC’s confident claims about pools’ robustness and leak-proof nature don’t hold water.

At lines 12-14 on Page 2-16, NRC states: “Following the terrorist attacks on September 11, 2001, the NRC issued Orders to ISFSI licensees to require certain compensatory measures. For example, on May 23, 2002, the NRC issued an Order to GEH Morris wet storage ISFSI (NRC 2002b).”

But in August or September 2002, while traveling through Morris, IL, I saw with my own eyes that the GE Morris ISFSI was “wide open” to a potential attack. Although anti-car bomb concrete “Jersey” barriers had indeed been installed, they had been parted open, wide enough to allow a vehicle to drive through. And although a law enforcement squad car was parked there, its door was wide open, revealing that the car was in fact unoccupied. I witnessed this obvious security breach while just happening to pass by, which does not instill confidence in the security status of the GE Morris ISFSI.

On Page 2-18, NRC claims “The [PFS LLC] site would be located in the northwest corner of the reservation approximately 6 km (3.5 mi) from the Skull Valley Band’s village.” Having spent considerable time in the Skull Valley Band’s village, as part of the resistance against the environmentally racist radioactive waste dump proposal, I find it hard to believe that the distance between the residences and targeted dumpsite was actually that great. I think the distance was shorter. Fortunately, this is now an academic point, as the dump proposal has been cancelled. NRC should really not be citing PFS, LLC in any positive way whatsoever, given the environmental injustice it represented, and its very welcome cancellation – that is, failure – despite NRC’s rubberstamp of the construction and operating license.

I have submitted, as Exhibit O, the group letter, signed by 437 environmental and environmental justice groups, urging NRC to not license PFS, LLC, as a matter of environmental justice. NRC did anyway – a grave violation of environmental justice. The letter is posted online at:
<http://www.nirs.org/radwaste/scullvalley/skullvalleygoshutesgroup1tr772005.pdf>

NRC continues to violate EJ, by citing PFS, LLC (even though it was cancelled a year ago) as a model, as proof positive that parking lot dumps can be licensed.

On Page 2-25 (lines 13-16), NRC states: "Beyond the decommissioning period, the NRC assumes that all of the spent fuel has been transferred to a dry cask storage system in an at-reactor or away-from-reactor ISFSI, **as no other option currently exists.**" (emphasis added) This is a refreshingly frank admission, for a change, coming from NRC! But we would add, these on-site, or away-from-reactor (centralized "parking lot dumps") ISFSIs could very well themselves become *de facto* permanent surface storage facilities – or dumps. The on-site ISFSI at Surry, VA has been there since 1986, with no end in sight. The so-called "away-from-reactor" ISFSI (wet pool storage) at GE Morris in IL (so-called, as the Dresden nuclear power plant's three reactors are just a half-mile away!) has been there since the late 1960s, with no end in sight. The list of examples is a very long one.

At Page 2-26, NRC admits, re: "Activities at At-Reactor ISFSIs," that there is but "limited physical and continuous electronic surveillance." Thus, ISFSI security leaves a lot to be desired! This is certainly the case at the Big Rock Point ISFSI in northwestern MI, the Palisades ISFSIs in southwestern MI, and many other sites! But security is not the only risk being neglected. So is safety. Even such basic safeguards as radiation monitors, temperature monitors, and pressure monitors are not required on ISFSIs, remarkably. At a site like Big Rock Point, MI, this is all the more alarming. NRC has permitted once every two week walk by inspections. This means a problem could be underway for two weeks, and Entergy Nuclear could well not even know about it!

NRC's statement, at line 21-22, that "A licensee will also maintain an emergency response plan for ISFSI-related events," is a significant admission that ISFSI emergencies are indeed possible. Whether or not the emergency response plan is adequate is a significant question. And Dominion Nuclear has requested an exemption from NRC, as of June 2013, that it not be required to have any Emergency Planning Zone requirements in place – even though its pool is still full. So any claims by NRC that emergency preparedness will remain in place for dry casks is suspect – as it appears poised to relieve Kewaunee of any such requirement re: its pool!

At lines 23-24, NRC states "In accordance with 10 CFR 72.42, the initial license term for an ISFSI must not exceed 40 years and licenses may be renewed upon NRC approval for a period not to exceed 40 years." This reflects a decrease in NRC safety oversight, over time. In the early 1990s, casks were certified for 20 years of operations, with the option for 20 year renewals. But last decade, by a split vote (Chairman Diaz dissented), the NRC Commission allowed for 40 year extensions at one fell swoop. That first one went to Surry, which happens to have the oldest ISFSI in the U.S. *Prima facie*, it is fair to say that NRC doubling ISFSI license extensions from 20 to 40 years (both for initial licensing, and for license extension) marks a significant decrease in regulatory oversight.

On Page 2-26 (lines 32-35) to 2-27 (lines 1-2), NRC states: "The kinds of aging effects managed under an aging management program include, but are not limited to: concrete cracking and spalling; loss of confinement; loss of material; and reduction in heat transfer (e.g., by blocked air duct screens). The application of aging management programs may include structure monitoring; monitoring of protective coating on carbon steel structures; ventilation surveillance; welded canister seal and leakage monitoring programs; and bolted canister seal and leakage monitoring programs (DOE 2012b).

It was just such meaningful oversight on aging degradation issues at Palisades ISFSIs that environmental interveners were seeking during the license extension proceeding, particularly in regards to the defective cask already identified there. But the interveners were rebuffed by NRC's ASLBP.

On Page 2-27, line 5, it is unclear why NRC writes “private fuel storage facility environmental impact statement,” all in lower case. Private Fuel Storage, LLC was a proper name. The phrase “Environmental Impact Statement” is also usually capitalized when used in this way.

On Page 2-27, NRC writes “The proposed PFS facility was designed to store up to 40,000 MTU (44,000 tons of spent fuel) and was licensed to operate for 20 years. The NRC now allows an initial license term of 40 years with 40-year renewal terms, representing a decrease in safety regulatory oversight.

As mentioned above, 437 environmental and environmental justice groups protested NRC’s licensing of PFS (see their letter, posted online at <http://www.nirs.org/radwaste/scullvalley/skullvalleygoshutesgroupltr772005.pdf>). But NRC’s oversight has been weakened even more since then, now allowing 40 year initial licensing for ISFSIs, followed by 40 year license extensions.

At Page 2-27, lines 10-12, NRC states “it should be recognized that the environmental impacts of constructing and operating an away-from-reactor ISFSI would be evaluated in more details (sic) in an environmental review associated with a site-specific license application.” But NRC really doesn’t know what it’s talking about, as it has never really done one. It’s all assumptions. If PFS, LLC is the best they’ve got to point to, it doesn’t instill much confidence. Its licensing was highly controversial, for good reason; and in the end, it got cancelled!

At line 18, NRC states “Groundwater wells could be installed for potable water use or aboveground storage tanks could be erected for potable water and water for fires and the batch plant.” Re: fires at an ISFSI, would fire fighting water help or hurt, in terms of a zirconium fire, once initiated, as in a dry cask, a risk that Dr. Gordon Thompson, expert witness on behalf of dozens of environmental groups, has identified in this proceeding.

At line 23, NRC states: “If a repository becomes available, operations could include the transfer of spent fuel canisters to shipping casks and transportation to the repository.” While the federal courts have ordered NRC to address the potential for no repository ever opening, NRC’s admission here of “if, but not when” a repository ever open underscores the risk that on-site or away-from-reactor ISFSIs could well become *de facto* permanent, surface storage “parking lot dumps.”

Re: Page 2-28, Section 2.2.2.1, Construction and Operation of a DTS [Dry Transfer System], the question is begged, why has NRC assumed DTSs, instead of newly constructed wet pools for transfer of irradiated nuclear fuel? For example, a GAO study published in 2009, comparing the costs of the Yucca dump, to centralized interim storage, to long-term on-site storage, did consider the potential for installing new pools (after the old ones had been dismantled during decommissioning) for the transfer of irradiated nuclear fuel from old dry casks to new ones as containers degraded with age. However, building new pools at each site would be staggeringly expensive, measured in the tens or hundreds of millions of dollars *per pool*.

Steve Frishman, a consultant to the State of Nevada Agency for Nuclear Projects, has shared the story of a Yucca dump public meeting at which DOE officials presented ideas for the use of a large-scale pool for irradiated nuclear fuel storage, and transfer into disposal containers, at the Yucca site. After Mr. Frishman presented a number of concerns about pool storage during the discussion period, the DOE moderator called for a break in the meeting. When the meeting resumed, the DOE officials

announced that the proposed pool, previously under discussion, was no longer under consideration. Dry transfer would not be the approach followed at Yucca. Cancelled, just like that, during a 15 minute coffee break!

I tell this story only to point out that a comprehensive DGEIS, which NRC should have carried out here, should have included a transparent examination of various options going forward. Pools? DTSs? Some combination thereof? No such comparisons have been carried out. No explanation has been given as to why DTSs were assumed, as opposed to pools. Given the large risks associated with irradiated nuclear fuel, NRC should have carried out a particularly "hard look" under NEPA at the pros and cons of various options, but has not done so.

At Page 2-28, lines 20 and following, NRC states "...the receiving cask lid and outer and inner canister lids are removed. Finally, the receiving cask is moved into the lower access area and mated to the transfer confinement area..." and so on.

NRC makes transfer of irradiated nuclear fuel sound so smooth and simple. Reality will be different, especially considering fuel degradation with age. Irradiated nuclear fuel could simply fall apart. What can be done then? Build a sarcophagus over the DTS? What about criticality risks, if fuel debris falls to the bottom of DTS, and a later flood were to inundate the inside of the structure? What about the radiological leakage risks from such a scenario, in addition to the criticality risks? NRC has simply "assumed safety" rather than analyze such potential, and even likely (over time, given age related degradation of irradiated nuclear fuel), risks.

Besides age related degradation, there is irradiated fuel that has already failed, or begun to fail, in the present day, as due to design defects, fabrication mistakes, operational damage, etc. These risks may not be off into the future – they have already begun to unfold in the present.

Page 2-29, line 3: the NRC's mention of "effluent radiation monitoring" is a clear admission that there will be radiological releases from the DTSs over time. The overall radiological impact on people and environment, over time, should be included in the NEPA decision making on whether, or not, the use of nuclear power to generate electricity is a wise societal decision.

While typos and grammatical errors are very minor in significance, compared to the radiological risks to people and environment of irradiated nuclear fuel, which should be the focus of this DGEIS comment and discussion, such errors are an indication of the rush NRC has displayed in racing through this EIS proceeding. NRC staff had previously indicated it would take 7 years to carry out such an EIS. Instead, a mere two years has been allotted. But one unpleasant aspect of NRC's rush job has been its enforcement of mere three minute public comment opportunities at meetings across the country. It is certainly difficult to say much in three minutes about a topic as societally significant, not just for current, but for all future generations, as irradiated nuclear fuel generation, storage, and disposition. This NRC rush job may explain the large number of typos, grammar errors, and other mistakes in the DGEIS text, such as this one:

Line 10, "...construction of [] new ISFSI pads adjacent to, or nearby, the initial pads"

At Page 3-1, lines 2 and following, NRC states: "the affected environment is the environment that exists at and around the facilities that store spent nuclear fuel (spent fuel) after the end of a reactor's licensed life for operation."

But of course, if the irradiated nuclear fuel spills into Lake Michigan, for example at the Big Rock Point and/or Palisades nuclear power plant sites on Michigan's Lake Michigan shoreline, then it will flow downstream; if it leaks into the air, it will blow downwind. Over vast distances. It would re-concentrate up the food chain, atop which humans sit. And the effects would persist for many generations into the future. So, NRC's definition of the potential "affected environment" needs to be expanded, significantly.

Re: lines 5 and following, "Where appropriate, this chapter will discuss the environmental impacts during reactor operations to establish the baseline affected environment at the beginning of continued storage."

But reactor operations is not an appropriate baseline. The pristine environment that existed before the reactor was built is the appropriate baseline, at least from a radiological perspective. To exploit the fact that the adjacent reactor has already radioactively contaminated the environment, to justify further radioactive contamination from forevermore radioactive waste storage, is not appropriate.

At Page 3-2, lines 1 to 13, NRC states that nuclear power plants are often located in areas surrounded by "wooded or agricultural areas;" "undeveloped land (forest, wetlands, herbaceous cover, and shrub/scrub land), agricultural land, or open water;" "open water, forest, wetlands, and agricultural;" "agricultural land, open water, and forests."

Left unstated is the reason for locating nuclear power plants in such undeveloped, or at least sparsely populated lands, or near open water: to create a buffer zone; so nearby, densely concentrated populations are not being exposed to "routine" radioactivity releases, and are further away if catastrophe strikes. But what about the radioactive contamination of food? Of drinking water? Of fisheries? That results from the location of U.S. nuclear power plants?

Re: Page 3-3, lines 13 and following, "Some plant owners lease land for agricultural (farming) and forestry production, permit cemetery and historical site access, and designate portions of their sites for recreation, management of natural areas, and wildlife conservation." – what about the contamination of food that results? Should persons be allowed to come close to the nuclear power plants? Doesn't this increase their risk of radiogenic harm? Doesn't this increase security risks? Don't the nuclear plants irradiate wildlife?

Re: lines 19 and following, "Spent fuel pools are housed in shield buildings at nuclear power plants with boiling water reactors or in fuel buildings at plants with pressurized water reactors..." --The shield buildings, so called, did not survive the earthquake, tsunami, meltdowns and explosions in March 2011 at Fukushima Daiichi nuclear power plant in Japan. Now, those high-level radioactive waste storage pools, at Fukushima Daiichi Units 1, 2, 3, and 4, are exposed to the open air. The U.S. has 23 identically designed GE BWR Mark I reactors still operating. The U.S. has an additional 8 similarly designed GE BWR Mark II reactors still operating. Attached to these comments is a fact sheet I wrote in the aftermath of the Fukushima Daiichi nuclear catastrophe re: Mark I and II HLRW storage pool risks in the U.S. The NRC should address those risks in this DGEIS, but has not done so.

Re: NRC's mention of "reinforced concrete pads" at line 35--At Palisades in MI, the pads are "reinforced" with 55 feet of loose sand underneath. That is, although they are three feet thick themselves, the pads are not anchored to anything. They are "floating" on top of 55 feet of loose

sand. They are located right next to Lake Michigan, source of drinking water, and so much more, for tens of millions of people. This is a violation of NRC earthquake safety regulations, and a major risk to Lake Michigan. At Dresden in IL, the pads are "reinforced" with dirt, next to the river, thanks to an NRC regulatory exemption due to a bad pad pour. During a tour of nuclear industry and government regulatory officials conducted of Dresden's ISFSI in September 2001, as part of the PATRAM [Packaging and Transportation of Radioactive Materials] conference I attended, an Exelon spokesman overseeing the ISFSI pad admitted that NRC had granted an exemption do to the bad cask pour.

Re: Table 3-1 on Page 3-4—Discussions of the land area requirements for dry cask storage can be significantly misleading, if context is not provided. An acre here, a half-acre there, 4/100ths of an acre there, sound like very small impacts in the grand scheme of things. Nuclear power proponents in the U.S., be they industry or government spokesmen, are wont to speak of the football stadium metaphor – all the irradiated fuel ever generated in the history of the U.S. nuclear power industry would only fill a football field to a certain height above the ground. The Canadian nuclear establishment equivalent utilizes a culturally-appropriate alternative – a hockey rink filled up so high with irradiated nuclear fuel. Of course, there's no discussion of what would happen if that much irradiated nuclear fuel were actually piled that deep in one place. It would likely catch fire, due to quickly overheating, and lead to the biggest radioactive inferno the world has ever seen. And you certainly wouldn't want to have fans in those stands – without radiation shielding, even those in the bleacher seats would be at grave risk of fatal doses; especially if the waste caught on fire. Of course, it's not the volume of the waste, or the land area of the containers needed to keep it cool and isolate it from the environment, that constitute the most significant impacts. It's the forever deadly nature of the material, and the risks should it ever escape into the environment, that much be addressed.

NRC's dismissive remarks about rural economies, at Page 3-4, line 17 and following, leaves a bad taste. After all, it was the local concerned farmer at Clinton, IL, who not only educated me about NRC's Nuclear Waste Con Game, but prompted NRC's meeting facilitator, Chip Cameron, to have to remind his colleagues about the policy's existence. Of course, the impacts of nuclear power – including, relevantly here, its forever deadly high-level radioactive wastes – are of LARGE significance to agricultural areas of this country that have the dubious "honor" of "hosting" them – from Clinton, IL to Kewaunee, WI and many other sites.

At line 23, NRC's describing the Indian Point, NY and Limerick, PA areas as "semi-urban" is puzzling? There are 21 million people within 50 miles of Indian Point! That is the most urbanized geographical area surrounding any nuclear power plant in the U.S.! And Limerick has some of the highest casualty figures on the CRAC-2 charts! Again, the 50 mile radius surrounding Limerick's two reactors, and on-site irradiated nuclear fuel storage facilities, is amongst the most urbanized areas in the entire country! By the way, CRAC-2 refers to Calculation of Reactor Accident Consequences. The report is also known as the 1982 Sandia Siting Study or as NUREG/CR-2239. I specify this, because at the Davis-Besse license extension oral argument pre-hearings held in Port Clinton, OH on March 1, 2011 (yes, ten days before the Fukushima Daiichi nuclear catastrophe was to begin), FirstEnergy Nuclear's attorneys, as well as NRC's attorneys and staff, as well as the ASLB panelists themselves, claimed not to know what CRAC-2 referred to.

Re: the bottom of Page 3-4, top of Page 3-5—NRC's socioeconomic analysis gives undue attention to the so-called "benefits" derived from "hosting" a long-term ISFSI. What about the negative economic consequences of being stuck with irradiated nuclear fuel for the long-term, perhaps forever? The radioactive stigma effect alone could prove very significant, in a negative way. As but two examples. Big

Rock Point's decommissioning ended in 2006. NRC has blessed the release of that site for unrestricted reuse, despite the radioactive contamination of the environment that still lingers (something that environmental watchdogs have protested, as in this report I wrote in 2006: <http://www.nirs.org/reactorwatch/decommissioning/bigrockbackgrounder272007.pdf>). But, because of the presence of 7 dry casks holding irradiated nuclear fuel, and an additional dry cask holding Greater-Than-Class-C so-called "low-level" radioactive waste, no development of that site can be expected anytime soon.

Likewise, at an end of cycle annual meeting near the Kewaunee nuclear power plant in northern WI in June 2013, a number of concerned local residents – many of them farmers – expressed their dissatisfaction that irradiated nuclear fuel would remain on-site for the long-term future. They could not envision any alternative use of the land, while the irradiated nuclear fuel is stored there, not only due to safety and security concerns, but also because of the stigma involved. Certainly, those local residents who attended this NRC public meeting did not regard long-term ISFSI storage at Kewaunee as an economic boon for their area – quite to the contrary.

Re: Page 3-5, line 1 and following—Again, NRC's flip examination of supposed economic benefits is all the more ironic, given its shallow analysis of the risks of irradiated nuclear fuel generation, storage, and disposition in this DGEIS.

Those risks are potentially catastrophic, whether they unfold from pools or dry casks, whether due to accident, attack, or leakage. But so few people have been assigned to worry about such risks, it seems. And, as evidenced by this DGEIS itself, even those assigned to analyze the risks – under court order – have not done so. They have downplayed the risks, to the point of ignoring and even denying them, while here examining supposed benefits. This is very telling, not only about the nuclear utilities' attitude toward irradiated nuclear fuel risks, but even that of the NRC staff.

As the old saying goes, "follow the money." Why are such potentially catastrophic societal risks taken by industry, and allowed by NRC? Well, vast fortunes are being made. The nuclear power industry, with lots of help from friends in government, have largely succeeded in externalizing their costs, risks, and liabilities onto the public, whether the rate-paying public, or the taxpaying public (actually, most people I know are both ratepayers and taxpayers!). Meanwhile, the industry pockets the profits made from large-scale electricity generation, not to mention the large-scale subsidies enjoyed, again, at the expense of the public. Why does industry and NRC work so hard to convince themselves and others that nothing could possibly go wrong with irradiated nuclear fuel? Why don't they do the health studies re: what "routine" radioactivity releases alone are doing to health in the area of atomic reactors and irradiated nuclear fuel storage sites, let alone the health and safety risks from potential disasters? To do so would risk the lucrative business they profit from, of course. So risks are downplayed in the public arena, while their armies of lawyers make sure, behind the scenes, that the companies will not be held liable if the worst happens. The public will be left holding the bag, yet again. Upton Sinclair's famous quote is apt: "It is difficult to get a man to understand something, when his salary depends on his not understanding it."

At Page 3-5, line 30 and following, NRC states "At GEH Morris, an away-from-reactor spent fuel pool storage facility; fewer than 20 full-time employees monitor and maintain the spent fuel at the site (NRC 2004)."

Fewer than 20 people, manage 772 tons of irradiated nuclear fuel at GE Morris? What about the security and safety risks of 772 tons of irradiated fuel, stored in an age-degraded facility upwind of Chicago? What if a 9/11-scale attack were launched at GE Morris, involving 19 attackers as took part in the 9/11 attacks? How many of those 20 GE Morris are actually on shift at any given time? How many of those 20 are security guards? As I described above, driving past GE Morris in September

2002, I found GE Morris's truck bomb barrier wide open, and its security squad car not only open, but unmanned. The sight did not instill confidence.

I just hope that the new ownership, General Electric-Hitachi, decides to keep the heat turned on at its Morris ISFSI facility (well, the heat in the building, and the cooling water circulation in the pool storing the 772 tons of irradiated nuclear fuel, that is!). For just a half-mile away, at Dresden nuclear power plant, Commonwealth Edison decided to turn the heat off at Unit 1 after its permanent shutdown. Eventually this led to the freezing of pipes on service water systems in the winter time, leading to a large flood in the basement. Had vulnerable pipes and other systems, structures, and components frozen on the storage pool for high-level radioactive waste at Dresden 1, a pool drain down and high-level radioactive waste fire could have taken place, causing a radioactive catastrophe for Chicago downwind.

It's interesting that even with 20 employees, GE Morris seemed unaware of a radioactive hot spot on the pool walkway that I discovered with a handheld RadAlert monitor in September 2001, on the same tour where I learned that NRC had granted Commonwealth Edison/Exelon an exemption due to the bad pad pour at the Dresden ISFSI. I was the only person on the GE Morris tour who had a real-time radiation monitor, although we all wore film badges. My RadAlert alarmed, revealing a reading of some 4,500 counts per minute, as I stood about midway down the walkway alongside the GE Morris pool. Others on the tour were surprised and even alarmed at the radiation levels my RadAlert was revealing. One of those 20 GE Morris employees, the one leading the tour, then rushed us along.

My point is, I hope those 20 workers at GE Morris, and their counterparts at Dresden right next door, are very good at what they do. Between the two immediately adjacent nuclear facilities, there are some 3,000 metric tons of irradiated nuclear fuel, one of the biggest such concentrations in the entire country. This is a mother lode of radioactive risk, upwind of millions in the metro Chicago area.

Re: Page 3-6, line 29 and following, it is disconcerting to learn that a mere 35 workers watch over more than 50 casks at the Maine Yankee site. It is even more disconcerting to learn that only 10 workers watch over 240 casks holding high-level radioactive waste at the Fort St. Vrain site in CO. Only a small number of whom, presumably, are security guards. How many on those teams are PR officials? What role do they play in securing and safeguarding the high-level radioactive wastes?

At Page 3-15, in Section 3.5, Geology and Soils, NRC speaks confidently about earthquake preparedness and seismic safety. But what about Palisades' dry cask storage near Lake Michigan? What about its violation of NRC earthquake safety regulations, described above?

I'd like to here finish a comment I was making that was interrupted by NRC's strict three minute rule at the Perrysburg, OH public comment meeting. I had pointed out that the War of 1812 had also raged in the Toledo area 200 years ago, begging the question, what does the next 200 years have in store for the high-level radioactive wastes stored on the surface at nearby Davis-Besse atomic reactor? And I was going to close with a comment about seismic risks in the area. Tecumseh, the great Shawnee War Chief who led a broad Native American confederation, and fought in alliance with the British against the Americans in the War of 1812, is reported to have predicted the New Madrid earthquakes of 1811 to 1813. Based on historical records of the time, such as news accounts in the eastern U.S., personal journal entries, etc., as well as physical evidence, the monster quakes have been calculated to have been around 8.0 in magnitude on the Richter scale, which would make

them the largest quakes in North American recorded history. Epi-centered in New Madrid, MO, the powerful quakes reversed the flow of the Mississippi River; rang church bells as far away as Maine; and created giant waves on the Great Lakes; among many other impacts. Has the NRC analyzed the seismic risks of 8.0 magnitude, or larger, earthquakes on pool and dry cask storage in the New Madrid zone region? 200 years after those quakes struck, some seismologists are concerned they are overdue to strike again. Of particular concern are the ISFSIs at Palisades, in violation of NRC earthquake safety regulations, and immediately adjacent to Lake Michigan, part of the Great Lakes drinking water supply for 40 million people in 8 U.S. states, 2 Canadian provinces, and a large number of Native American First Nations.

Re: NRC's statement on Page 3-16, beginning at line 11, that "Commercial mining or quarrying operations are not allowed within nuclear power plant boundaries (NRC 2013a)"—this is odd, because it seems that natural gas fracking is being allowed, by NRC, and other decision making bodies, within a mere ¼ mile from the Beaver Valley nuclear power plant in Shippingport, PA. What are the seismic risks of this? On New Year's Eve, 2011, a nearly 4.0 quake struck Youngstown, OH. Fracking activities were suspected immediately, for Youngstown had never experienced such a quake before in recorded history. The Governor of Ohio acknowledged immediately that fracking activities were likely to blame. This has recently been confirmed to be the case:

<http://www.nbcnews.com/science/fracking-practices-blame-ohio-earthquakes-8C11073601>.

Re: NRC's statement, on Page 3-18, lines 33 and following, that "Where shallow aquifers are immediately underlain by thick, impermeable shale or massive, unjointed carbonate strata, there is likely little or no hydraulic connection with deeper, regional groundwater flow systems."—this, of course, is entirely changed, in ways that are difficult to track, by the fracking free for all underway in many parts of the U.S. U.S. hydrogeology is being changed, in a major way, that is little understood, in many regions. NRC has not addressed the interplay between fracking and the new risks to irradiated nuclear fuel storage this represents.

Re: NRC's Section 3.8.3, Wildlife, what about wildlife being attracted to the warmth given off by ISFSIs? What about the risk to the stored irradiated fuel by wildlife nesting in or near ISFSIs, to take advantage of the warmth? Could the convection current flow paths be blocked, as by nesting debris? In North Korea, at the Yongbyon nuclear power plant, frogs and other wildlife were reported to be inhabiting the indoor irradiated fuel pool. Is there a risk of U.S. irradiated fuel storage pools being neglected to such a point during the post-reactor operations timeframe? What risks to wildlife survival, and even genetic damage, could result from such exposures to the radioactive waste facilities, over time?

At Page 3-27, re: Section 3.9.2.5, beginning at line 18, NRC states: "Other important aquatic species include cephalopods (e.g., squid and octopus), marine mammals (e.g., seals and whales), sea turtles, and reptiles. These species may be present near at-reactor storage facilities; however, because of the significantly reduced water demands for spent fuel pool cooling during continued storage, these larger organisms are more likely to avoid being impinged or entrained by the cooling system, and are therefore not discussed in Chapter 4 of this draft GEIS." But besides risks of impingement or entrainment, what about the ongoing risks from exposure to the radioactive wastes that these species will be subjected to over time, given the coastal locations of nuclear power plants and their radioactive waste storage facilities?

At line 27, NRC wrote "underground" where it meant to write "underwater."

On Page 3-31, lines 10-11, NRC states “the NRC reviewed historic and cultural resource reviews that were performed for 40 license renewals.” The Don’t Waste MI/NIRS intervention against the 20-year license extension, from 2005 to 2007, featured a Historic and Cultural Resources proposed contention, as well as extensive public comment on the EIS component of the proceeding. Although the ASLB panel refused to grant a hearing on the merits of the contention, NRC staff was pressured to bring in additional expertise to address our allegations of significant cultural resources on-site put at risk for the license extension. NRC claimed to have reached a strict agreement with the nuclear utility to assure protection of the Native American cultural resources already identified, and those that have not yet been located on the Palisades site. The environmental intervention and comment made a significant difference for the better in that proceeding.

At Page 3-31, line 20, where NRC states “It is unlikely that historic and cultural resources are present within heavily disturbed areas,” they failed to clarify that this is because the damage is already done. Any resources formerly located there have long since been destroyed.

Page 3-32, re: noise that is “otherwise annoying” or irritating—will live gunfire exercises, for security personnel training, continue forevermore into the future at irradiated nuclear fuel storage sites, as they do currently at nuclear power plant sites?

Re: Page 3-36, Section 3.14.4, Nonradioactive, Nonhazardous Waste, at Big Rock Point in MI, radioactive waste was simply treated as if it weren’t, and was dumped in the Waters Twp., MI household trash landfill. Such “clearance level” or “below regulatory concern” exemptions permitted by NRC are unacceptable.

Re: line 31, “Waste minimization techniques employed by the licensees may include source reduction and recycling of materials either onsite or offsite”—This is quite Orwellian – “recycling” hazardous wastes? Into WHAT?! What are the risks to people and the environment of doing that? What is the motivation? To save industry money on disposal costs for toxic waste?

Re: Page 3-37, Section 3.15 Transportation, where NRC admits: “For transportation of radioactive material from a nuclear power plant site, the affected environment includes all rural, suburban, and urban populations living along the transportation routes within range of exposure to radiation emitted from the packaged material during normal transportation activities or that could be exposed in the unlikely event of a severe accident involving release of radioactive material. The affected environment also includes those members of the public that could be exposed to radiation emitted from the packaged material during normal transportation activities including people in vehicles on the same transportation route, people living along transportation routes, and people at truck stops and workers that are involved with the transportation activities”—Given this admission, NRC should have expanded its public comment opportunities, given this important issue of transportation risks more focus and attention, and held public comment meetings along likely transport corridor locations on the roads, rails, and waterways to centralized interim storage, away-from-reactor, parking lot dumpsites. No such focus, attention, or meetings took place in this entire public comment proceeding.

Re: Page 3-38, Section 3.16.1, Radiological Exposure, NRC states: “The Atomic Energy Act of 1954 requires the NRC to promulgate, inspect, and enforce standards that provide an adequate level of protection for public health and safety and the environment”—The highly legalistic phrase, “adequate level of protection for public health and safety and the environment,” seems highly significant. Could NRC please say the phrase in plain English, and explain what it means more clearly

to non-lawyers, and a lay public audience? An NRC staffer from ORR, Office of Regulatory Research, Jennifer Uhle, in recent months, at an NRC HQ public meeting held in the Commissioners Conference Room on a parallel matter, Expedited Transfer of Spent Nuclear Fuel from Pools to Dry Casks, shed light on this question. She explained that adequate protection meant that NRC was allowed to increase societal latent cancer fatality rates by a level of one tenth of one percent of latent cancer fatality rates already present in society. Is this true? Could NRC elaborate in this proceeding on this? Re: radiation poisoning deaths in a nuclear accident, Ms. Uhle explained that “adequate protection” still allows NRC to increase societal norms of accidental death by a level of $1/10^{\text{th}}$ of 1 percent, as well. Are auto accident deaths included in the figure for already existing societal norms? What other kinds of accidental deaths are included in that societal norm figure? Could NRC kindly provide the figures for how many additional latent cancer fatalities it is allowed to permit from nuclear power industry approvals? And how many additional radiation poisoning deaths is NRC allowed to add onto our society’s figure for accidental deaths from other causes, in its risk balancing decision making re: safeguards to take against reactor catastrophes, or, in this context, radioactive waste catastrophes?

Re: Page 4-1, at line 10, where NRC states “In the short-term storage timeframe, the NRC evaluates the impacts of continued storage of spent fuel for 60 years beyond the licensed life for operations of a reference reactor.”—60 years as “short-term”? But this is 60 years of pool storage beyond the cessation of reactor operations, which themselves could have gone on not 40 years (initial operating license), not 60 years (including one 20-year license extension), but 80 years (including a second 20-year license extension). That’s up to $80 + 60 = 140$ years of pool storage, referred to by NRC as “short-term.” The Atomic Age has certainly given Orwellian new meanings to words like “short-term,” if 140 years of high-level radioactive waste storage pool risks are included in that definition!

Longer-term, if 200 to 300 years of on-site storage are under consideration, it must be pointed out that this would be longer-term than our country has even had its independence from Great Britain thus far (1776 to 2014 is 238 years).

But of course, NRC has – absurdly -- blessed forever on-site storage as “adequately” safe!

Re: Page 4-2, lines 18-22, “the NRC assumes that the ISFSIs are completely replaced every 100 years. This replacement activity would require separate site-specific authorization from the NRC before the start of any replacement activities. NRC authorization to relicense or replace an ISFSI and NRC authorization to construct, operate, and replace a DTS are separate licensing actions that would require an NRC review. They are considered Federal actions under NEPA and would be undertakings under the National Historic Preservation Act (NHPA).”—NRC’s assumption, that it’ll be around, and these laws still in force, centuries or millennia into the future, is absurd, with so historical, or rationale, basis whatsoever. No government has ever last that long. Few human institutions of any description have even lasted millennia, let alone forever, as NRC is assuming it will do, and the nuclear industry will do.

Re: Page 4-3, beginning at line 1, where NRC states “The TMI-2 ISFSI is a modified NUHOMS spent fuel storage system (designated NUHOMS-12T) with 30 horizontal storage modules (DOE2012). It was licensed by the NRC in March 1999 and contains spent fuel from the damaged TMI-2 reactor (a single reactor core). Although the NUHOMS-12T storage module contents are core debris (not fuel assemblies) and the debris storage canisters could not be treated like fuel cladding, the design of the NUHOMS-12T accounts for these technical differences. Each NUHOMS-12T module provides for the horizontal dry storage of up to 12 TMI-2 stainless-steel canisters

inside a dry shielded canister, which is placed inside a concrete horizontal storage module. The NUHOMS-12T modification includes venting of the dry shielded canister through high-efficiency particulate air grade filters during storage.

The vent system allows for release of hydrogen gas, generated due to radiolysis, and monitoring and/or purging of the system during operation (DOE 2012)." (highlight added)—It is disconcerting to learn that TMI-2 is still generating hydrogen, nearly 35 years since the meltdown! Is the venting required in order to prevent gas pressure damage, or even an explosion, in the container? Is the hydrogen gas tritiated? What radiological impact is tritium releases from TMI-2's damaged fuel storage having on Idaho residents downwind of the INL storage location? Are other radionuclides being released along with the vented hydrogen gas? Noble gases? What biologically interactive decay products do the escaping radioactive Noble gases convert into?

On Page 4-4, lines 27-28, NRC states "ISFSIs are designed as passive systems that require no power or regular maintenance other than routine visual inspections and checks of the cask ventilation system (e.g., for blockages of ducts)."—But what about when institutional control is lost, and those manual inspections and checks are abandoned, along with the ISFSIs themselves? For a decade, NRC has allowed Big Rock Point personnel to limit "walk by" inspections to once every two weeks. So, an incident could be under at Big Rock Point even now – such as a vent blocked by trash, debris, sand, etc., and Entergy Nuclear would not even know about it for up to two weeks – risking overheating of the irradiated nuclear fuel, its degradation, etc.

Re: Pages 4-4 to 4-6 in the Section on Land Use--this entire Land Use section doesn't discuss radioactivity, only physical use of land. But of course, the radioactive risks are the real issue. They impair, limit, even preclude the use of the land for other purposes.

Re: Section 4.1.3 Indefinite Storage (page 4-6) – It's hard to understand how NRC can find SMALL impacts, when even current safety, security, health, and environmental risks due to irradiated nuclear fuel storage preclude the use of the land "hosting" the ISFSIs for any other use, as at Big Rock Point in MI.

Re: footnote #1 on Page 4-7, where NRC states "Typically shutdown units that are co-located with operating units either have a small dedicated staff or have workers from the operating units assigned and dedicated to the shutdown unit (e.g., spent fuel pool maintenance and monitoring activities)."—It was fortuitous, as conveyed in David Lochbaum's expert witness commentary, that the worker at Dresden 1 in the mid-1990s happened to discover, by sheer luck while walking through the long shuttered Unit 1 building, a flood of leaking service water system water in the basement, due to a frozen pipe. Commonwealth Edison had decided to simply not heat the building, to save money. Had the irradiated nuclear fuel storage pool likewise sprung an unnoticed leak, a catastrophe could have unfolded!

Re: Page 4-9, Section 4.3, Environmental Justice, NRC states "Environmental justice refers to a Federal policy that ensures that minority, low-income, and tribal communities that have historically been excluded from environmental decision-making are given equal opportunities to participate in decision-making processes"—NRC has an odd notion what Environmental Justice means. In 2006, NRC rubberstamped, albeit by a split decision at the ASLB and NRC Commission levels, the PFS, LLC parking lot dump targeted at the Skull Valley Goshutes Indian Reservation in Utah. NRC had approved a nuclear power industry scheme to park 40,000 metric tons of irradiated nuclear fuel on the reservation homeland of a tiny, low income

Native American tribe. This, despite the call by 437 environmental and environmental justice groups to "not go there." See:

<http://www.nirs.org/radwaste/scullvalley/skullvalleygoshutesgroupltr772005.pdf>. NRC approving PFS, LLC anyway led me to dub the agency the "Nuclear Racism Commission," for its environmental injustice.

Given PFS, LLC's inherent violation of EJ, as well as its welcome cancellation a year ago, NRC should not rely upon it as a positive example to point to, as proof that away-from-reactor storage can be licensed!

NRC states on Page 4-10, that "environmental justice, as applied at the NRC, "means that the agency will make an effort under NEPA to become aware of the demographic and economic circumstances of local communities where nuclear facilities are to be sited, and take care to mitigate or avoid special impacts attributable to the special character of the community" (NRC 2002a, 2004b). How ironic then, that NRC approved the PFS, LLC license.

At lines 13-14, NRC states "socioeconomic conditions affected by the continued storage of spent fuel as they relate to minority and low-income populations living near nuclear power plant sites would remain unchanged"—This is a strange logic applied by NRC. So, low income, and/or people of color communities, which already have "hosted" a nuclear power plant for 40 or 80 years, just have to deal with the radioactive waste forever, in addition, so there is no further disproportionate impact on them? This is a "nuclear sacrifice zone" attitude by NRC. It makes a "nuclear sacrifice zone" of a low income or people of color community, doomed forever to suffer radiological impacts, as by radioactive waste storage.

At Page 4-10, lines 24 and following, NRC describes monitoring "releases from the spent fuel pools and at-reactor ISFSI." But any such talk, in an EJ context like this, is unacceptable. The Prairie Island Indian Community, as but one example, had suffered enough before NSP tricked their way onto the island, promoting the benefits to be gleaned from a "steam generating plant" – careful to keep the word "nuclear" out of the conversation for as long as possible. The two reactors were built against the will, and without the informed consent, of the tribe. And it's been all downhill since. There should be absolutely no discussion of radiological releases from irradiated nuclear fuel storage facilities at a place like Prairie Island. Enough is enough. NRC makes a mockery of "environmental justice" by attempting to explain how "acceptable" or "permissible" releases from radioactive waste storage at a place like Prairie Island will be "monitored" in order to assure "environmental justice" goals!

Re: Page 4-11, lines 19 to 21, again, NRC is attempting to apply a "nuclear sacrifice zone" or "nuclear sacrifice community" logic here. The community is already negatively impacted by a nuclear power plant, so the relatively similar, albeit additional, impacts from radioactive waste storage are, therefore, no big deal. But another way of looking at it is, this community of color, low income community, etc. has already suffered enough from the nuclear reactors, and shouldn't be burdened again with the radioactive waste.

At Page 4-14, lines 28 to 29, how can NRC so confidently claim "there would be no increase in emissions during continued storage"? What if an explosion or fire occurs? That would "increase emissions"!

At Page 4-15, line 12, why is it that "testing requirements may be reduced or eliminated for emergency diesel generators once the reactor is permanently shutdown."?--How smart is it to do away with EDGs when the pool is still full of waste? What if something very serious goes wrong with the primary electric grid, and it would be impossible to restore before significant boiling occurs in the pool? How will the water circulation pumps on the pool be restored before a boil down fire is sparked?

NRC states at lines 18-19 that "dry cask storage systems do not have active systems (e.g., diesel generators), these activities do not involve significant releases of air pollutants."—But of course, as Dr. Gordon Thompson has warned, a malevolent act could result in a dry cask's contents going up in flames, in a Zr fire. Or, the cask could simply release radioactive gases and volatile particles over time due to nothing more dramatic than simple leakage, due to age degradation and decay under the elements. That is an impact on air quality.

At Page 4-15, lines 21-22, NRC describes significant local temperature increases due to dry cask storage: "Thermal releases from the at-reactor ISFSI will cause some local atmospheric heating. Downwind from an ISFSI, ambient temperatures can increase by 2.1°C (3.8°F) at 1 km (0.6 mi) to 0.1°C (0.2°F) at 10 km (6.2 mi) from the site (NRC 1984)." Increasing the local area's temperature, out to a distance of 0.6 miles, by nearly 4 degrees F, is a significant air quality impact, just from the thermal heat of irradiated nuclear fuel alone! It is the equivalent, on a local level, of the dire global warming impacts that the UN IPCC warn about on a global level. In fact, the two should be considered together. What is the impact of raising a local area's temperature by nearly 4 degrees F just by storing irradiated nuclear fuel there, combined with another increase of temperature of several degrees F due to global warming? NRC has not carried out any such impact analysis. Such heat output from the dry casks would continue for how long?

Re: Section 4.4.3, Indefinite Storage, Page 4-17 to 18

Leakage of radioactivity from one or more casks in the ISFSI would mean HUGE air impacts over time! But NRC conveniently just assumes they (who are "they"?) will just keep replacing the casks forever! What's the price tag on THAT?! Too cheap to meter still? No! But with loss of institutional memory and control, and even societal collapse, how can NRC guarantee that will happen forevermore?! NRC can't guarantee that!

Re: Pages 4-18 to 19, Section 4.5, Climate Change--what about radioactive C-14 releases from atomic reactor stations, irradiated fuel storage pools, etc. during decommissioning? A climate change causing greenhouse gas, plus a severe radiological hazard, all rolled into one! C-14 is a significant biological hazard. It has a very long half-life, and can integrate into the food chain and human anatomy wherever carbon does, which is just about everywhere!

Re: Page 4-20, Section 4.5.3, Indefinite Storage, indefinite could mean forever. So that rate of CO₂ emission X infinity = infinity, which isn't good for the climate, that much greenhouse gas emission!

Re: Page 4-20, Section 4.6, Geology and Soils, lines 26-28, NRC states "the NRC expects that most soil contamination from spent fuel pool leaks would remain onsite and, therefore, offsite soil contamination is unlikely to occur. Therefore, the NRC concludes that the environmental impact of spent fuel pool leaks to offsite soils

(i.e., outside the power plant's exclusion area) would be SMALL." This is preposterous. What about the leaks already documented?! NRC lists such pool leaks in Table E-4 on Page E-20. The leaks at Hatch in GA, Indian Point 1 & 2 in NY, Palo Verde in AZ, Salem 1 & 2 in NJ, San Onofre in CA, Seabrook in NH, and Watts Bar in TN, NRC admits have released radioactive liquid to the environment. Now NRC claims offsite soil contamination is not likely to occur?! As David Lochbaum of UCS points out in his expert witness commentary, the Brookhaven National Lab pool leak should have been included in Table E-4, or at least somewhere else in this DGEIS, rather than being left out. So too should have the Yankee Rowe pool leak. This growing list of pool leaks to the environment across the U.S. has included serious contamination of groundwater, and hence, soil.

At Page 4-22, lines 9-11, NRC states “consumptive water loss per 1,000 MW(e) for different cooling systems used at operating power plants ranges from 8,100 gpm for plants that use once-through cooling system to 14,000 gpm at plants with mechanical draft cooling towers (NRC 2013a).”—I’d have thought cooling towers would mean LESS consumption than once-through? Can NRC explain why this is?

At Page 4-23, NRC states “because surface waters in the vicinity of nuclear power plants are usually large to meet reactor cooling requirements, a large volume of surface water is usually available to dilute groundwater contaminants that flow into the surface waterbody. This dilution ensures that contaminants that may have been present above applicable groundwater-quality standards are diluted well below limits considered safe.” NRC is stating its unacceptable “dilution is the solution to radioactive pollution” philosophy. This is a delusion, an illusion of a solution. NRC cannot call such dumping of radioactivity into the environment “safe”! “Acceptably risky,” in their opinion, perhaps, but not “safe”! NRC has carried out a cost-benefit analysis, and determined that the levels of harm to human health caused by the radioactivity releases are acceptable in their eyes, given the benefit the industry derives from the practice. For NAS has affirmed for decades that any exposure to radioactivity, no matter how small, still carries a health risk for cancer. There is no such thing as a “safe” dose. NRC cannot and should not say such a thing. NRC is intentionally misleading and deceiving the public by doing so.

On Page 4-23, lines 7 to, NRC remarkably attempts to make the argument that pool leaks are really no big deal, given how much they routinely discharge with a permit anyway:

“The NRC estimated an annual discharge rate for leakage from the spent fuel pool of 380 L/d (100 gpd) with contaminants at certain concentrations assumed to be present at the start of short-term storage. These concentrations were compared to annual effluent ranges for BWRs and PWRs. Even in the unlikely event that spent fuel pool leakage flowed continuously (24 hours per day, 365 days per year) undetected and unimpeded to local surface waters, the quantities of radioactive material discharged to nearby surface waters would be comparable to values associated with permitted, treated effluent discharges from operating nuclear power plants (see Table E-4). Based on the above considerations, the NRC concludes that the impact of spent fuel pool leaks on surface water would be SMALL.”

That is, NRC is so enamored with its own “dilution is the solution” delusion that it flippantly decides here to just double it for good measure. Now “permitted” discharges from the atomic reactor’s operations, and an equal discharge rate by accidental, unintended leak from the pool, can both flow together into local surface waters, double-dosing area residents in drinking water, double-concentrating up the food chain, downstream, and down the generations. According to NAS’s linear, no-threshold model for understanding the cancer risk associated with human exposure to radioactivity, that would simply double the risk that such releases cause cancer in surrounding, exposed populations. NRC’s flippant acceptance of pool leakage is unacceptable.

Please see Beyond Nuclear’s pamphlet about “routine radioactivity releases” from nuclear power plants, which discusses the significant health hazards this creates in the environment.

Re: NRC’s statement on Page 4-23, starting at line 20, “As passive, air-cooled storage systems, ISFSIs do not consume water and they generate minimal liquid effluents that may be discharged to surface waterbodies **during normal operation**. For example, in its consideration of water-use impacts for

the renewal of the Calvert Cliffs ISFSI, the NRC determined that both direct and indirect impacts would be SMALL (NRC 2012a)." (emphasis added) What about OFF normal conditions?!

On Page 4-24, line 3, NRC states "During ISFSI demolition, a small amount of water could be sprayed from water trucks to minimize dust clouds."—What about the radioactivity in the dust, then entering into the runoff, flowing into the soil and groundwater and surface waters?!

Similarly, at lines 16-17, NRC states "During [DTS] operations, water would be brought to the facility by tanker truck or temporary connection to public water supply for general purpose cleaning and canister decontamination" (highlight added)—Again, what about the radioactivity in the dust and runoff?!

Re: Page 4-24, lines 21 to 25, NRC states "The NRC concludes that the potential consumptive use and surface-water quality impacts from continued ISFSI operations would be minimal. Consumptive use of surface water for ISFSI replacement and DTS construction, operation, and replacement would involve amounts of water that are a small fraction of water use during reactor operations. Therefore, the NRC concludes that the potential impacts on surface-water use and quality for the long-term storage timeframe would be SMALL."

NRC seems to be attempting to justify future, and ongoing, impacts, by pointing to past impacts that are even larger in magnitude, essentially arguing that long-term and even indefinite impacts are SMALL by comparison. This is an unacceptable attempt to "normalize" radioactivity and other impacts.

And the only way NRC can get away with this paper game is to assume that dry cask storage replacements will happen, and will go smoothly. Those are indefensible assumptions.

Essentially, NRC is making the absurd argument that impacts – whether in the so-called "short," long, or even forever term – are essentially zero. Zero X forevermore = zero, NRC absurdly reasons. Of course, the impacts are greater than zero. And any value greater than zero X infinity = infinity, unfortunately.

At Page 4-25, starting at line 29, NRC states "in the very unlikely event that a leak from a spent fuel pool goes undetected and the resulting groundwater plume reaches the offsite environment, it is possible that the leak could be of sufficient magnitude and duration to contaminate a groundwater source above a regulatory limit (i.e., a maximum contaminant level [MCL] for one or more radionuclides)." (highlight added)--VERY UNLIKELY EVENT?! What about all the leaks listed in this DGEIS's Table E-4 that NRC admits leaked radioactivity into the environment, sometimes for many years, without detection? What about the pool leaks at Brookhaven National Lab, as David Lochbaum asks, again a years-long, undetected leak?

Re: Page 4-26, beginning at line 5, where NRC states "Further, as discussed in Appendix E, spent fuel pool design (e.g., stainless-steel liners and leakage-collection systems) and operational controls (e.g., monitoring and surveillance of spent fuel pool water levels) make it unlikely that a leak will remain

undetected long enough to exceed any regulatory requirement (e.g., the NRC dose limit or EPA-mandated Maximum Contaminant Level) in the offsite environment. Although a small number of spent fuel pool leaks have caused radioactive liquid releases to the environment, based on the available data, none of these releases have affected the health of the public (NRC 2006a).”--Re: health impacts, what about the insights documented in Kelly McMasters’ book *Welcome to Shirley: Memoir from an Atomic Town?* Shirley, Long Island drank the groundwater contaminated with tritium and other radioactive poisons from the leaking pool at Brookhaven National Lab, which NRC didn’t even bother to include in its Appendix E. As David Lochbaum comments, the Brookhaven National Lab pool leak must be added to this analysis, and its significant impacts on the health of downstream residents, especially children, taken seriously.

Re: Page 4-46’s NRC’s statements, re: NPDES, RCRA, and SDWA, lines 36 to 40, re: nonradiological contaminants, amount to rosy, overly optimistic assumptions. What could possibly go wrong? NRC seems to be saying. It is not a conservative, protective, precautionary approach to the risks.

Casting further doubt on NRC’s over optimism, the diesel spill at Braidwood, IL, eventually led to the discovery of the massive tritium spills there (which had been covered up for a decade, with the complicity of the IL EPA and NRC). Also, sodium fires and tritium spills have occurred at Fermi 1, as recently as 2008 – remarkably, 42 years post-meltdown, and 36 years post-shut down; in addition; decommissioning continues, after 41 years.

Re: Page 4-28, line 32, NRC’s statement “The significance of potential impacts on plants and animals and their habitats depends on the importance or role of the plant or animal within the ecological community that is affected.”--There are no insignificant species. (Except perhaps humans. Most other species could get by just fine without us.) But we cannot get by without them, we will find out the hard way. NRC’s attitude is anachronistic, belonging (never belonging) to a much earlier phase of the “industrial extinction event” humankind has unleashed on the planet. Whether from a Native American spiritual perspective (which NRC should give serious consideration to in this EIS, as an element of EJ), to a Western scientific ecosystem perspective, no species can be regarded as insignificant.

Alanis Obomsawin, an Abenaki from the Odanak reserve, seventy odd miles northeast of Montreal, has put it well:

“...When the last tree is cut, the last fish is caught, and the last river is polluted; when to breathe the air is sickening, you will realize, too late, that wealth is not in bank accounts and that you can’t eat money.”

Re: beginning at line 10, Page 4-29, Section 4.9.1, “Spent Fuel Pools,” NRC states “Operation of a spent fuel pool and its associated cooling system during short-term storage would require the withdrawal of water and discharge of effluents into a nearby waterbody.”—As NAS has long affirmed that any exposure to radioactivity carries a health risk of cancer, NRC’s admission that “effluents” are discharged into nearby waterbodies bodes ill for those who live downstream, and up the food chain. Where is NRC’s serious analysis re: those discharges’ radioactivity content, and their impact on human health?

On Page 2-14, line 6, NRC makes another spelling error: permitevery.

In Table 4-1 on Page 4-30, NRC shows that a reactor requires 1.152 BILLION gallons per day for once-through cooling:

$$800,000 \text{ gallons/minute} \times 60 \text{ mins/hr} \times 24 \text{ hrs/day} = 1.152 \text{ billion gallons/day}$$

NRC also reveals that 10 BILLION BTUs per HOUR are discharged to environment, whether once-through cooling, or cooling towers, are used!

These are, on their face, large impacts on the environment.

But NRC yet again tries to present those large reactor impacts as somehow a justification for the smaller irradiated fuel pool impacts, of 2,800 gallons per minute water withdrawals for cooling, and discharge of 35 million BTU/hr of heat. But the pool impacts are in addition to the reactor impacts during operations. And even after the reactor permanently ceases operations, the ongoing pool impacts would be on top of the damage already done to the environment during 40, 60, or even 80 years of reactor (and pool) operations. As accumulative impacts, 60 additional years of pool impacts cannot be justified as "SMALL" by comparison. This is especially so given the radiological and other hazardous releases the pools are all too capable of.

On Page 4-31, NRC continues its arguments that irradiated nuclear fuel storage impacts are small when compared to reactor operations. But exploiting the public's numbed "shock and awe" from by the damage already done by reactors does not justify or excuse additional, cumulative impacts from irradiated nuclear fuel storage. Two wrongs don't make a right.

On Page 4-31, NRC states "Normal operation of an ISFSI does not require water for cooling and the facility would produce minimal gaseous or liquid effluents."--

But, if the ISFSI is attacked, as Dr. Gordon Thompson has commented, or involved in an accident, or simply leaks over time, then disastrous levels of hazardous radioactive gases and liquids could escape out into the environment.

Re: Pages 4-29 to 4-34, "short-term" (60 years post reactor shutdown, after as many as 80 years of operations – at Palisades, for example, 80 years of operations would end in 2051, so 60 years of pool storage beyond that would end in 2111), "long-term" (another 100 years beyond "short-term"—at Palisades, ending in 2211), and "indefinite" (aka forevermore), Nukespeak has given a whole new meaning to the word "temporary"!

On Page 4-32, NRC has stated, beginning at line 16, that "licensees are required to adhere to the protection of eagles and migratory birds under the Federal Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. In addition, coordination with State natural resource agencies may further ensure that power plant operators take appropriate steps to avoid or mitigate impacts on State species of special concern that may not be protected under other Federal statutes." --Has NRC

considered the risk of eagles or other species (osprey, birds that nest on human structures) nesting on/near dry casks, given the lure of the warmth?! Loss of institutional control – no humans around – could worsen this risk. NRC has reported that dry cask storage will increase the ambient air temperature several degrees downwind, out to a distance of 0.6 miles. What is to prevent this warmth “island” from attracting wildlife, including endangered migratory birds, especially if their prey species are attracted to the warmth? What would be the impact of such species interacting at such close proximity to the radioactive waste storage. After all, mutagenic gamma radiation is allowed to emanate from dry casks at a rate of 10 mRem/hour at distances 6 feet away – and at a rate 20 times higher at the casks’ surface.

Thank you.

Sincerely,

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Beyond Nuclear aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abandon both to safeguard our future. Beyond Nuclear advocates for an energy future that is sustainable, benign and democratic.

Please also take into consideration all of my Nuclear Waste Confidence public comments made on Dec. 20, 2013, contained in Appendices, A-O

Please take into careful consideration DOE's 2002 Yucca dump FEIS admission that dry casks will leak catastrophically at some point, once institutional control is lost. This is applicable both at nuclear power plant on-site storage locations, as well as away-from-reactor storage locations, such as centralized interim storage facilities (also called monitored retrievable storage facilities).

Please take into consideration NRC Chairman Allison Macfarlane's dissent, that institutional control will someday be lost, by definition, in her Nuclear Waste Confidence vote.

Please take into consideration the relevant points regarding dry cask storage contained in the HOSS (Hardened On-Site Storage) *Principles for Safeguarding Nuclear Waste at Reactors*, posted online at:

http://ieer.org/wp/wp-content/uploads/2010/03/HOSS_PRINCIPLES_3-23-10x.pdf

Please consider the many relevant points about dry cask storage contained in my following 2004 backgrounder:

<http://archives.nirs.us/radwaste/atreactorstorage/drycaskfactsheet07152004.pdf>

Please consider all relevant aspects to dry cask storage contained in this Dec. 16, 2013 expert witness declaration made by Dr. Mark Cooper, in the context of NRC's Nuclear Waste Confidence public comment proceeding:

<https://www.nirs.org/wp-content/uploads/radwaste/exhibitd2013-12-16markcooperfinaldeclarationrespentfuelcosts.pdf>

Similarly, please consider all relevant aspects to dry cask storage contained in this Dec. 20, 2013 environmental coalition public comment to NRC in the context of NRC's Nuclear Waste Confidence public comment proceeding:

<http://www.cleanenergy.org/wp-content/uploads/2014-01-07-Environmental-Organizations-Corrected-Comments-on-Waste-Confidence-GEIS-and-Proposed-Rule-2013-12-20.pdf>

Likewise, please consider all aspects of this Dec. 20, 2013 expert declaration submitted to NRC by Dr. Arjun Makhijani expert, in the context of NRC's Nuclear Waste Confidence public comment proceeding:
<http://www.cleanenergy.org/wp-content/uploads/2014-01-07-Corrected-Exhibit-A-Makhijani-Declaration-2013-12-20.pdf>

Many to most of Dr. Makhijani's comments are specifically relevant to dry cask storage, as indicated in his summary below:

2.11. My declaration is organized as follows:

- In Section 3, I will provide background information regarding past environmental studies and regulations and the Draft GEIS.
- In Section 4, I will discuss the basis for my expert opinion that the NRC's proposed finding that spent fuel can be stored for a long-term or indefinite period safely and without significant environmental impacts is not supported by adequate data or analysis.
- In Section 5, I will address criticality risks and high burnup fuel.
- In Section 6, I will address the unreasonableness of the NRC's critical assumption of perpetual institutional control and continued funding of spent fuel storage and management for millennia, tens of millennia, or longer.

- In Section 7, I will address the potential consequences of indefinite storage that have been ignored or treated very inadequately in the Draft GEIS, notably in case of a loss of institutional control.
- In Section 8, I will discuss the basis for my expert opinion that the NRC's proposed findings regarding the feasibility and safety of spent fuel disposal are unsupported.
- In Section 9, I will discuss site-specific issues that are not amenable to resolution in a generic manner.
- Section 10 contains a summary of the main points of my declaration.
- Section 11 provides a list of references. Electronic copies of these documents are also being provided.

Thank you for considering my public comments, on behalf of Beyond Nuclear's members and supporters across the country.

Sincerely,

--
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