

January 11, 2018

MEMORANDUM TO: John P. Segala, Chief
Advanced Reactor and Policy Branch
Division of Safety Systems, Risk Assessment and Advanced
Reactors
Office of New Reactors

FROM: William D. Reckley, Senior Project Manager **/RA/**
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Division of Safety Systems, Risk Assessment and Advanced
Reactors
Office of New Reactors

SUBJECT: SUMMARY OF DECEMBER 14, 2017, PUBLIC MEETING
TO DISCUSS REGULATORY IMPROVEMENTS FOR
ADVANCED REACTORS

On December 14, 2017, the U.S. Nuclear Regulatory Commission (NRC) held a Category 2 public meeting with stakeholders, Department of Energy (DOE), national laboratories, and Nuclear Energy Institute (NEI), to discuss ongoing initiatives within the industry and NRC related to the development and licensing of non-light water reactors (Agencywide Documents Access and Management System [ADAMS] Accession No. ML17334A251). Enclosure 1 contains a list of meeting attendees and participants who joined via webinar. The slides and meeting handouts are available in ADAMS Accession No. ML17354B219.

Mr. Ed Wallace and Dr. Karl Fleming, of the Licensing Modernization Project (LMP), provided a summary of the LMP white paper "Risk-Informed and Performance-Based Evaluation of Defense-in-Depth Adequacy" (ADAMS Accession No. ML17354B174). The LMP paper derives from and maintains much of the structure and logic from similar efforts under the Next Generation Nuclear Plant Project. The structure includes basic definitions for plant capability defense in depth, programmatic defense in depth, and risk-informed evaluation of defense in depth. The white paper also aligns the LMP process with established international standards by defining five layers for defining and assessing the adequacy of plant design and programs in terms of providing an appropriate degree of defense in depth. The defense-in-depth white paper builds on previous LMP white papers on event selection, probabilistic risk assessment, and safety classification of equipment. The staff plans to provide comments and questions to the LMP on the defense-in-depth white paper by mid-January 2018 to support further discussion at future periodic stakeholder meetings and the development of a consolidated guidance document for use by reactor developers in designing and licensing non-light water reactors (non-LWRs).

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Mr. Mike Tschiltz, representing NEI, discussed the white paper related to fuel supply for advanced reactors, with an emphasis on the expected use of higher assay low enriched uranium (ADAMS Accession No. ML17341A604). This topic was discussed in more detail at the meeting on November 2, 2017. The staff has added the major issues from NEI's fuel cycle white paper to the non-LWR policy table (ADAMS Accession No. ML18010A484). The rulemakings related to material control and accounting and enhanced security for special nuclear material will be addressed in upcoming NRC public meetings. NRC staff will participate in the collaborative efforts with DOE on topics such as criticality benchmark data and transportation packages and will, when appropriate, hold public meetings on these topics.

Mr. Peter Hastings, representing NEI, led a brief discussion on efforts to develop guidance for reactor developers preparing a regulatory engagement plans. This topic was discussed at the public meeting on November 2, 2017, and a draft outline for the industry guidance document was provided as an enclosure to the meeting summary (ADAMS Accession No. ML17319A210). The staff expects to provide additional comments on the guidance document to support future discussions and NEI's issuance of the document.

The staff summarized a draft white paper on functional containment performance criteria (ADAMS Accession No. ML17334A155). The white paper was prepared to solicit feedback from stakeholders and support the staff's efforts to prepare a Commission paper in early 2018. The white paper describes a proposed methodology for defining performance criteria on the basis of the role of structures, systems, and components in retaining fission products during events within the categories defined by the LMP white papers. The white paper also discusses possible functions for physical buildings or enclosures other than radionuclide retention, such as protection against external events or supporting heat removal systems. The staff's discussion of next steps included upcoming meetings with the Advisory Committee on Reactor Safeguards and the likely need to interact with stakeholders prior to the next periodic meeting that is scheduled for February 1, 2018. A revision to the staff's white paper has been made available (ADAMS Accession No. ML18010A516) to support the February meeting and other potential interactions. Stakeholders are encouraged to provide feedback on the revised paper by contacting Bill Reckley by phone at (301) 415-7490 or email at william.reckley@nrc.gov.

The afternoon session began with discussions of the continuing work on and possible NRC endorsement of Division 5, "High Temperature Reactors," of Section III, "Rules for Construction of Nuclear Facility Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Presentations were provided by the staff, DOE's Office of Nuclear Energy (William Corwin) and ASME (Sam Sham) describing the current status of the Code and ongoing activities to support high-temperature reactors (see slides in ADAMS Accession No. ML17354B219). The non-LWR developers and other stakeholders, participating in the meeting, recommended that the staff begin the endorsement process for the 2017 Edition of Section III, Division 5. The staff has requested formal input from the non-LWR technology working groups and ASME. The staff expects to start planning this activity in FY 2018 following receipt of the ASME request for endorsement.

The staff provided background information on a possible issue related to current NRC guidance on siting of nuclear power reactors in relation to population centers and population densities. A draft white paper on this topic was released prior to the meeting to support the discussion (ADAMS Accession No. ML17333B158). Regulatory requirements on siting and defining exclusion areas and low population zones are based on potential offsite radiation doses from reactor accidents. Light-water small modular reactors (SMRs) and non-LWR technologies could result in lesser potential offsite releases and therefore reduced limitations related to siting in

populated areas. NRC policy includes locating reactors away from densely populated centers and existing guidance includes considering population densities to distances out to 20 miles from a power reactor facility. Mr. Randy Belles, of Oak Ridge National Laboratory (ORNL), provided insights from evaluations using an ORNL siting tool based on geographical information systems and spatial modeling techniques. The tool supports considering factors such as populations, proximity to transmission lines, and availability of cooling water. The presentation provided an example of potential SMRs replacing fossil power stations near a city and how different population density criteria resulted in inclusion or exclusion of various sites. This topic will be discussed in upcoming meetings of the NEI Advanced Reactor Working Group and, when appropriate, future NRC public stakeholder meetings.

The meeting ended with a discussion of other topics and future meetings. Dr. Andrew Sowder, of the Electric Power Research Institute (EPRI), provided an update on limited scope topical report on manufacturing TRISO [tristructural-isotropic] fuel particles expected to be submitted in late 2018. Preliminary agenda topics for the February 1, 2018 stakeholder meeting include:

- Licensing Modernization Project White Papers
- Functional containment performance criteria
- Regulatory Engagement Plans
- TBD – Fuel Cycle (Nuclear Infrastructure Council)
- TBD – Technology Working Group Updates – Regulatory Issues
- TBD – NEI Advanced Reactor Working Group – Regulatory Issues

Enclosures:

1. List of attendees

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NRO-002

OFFICE	NRO/DSRA/ARPB:PM
NAME	WReckley
DATE	01/ 11 /2018

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Attendance List – Attended at least part of meeting in person		
Name		Organization
Brian	Smith	NRC/NMSS
Charles	Teal	NRC/NMSS
Bernie	White	NRC/NMSS
Arlon	Costa	NRC/NRO
Jan	Mazza	NRC/NRO
Matthew	Mitchell	NRC/NRO
John	Monninger	NRC/NRO
Bill	Reckley	NRC/NRO
Jeff	Schmidt	NRC/NRO
John	Segala	NRC/NRO
George	Tartal	NRC/NRO
Lucieann	Vechioli	NRC/NRO
Joe	Williams	NRC/NRO
Andrew	Yeshnik	NRC/NRO
Joe	Rivers	NRC/NSIR
Todd	Smith	NRC/NSIR
Maxine	Segarnick	NRC/OGC
Matthew	Gordon	NRC/RES
Amy	Hull	NRC/RES
Raj	Iyengar	NRC/RES
Shah	Malik	NRC/RES
Ruth	Reyes	NRC/RES
Rebecca	Onuschak	DOE-NE
Craig	Welling	DOE-NE
Farshid	Shahrokhi	Areva
Andrew	Sowder	EPRI
Peter	Hastings	hastings group
Mark	Holbrook	INL
Ed	Wallace	LMP
Karl	Fleming	LMP
Amir	Afzali	LMP - Southern Co.

Ryan	Lighty	Morgan Lewis
Kati	Austgen	NEI
Everett	Redmond	NEI
Mike	Tschiltz	NEI
Caroline	Cochran	Oklo
Philip	Gibbs	ORNL
Jason	Redd	Southern Company
Peter	Gaillard	TerraPower
Andries	Haasbroek	X-energy
Prasad	Kadambi	
Hiroki	Watanabe	

Attendance List – Webinar Attendees		
Name		Organization
Uriel	Bachrach	Westinghouse
Randy	Belles	ORNL
Jana	Bergman	Curtiss-Wright
John	Bolin	General Atomics
Scott	Bussey	NRC
Trevor	Cook	DOE-NE
William	Corwin	DOE-NE
Timothy	Crook	Transatomic r
George	Flanagan	ORNL
Matthew	Gordon	NRC
David	Grabaskas	ANL
Kathy	Halvey Gibson	NRC
Jerald	Head	GE-H
David	Holcomb	ORNL
Alex	Huning	X-energy
Raj	Iyengar	NRC
Diane	Jackson	NRC
Nicole	LaHaye	PNNL
Chris	Lui	NRC
Edwin	Lyman	UCS

Imtiaz	Madni	NRC
Gary	Mays	ORNL
Olivia	Mikula	NRC
Wayne	Moe	INL
Chantal	Morin	CNSC
Carol	Moyer	NRC
Ronald	Omberg	PNNL
Thomas	Pedersen	Copenhagen Atomics
Mike	Poore	ORNL
Alex	Popova	Oklo
Jeff	Powers	ORNL
Christopher	Regan	NRC
Pranab	Samanta	BNL
Sam	Sham	ANL
Timothy	Smith	GSI
Dan	Stout	TVA
Aslak	Stubsgard	Copenhagen Atomics
Kenneth	Thomas	NRC
Tammy	Way	IRDPA
Staci	Wheeler	ARTC
David	Wootan	PNNL