

November 21, 2017

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/*
Advanced Reactor and Policy Branch
Division of Safety Systems, Risk Assessment and Advanced
Reactors
Office of New Reactors

SUBJECT: SUMMARY OF NOVEMBER 2, 2017, PUBLIC MEETING
TO DISCUSS REGULATORY IMPROVEMENTS FOR
ADVANCED REACTORS

On November 2, 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. ML17296B241). 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. ML17310B495.

The staff summarized revisions to the document "A Regulatory Review Roadmap for Non-Light Water Reactors" (ADAMS Accession No. ML17279B177), including the incorporation of a previously separate document "Nuclear Power Reactor Testing Needs and Prototype Plants for Advanced Reactor Designs," as an enclosure. Drafts of both documents had been made available for public review and had been discussed in public meetings. The staff explained several revisions to the content based on interactions with stakeholders and described plans to complete internal reviews and issue Revision 0 of the roadmap document in December 2017.

Mr. Mike Tschiltz, representing NEI, provided a summary of a white paper being prepared on the topic of fuel supply for advanced reactors, with an emphasis on the expected use of higher assay low enriched uranium (HALEU), which involves enrichments between 5 % and 20 %. Mr. Tschiltz discussed issues such as the need for criticality data and related support from DOE, licensing of fuel cycle facilities, transportation packages, material control and accounting, and physical security plans. The NRC staff provided some insights related to ongoing activities to develop regulations and guidance. NEI expects to complete the paper and provide it to the NRC, DOE, and other stakeholders to support further discussions at the NRC's periodic public meeting on advanced reactors scheduled for December 14, 2017.

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Mr. Peter Hastings, representing NEI, provided an update on efforts to develop guidance for reactor developers preparing a regulatory engagement plan (REP) to help formulate and negotiate interactions with the NRC staff. Excerpts from the current draft are provided within the presentation materials available in ADAMS Accession No. ML17310B495. Additional information, in the form of a draft outline for the industry guidance document, is provided as Enclosure 2. This topic will be discussed further during upcoming stakeholder meetings.

The staff summarized preliminary feedback provided to the Licensing Modernization Project (LMP) on the draft white paper "Safety Classification and Performance Criteria for Structures, Systems, and Components" (ADAMS Accession No. ML17290A463). The staff's preliminary questions and comments on the draft white paper are provided as Enclosure 3. The draft white paper and a related draft white paper on defense in depth will be discussed at the periodic public meeting on advanced reactors scheduled for December 14, 2017.

The staff initiated a discussion after the lunch break related to financial protection or liability insurance for advanced reactor designs. The staff described its goal to include a discussion of advanced reactors within a report from the Commission to Congress due by December 2021 with recommendations as to the repeal or modification of any provisions of the Price-Anderson Act. Mr. Mike Cass, representing the American Nuclear Insurers (ANI), provided an overview of financial protection requirements and their implementation as well as providing insights for advanced reactor technologies. The NEI Advanced Reactor Regulatory Task Force is planning to continue discussions on this issue and propose an appropriate time to discuss during a future periodic stakeholder meeting.

The NRC staff led a discussion on revisions to selected advanced reactor design criteria (ARDC) as part of addressing comments on draft regulatory guide DG-1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors" (ADAMS Accession No. ML16301A307). The proposed changes to ARDC-17 on electrical power systems and ARDC-26 on reactivity control systems are available in ADAMS Accession No. ML17291A292.

Preliminary agenda topics for the December 14, 2017, stakeholder meeting include:

- Licensing Modernization Project White Papers
 - Defense in depth
- Siting considerations related to nearby populations
- American Society of Mechanical Engineers (ASME) Section III, Division 5 (high temperature materials)
- Functional containment performance criteria
- NEI HALEU white paper
- NEI REP white paper

Enclosures:

1. List of attendees
2. NEI REP draft outline
3. NRC staff preliminary comments on LMP draft white paper on safety classification

SUMMARY OF NOVEMBER 2, 2017, PUBLIC MEETING TO DISCUSS TO DISCUSS
REGULATORY IMPROVEMENTS FOR ADVANCED REACTORS November 21, 2017

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***via e-mail**

NRO-002

OFFICE	NRO/DSRA/ARPB:PM		
NAME	WReckley		
DATE	11 / 21 / 2017		

OFFICIAL RECORD COPY

Public Meeting to Discuss Regulatory Improvements for Advanced Reactors
November 2, 2017
Attendance List

Attendance List – Attended at least part of meeting in person		
Name		Organization
Jim	Hammelman	NRC/NMSS
Brian	Smith	NRC/NMSS
Amy	Cubbage	NRC/NRO
Imitiaz	Madni	NRC/NRO
Ryan	Nolan	NRC/NRO
Paul	Prescott	NRC/NRO
Bill	Reckley	NRC/NRO
Jeff	Schmidt	NRC/NRO
John	Segala	NRC/NRO
Martin	Stutzke	NRC/NRO
Joe	Williams	NRC/NRO
Bob	Fitzpatrick	NRC/NRR
Sheila	Ray	NRC/NRR
Marcia	Carpentier	NRC/OGC
Julie	Ezell	NRC/OGC
Joe	Gillespie	NRC/OGC
Maxine	Segarnick	NRC/OGC
Farshid	Shahroki	Areva
Craig	Welling	DOE
Tom	King	INL
Kati	Austgen	NEI
Everett	Redmond	NEI
Mike	Tschiltz	NEI
Caroline	Cochran	Oklo
Steve	Frantz	Self
Prasad	Kadambi	Self
Amir	Afzali	Southern
Robin	Rickman	TEUSA
Peter	Hastings	THG

Public Meeting to Discuss Regulatory Improvements for Advanced Reactors
November 2, 2017
Attendance List

Attendance List – Webinar Attendees		
Name		Organization
Uriel	Bachrach	Westinghouse
Jana	Bergman	Curtiss Wright
Stephen	Burdick	Morgan Lewis
Scott	Bussey	NRC/OCHCO
Arlon	Costa	NRC/NRO
Karl	Fleming	LMP
Pete	Gaillard	TerraPower
David	Grabaskas	ANL
Kathy	Halvey Gibson	NRC/RES
Mark	Holbrook	INL
Raj	Iyengar	NRC/RES
Mike	Keller	Hybrid Power
Jim	Kinsey	INL
Jun	Liao	Westinghouse
Lisa	Matis	Tetrattech
Wayne	Moe	INL
Chantal	Morin	CNSC
Jim	Palaia	ANI
JongSeuk	Park	KINS
Per	Peterson	Kairos Power
Mike	Poore	ORNL
Alex	Popova	Oklo
Jason	Redd	Southern
Pranab	Samanta	BNL

Public Meeting to Discuss Regulatory Improvements for Advanced Reactors
November 2, 2017
Attendance List

Jennifer	Scro	NRC/OGC
Courtney	St. Peters	NRC/NRO
Nanette	Valliere	NRC/OCMSB
Lucieann	Vechioli	NRC/NRO
Caleb	Ward	USNIC
Staci	Wheeler	ARTC

Enclosure 2

Industry Guideline for Development of a
Regulatory Engagement Plan

Draft version provided via email as followup to 11/02/17 public meeting

(following 4 pages)

INDUSTRY GUIDELINE FOR DEVELOPMENT OF A
REGULATORY ENGAGEMENT PLAN

PART I INTRODUCTION TO THIS GUIDANCE DOCUMENT

- 1 GENERAL
 - 1.1 FORMAT AND CONTENT
 - 1.2 NOTES ON USAGE AND OPTIONALITY
 - 1.3 RELATIONSHIP TO OTHER COMMUNICATIONS
- 2 COMMUNICATING WITH NRC
 - 2.1 WRITTEN COMMUNICATION
 - 2.2 ORAL COMMUNICATION
 - 2.3 COMMUNICATIONS PROTOCOLS
 - 2.4 APPLICANT/PRE-APPLICANT EXPECTATIONS
 - Public Participation
 - Quality Assurance Program
 - Reporting of Defects
 - Control of Non-Public Information
- 3 PHASES OF ENGAGEMENT

PART II REGULATORY ENGAGEMENT PLAN GUIDANCE

- 1 INTRODUCTION/PURPOSE OF REP
 - 1.1 CONTACT INFORMATION
 - 1.2 COMPANY/PROJECT STRUCTURE
 - 1.3 SUMMARY STRATEGIC PROJECT APPROACH/GOALS
 - 1.4 BACKGROUND
 - 1.5 REP APPROACH
- 2 TECHNOLOGY SUMMARY
- 3 REGULATORY STRATEGY
 - 3.1 APPLICATION TYPE
 - 3.1.1 Early Site Permit (10 CFR 52 Subpart A)
 - 3.1.1.1 Design-specific
 - 3.1.1.2 Plant Parameter Envelope
 - 3.1.2 Standard Design Certification (10 CFR 52 Subpart B)
 - 3.1.3 Combined License (10 CFR 52 Subpart C)
 - 3.1.4 Standard Design Approval (10 CFR 52 Subpart E)
 - 3.1.5 Manufacturing License (10 CFR 52 Subpart F)
 - 3.1.6 Construction Permit (10 CFR 50)
 - 3.1.7 Operating License (10 CFR 50)
 - 3.1.8 Limited Work Authorization (10 CFR §50.10)
 - 3.1.9 Research and Test Reactors
 - 3.1.10 Prototype Provisions
 - 3.1.11 Other Considerations
 - 3.1.11.1 “Staged Approach”
 - 3.1.11.2 Partial Application Submittals
 - 3.1.11.3 International Considerations
 - 3.2 NATIONAL ENVIRONMENTAL POLICY ACT
 - 3.2.1 Site-Related Environmental Input and Review
 - 3.2.2 Research/Test Reactors

- 3.2.3 Non-Site-Related Environmental Input and Review
- 3.3 PRINCIPAL DESIGN CRITERIA
 - 3.3.1 10 CFR 50 Appendix A, General Design Criteria
 - 3.3.2 Advanced Reactor Design Criteria
 - 3.3.3 Establishment of Design-Specific Principal Design Criteria
- 3.4 SELECTION OF APPLICABLE GUIDANCE
 - 3.4.1 NUREG-0800
 - 3.4.2 NUREG-1555
 - 3.4.3 NUREG-1537
 - 3.4.4 ARDCs
 - 3.4.5 [additional examples]
- 3.5 USE OF STANDARDS
 - 3.5.1 Consensus Standards
 - 3.5.2 NEI Templates
 - 3.5.3 EPRI Guidance
 - 3.5.4 [other?]
- 3.6 ASSESSMENT OF ALIGNMENTS/GAPS
 - 3.6.1 Principal Design Criteria
 - 3.6.2 Design Specific Review Standard
 - 3.6.3 Ad Hoc Assessments
- 3.7 DESIGN-CENTERED REVIEW APPROACH
- 3.8 KEY ISSUES
 - 3.8.1 [pointer to NRC/ARWG/SMRWG list of policy issues]
 - 3.8.2 Staffing
 - 3.8.3 Security
 - 3.8.4 EP
 - 3.8.5 Fuel qualification
 - 3.8.6 Seismic
 - 3.8.7 Flooding
 - 3.8.8 Aircraft Impact
 - 3.8.9 I&C, Digital I&C
 - 3.8.10 PIRT/accident analysis methodology
 - 3.8.11 PRA/RIPB
 - 3.8.12 HFE
 - 3.8.13 QA
 - 3.8.14 Concept of operations
 - 3.8.15 [other examples]
- 3.9 NRC REVIEW TIMEFRAMES
- 4 PRE-APPLICATION ENGAGEMENT
 - 4.1 IDENTIFICATION OF TOPICS
 - 4.1.1 Regulatory Strategy
 - 4.1.1.1 Application Type(s)
 - 4.1.1.2 Deviations from Regulation and Guidance
 - 4.1.2 Identification of generic issues
 - 4.1.3 Identification of design-specific issues
 - 4.1.4 Prioritization of topics for early identification and resolution
 - 4.1.5 Consideration of engagement types for different issues
 - 4.2 TYPES AND FREQUENCY OF INTERACTIONS
 - 4.2.1 Routine project management discussions
 - 4.2.2 Technical discussions
 - 4.2.2.1 Initial meeting(s)

- 4.2.2.2 Subsequent project management and technical meetings
 - 4.2.2.3 Consideration of audiences:
 - Safety
 - Environmental
 - Technical disciplines
 - 4.2.2.4 Meeting Types/Categories
 - Technical
 - Administrative
 - Open/Closed [cross ref to withholding information]
 - 4.2.3 Project management “drop-ins”
 - 4.2.4 NRC staff familiarization or training
 - 4.2.5 Gap assessments
 - 4.2.6 Written submittals [note special treatment of topical, e.g., RAIs]
 - 4.2.6.1 Topical
 - 4.2.6.2 Technical
 - 4.2.6.3 PRISM example – discuss VDR-like process
 - 4.2.6.4 “White Papers”
 - 4.2.6.5 [cross ref to withholding information]
 - 4.2.7 Pre-Application Audits and Inspections [see below]
 - 4.2.8 Early ACRS engagement
 - 4.2.9 Periodic senior management and commission “drop-ins”
 - 4.2.10 Escalation of issues
- 4.3 NRC FEEDBACK
 - 4.3.1 Feedback as a function of submittal type
 - 4.3.2 Agreement in advance with NRC staff on feedback
 - 4.3.3 “Finality”
 - 4.3.1.1 As a function of design maturity and changes in design
 - 4.3.1.2 Policy issues
 - 4.3.1.3
- 4.4 SCHEDULE CONSIDERATIONS
 - 4.4.1 Scheduling of meetings and submittals
 - 4.4.2 Consideration of NRC staff and applicant resources
 - 4.4.3 Agreement on timing/duration of NRC staff reviews
 - 4.4.4 Communication of changes in schedule and scope
- 4.5 RELATION TO OTHER PROCEEDINGS/REVIEWS
 - 4.5.1 Related NRC Reviews
 - 4.6.1.1 COLA review during DCA review
 - 4.6.1.2
 - 4.5.2 Other Agencies
 - 4.6.2.1 Department of Energy (e.g., “landlord” considerations)
 - 4.6.2.2 US Army Corps of Engineers (NEPA) [cross-ref to NEPA section]
 - 4.6.2.3 US Fish and Wildlife (NEPA Consultations)
 - 4.6.2.4 State and Local Agencies
 - 4.6.2.5 American Indian Tribes
 - 4.6.2.6
- 4.6 PRE-APPLICATION AUDITS AND INSPECTIONS
 - 4.6.1 Quality Assurance
 - 4.6.2 Testing
 - 4.6.3 Site Selection
 - 4.6.4 Site Characterization

- 4.6.5 Security/DHS
 - 4.6.6 Supply Chain
 - 4.6.7 Other Technical Topics
- 5 APPLICATION PROCESS
 - 5.1 READINESS ASSESSMENT AUDIT
 - 5.2 APPLICATION SUBMITTAL
 - 5.3 ACCEPTANCE REVIEW
 - 5.4 DOCKETING
 - 5.5 NRC PROCESSES
 - 5.5.1 NOI
 - 5.5.2 NOO [brief discussion of establishment of hearing file]
- 6 POST-APPLICATION ENGAGEMENT
 - 6.1 PUBLIC INFORMATION SESSIONS (CERTAIN APPLICATION TYPES)
 - 6.2 NEPA SCOPING (CERTAIN APPLICATION TYPES)
 - 6.3 TECHNICAL MEETINGS
 - 6.4 AUDITS AND INSPECTIONS [INCLUDE DISCUSSION OF AUDIT/INSPECTION PLANS]
 - 6.5 REQUESTS FOR ADDITIONAL INFORMATION
 - 6.5.1 Supplemental information
 - 6.5.2 eRAI process (drafts, clarification call, formal, response)
 - 6.5.3 Response timing assumptions
 - 6.5.4 Collateral changes
 - 6.5.5 Application markups
 - 6.6 FREQUENCY OF INTERACTIONS
 - 6.7 APPLICATION REVISIONS
 - 6.8 REVIEW PHASES AND SCHEDULE
 - 6.9 BUDGET
 - 6.10 RELATION TO OTHER PROCEEDINGS/REVIEWS
- 7 WITHHELD INFORMATION
- 8 PARTNERSHIPS AND INDUSTRY PARTICIPATION
- 9 SCHEDULE AND BUDGET CONSIDERATIONS
- 10 REFERENCES

PART III APPENDICES (if any)

Enclosure 3

Preliminary Questions/Comments from NRC Staff
on draft white paper on Safety Classification and Performance Criteria

version provided via email to support 11/02/2017 public meeting

(following 1 page)

Preliminary Comments/Questions on SSC Classification White Paper

(Note that NRC staff expects to provide comments and questions following public meeting scheduled for November 2, 2017.)

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Will need to discuss the inclusion of Reliability and Integrity Management within documentation. It is not clear to the staff that this approach will be accepted within the consensus codes and standards. In addition, the staff has questions on how a possible lack of operating experience would translate into the development of such a program for many advanced reactor technologies.

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Question on the sentences :

Thus the QA requirements for SR classified SSCs, while consistent with 10 CFR 50 Appendix B, should be risk informed and performance based, and not compliance based as with current operating reactors. Any QA requirements that do not contribute to providing assurance that SSC reliability and capability requirements will be met are not considered to beconsistent with their importance to safety.

It is not clear how one would implement this under standard QA programs. Do you have an example in mind of particular Appendix B criteria that might not apply to an SSC under certain circumstances? Is this related to a distinction between safety function classification and SSC classification discussed elsewhere in the paper?

General

The terminology within the LMP white papers are largely taken from the NGNP program, and include differences from current usage for the operating plants (e.g., design basis events). As we approach the development of a consolidated, technology-inclusive guidance document, industry, NRC and stakeholders will need to decide on whether to keep with the NGNP terminology, to adopt the traditional LWR terminology, or to adopt/develop an alternate terminology.

General

A factor considered within the existing programs (e.g., 50.69 and RG 1.174) is related to safety margins for the affected SSCs. How are safety margins considered within the assessments described in the white paper?

General

Sensitivity analyses are briefly discussed in Section 3.1, Functional Design Criteria for Safety-Related SSCs. Sensitivity analyses usually have a broader role in use of PRA results and in risk-informed SSC categorization. The role of uncertainty in PRA results in the SSC categorization process is also not discussed. A discussion of uncertainty in the quantitative analyses and broader use of sensitivity analyses are possibly applicable. A better guidance on sensitivity analyses will also apply.

General

The approach presented in this document for SSC categorization makes use of a comprehensive PRA for all initiators and modes of operation, presumably including all sources of radioactivity. The document does not discuss any alternate methods. The SSC categorization process for LWRs allows use of alternate methods like Fire Induced Vulnerability Evaluation (FIVE), Seismic Margin Analysis (SMA), Alternate Shutdown Evaluation Method, etc. Use of alternate methods may be discussed and criteria for using the methods may be included.