May 27, 2011

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

James T. Wiggins, Director
Office of Nuclear Security and Incident Response

Brian W. Sheron, Director
Office of Nuclear Regulatory Research

Catherine Haney, Director
Office of Nuclear Material Safety and Safeguards

Scott W. Moore, Acting Director
Office of Federal and State Materials
and Environmental Management Programs

Margaret M. Doane, Director
Office of International Programs

Miriam L. Cohen, Director
Office of Human Resources

Victor M. McCree, Regional Administrator, RII

Stephen G. Burns, General Counsel
Office of the General Counsel

FROM: Michael R. Johnson, Director ***/RA/***
Office of New Reactors

SUBJECT: REQUEST FOR PARTICIPATION IN CROSS-ORGANIZATIONAL ISSUE IDENTIFICATION AND RANKING PROJECT FOR ADVANCED REACTORS

The purpose of this memorandum is to request participation in the cross-organizational issue identification and ranking project (IIRP) for advanced reactors. SECY-10-0034, "Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs," dated March 28, 2010, identified several key technical and policy issues that needed to be addressed to support timely licensing decisions for advanced reactors. In the last 2 years, it has

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(301) 415-6402

become increasingly apparent that the leading designs to be submitted will be the small (less than 300 megawatts electric) integral pressurized-water reactors. However, the industry is still discussing other technologies (e.g., high-temperature gas-cooled reactors and liquid-metal cooled fast reactors).

We have developed action plans to address the policy issues identified in SECY-10-0034 and have benefitted from strong support from other offices, particularly from the Office of Nuclear Regulatory Research (RES) on control room staffing and risk-informed review guidance, and from the Office of Nuclear Security and Incident Response (NSIR) on emergency preparedness and security. To further explore all of the policy issues, we developed the IIRPs to look at the issues in detail, in an effort to identify aspects that were not being addressed or related issues that need to be addressed. Staff members from RES, NSIR, and the Office of Nuclear Reactor Regulation are participating on IIRP working groups for emergency preparedness, control room staffing, and mechanistic source term. The diversity of experience and views these staff members bring to their particular working groups has proven to be very effective in exploring the issues.

We are initiating the cross-organizational IIRP, involving experts from across the agency with diverse backgrounds and expertise, with the objective of identifying and ranking (in terms of importance and timing) those issues that need to be addressed to support timely licensing decisions for advanced reactor designs. While we are interested in all of the advanced reactor designs, we are emphasizing the integral pressurized-water reactors.

Enclosed with this memorandum is a draft charter for the IIRP and some explanatory information about the process and the types of issues that may warrant further consideration.

I request that you identify a point of contact for your office that will help identify appropriate staff to participate in the working group for the IIRP. Lawrence Kokajko, the Acting Deputy Office Director for the Office of Nuclear Material Safety and Safeguards, has agreed to serve as the Senior Executive Service facilitator for this project. To support Lawrence and the project, we ask that you identify seasoned staff who can address broad, cross-cutting issues for these new designs. Based on an earlier meeting I had with some of you, points of contact have already been identified for RES (Kathy Gibson and Mike Scott) and for NSIR (Doug Huyck).

Please e-mail the name for your designated point of contact to Michael Mayfield, Director of the Advanced Reactor Program. If you or your staff members have questions about the IIRP or this request, please contact Mr. Mayfield at Michael.Mayfield@nrc.gov or at 301-415-0561.

Enclosure: As stated

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ADAMS Accession Number: ML111430520 ***via e-mail** **NRO-002**

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DATE	5/25/2011	5/24/2011	5/27/11

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Office of New Reactors

Advanced Reactor Program

Issue Identification and Ranking Project for Small Modular Reactor Cross-Organizational Issues

Working Group Charter

A. Introduction

Congress, the U.S. Department of Energy, and the nuclear industry have expressed strong interest in the development and commercialization of smaller nuclear reactor designs and corresponding facilities in the United States. Because of this national interest, the U.S. Nuclear Regulatory Commission (NRC) is developing a licensing framework to proactively identify and resolve potential regulatory impediments that could impact the nuclear industry's business plans. The main objective of the ongoing issue identification and ranking projects (IIRPs) within the Office of New Reactors' (NRO's) Advanced Reactor Program (ARP) is to identify all issues and questions that would need to be addressed to ensure successful licensing decisions (yes or no) for the diverse advanced reactor technologies and designs under consideration, specifically issues related to small modular reactors (SMRs). These may include policy, legal, technical, administrative, and logistical issues and questions.

B. Objective

The overall objective of the IIRP for SMR cross-organizational issues (COI) and its associated working group (WG) is to identify and prioritize the NRC regulations, guidance, resources, or schedules that could have a significant or potential impact on the SMR industry. This initiative will consider the life cycle of a power reactor in the areas of licensing, design certification, construction, operation, and decommissioning. This broad, comprehensive IIRP SMR-COI is in addition to the ARP activities described in Section C below, and it will focus on integral pressurized-water reactors while considering issues related to other technologies (e.g., high-temperature gas-cooled reactors and sodium-cooled fast reactors).

C. Background

ARP has been engaged in the early identification of potential policy, licensing, and key technical issues impacting design and license review applications for SMRs (see SECY-10-0034, "Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs," dated March 28, 2010). ARP has developed a program plan "to prepare for expected applications related to the design, construction, and operation of advanced reactors." This program also contains a systematic approach that focuses on addressing identified issues early (before license application submittal) in order to support specific design reviews of SMRs by fiscal year 2012. Each issue is assigned to a staff member who maintains the information

current while providing support for its resolution. By focusing early on identified issues, their potential impact on NRC resources associated with the licensing review schedule can be evaluated in time to prevent challenges to the SMR application review and approval processes. ARP has completed an SMR IIRP for emergency preparedness and is in on schedule to finish SMR IIRPs for source term, security, and staffing issues. Furthermore, preapplication meetings with stakeholders are ongoing and joint design centers are also asking stakeholders to identify potential SMR policy and technical issues.

D. Scope

The NRC staff and IIRP SMR-COI WG members will solicit stakeholder input as appropriate and conduct a broad, comprehensive review to identify cross-organizational SMR issues that could potentially affect or are related to the following (see draft examples in Enclosure 1):

- new design features and associated impact on NRC resources
- potential need for legislation, rulemaking, or policy changes
- need for NRC confirmatory research (e.g., new fuel design)
- dependencies on other policy or technical issues (e.g., source term input into emergency preparedness and response)
- applicant activities outside the licensing plan
- impact on NRC regulations (Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 20, 40, 50, 52, 73, etc.).
- other

The WG will make its findings and conclusions available in a final report to senior NRC management by September 2011. The final report, along with other ARP IIRPs, may become enclosures to a possible ARP staff SECY paper addressing a Commission staff requirements

memorandum (M110329) expecting the staff "to think early and expansively about upcoming issues and to engage the Commission early."

E. Project Tasking

The WG will complete the following tasks:

1) Identify the Senior Executive Service facilitator and WG membership.

2) Generate an IIRP SMR-COI "strawman" to help WG members focus on the objective of this initiative (see draft in Enclosure 1).

3) WG members fine tune the IIRP SMR-COI process (see Enclosure 4).

4) Determine the scope of the review (i.e., the information that the WG should review and consider to identify potential nontechnical issues that could have a significant impact on NRC resources or schedule, such as those identified in SECY-10-0034 and partially captured in the ARP issues worksheets).

5) Determine how the WG will acquire the information identified in step 4.

6) Apply the process defined in step 3.

7) Brief management on the results of the WG's findings.

8) Provide recommendations.

9) Issue WG findings in a final report.

F. Milestones and Detailed Schedule

The Microsoft Project detailed schedule file on the WG's SharePoint site provides the milestones and detailed schedule.

G. Team Leader Functions and Tasks

The team leader for the WG has the following functions and tasks:

1) Open a Technical Assignment Control (TAC) number.

2) Create and maintain an IIRP SMR-COI WG SharePoint site.

3) Schedule and lead WG and other meetings.

4) Prepare the agenda, minutes, and schedules and track action items from the meetings.

5) Circulate draft products via e-mail or the SharePoint site or both to WG members for review.

6) Notify responsible managers in the event of a modification to the IIRP SMR-COI WG charter.

7) Coordinate management briefings, as necessary.

8) Coordinate with senior management the issuance of the final report on the WG's findings.

H. IIRP SMR-COI WG Members

Members of the WG should include senior staff members, from the offices noted in the table below, who have a solid understanding of nuclear reactor technologies.

OFFICE	POINT OF CONTACT—WG MEMBER
1) NRO	
2) RES	Kathy Gibson and Michael Scott
3) NRR	
4) NMSS	
5) NSIR	Doug Huyck

*Blue underlined text are links to documents

6)	FSME	
7)	OGC	
8)	HR	
9)	IP	
10)	OI	
11)	OE	
12)	OCFO	
13)	Region II	

I. WG Membership Functions

WG members have the following functions:

1) Review the IIRP SMR-COI strawman (see draft in Enclosure 1) and issues already identified in the completed or ongoing ARP IIRPs.

2) Participate in meetings and perform action items generated during meetings.

3) Maintain the perspective of a subject matter expert from the NRC office being represented to influence identification of the IIRP SMR-COI issues that may exist in that area. For example, the member from the Office of Nuclear Security and Incident Response (NSIR) should maintain at least a broad perspective on security and emergency preparedness with regard to this IIRP SMR-COI objective.

4) Review documents and files posted on the WG's SharePoint site. Upload documents as necessary.

5) Periodically brief the WG on the status of any significant findings associated with SMR cross-organizational issues.

6) Rank the importance of these issues and questions in terms of their potential adverse impact on licensing decisions for design certifications and combined operating licenses.

*Blue underlined text are links to documents

7) Asses the need for NRC action to develop the basis to address the issues and answer the questions. Prioritize the resolution of each issue and question against criteria established by the WG.

8) Provide input for the final IIRP SMR-COI report.

J. Duration

The WG will be in place until it issues the IIRP SMR-COI final report (by September 2011).

K. Estimated Level of Effort

The team leader will coordinate WG meeting dates and locations in consultation with the WG members and facilitator, as appropriate. Certain offices will not expend the maximum level of effort because they have less involvement with SMR technologies. These offices may participate with minimum involvement and attendance at the meetings. Some offices may opt to use their senior staff, as necessary and approved by their management. The draft table in Enclosure 2 includes an estimate of each office's level of effort and will be adjusted by the participating office, possibly during the first WG meeting. The total level of effort for participation could range from 16 to 100 hours.

L. Proposed Sequence of WG Activities

The following provides a brief description of the sequence of WG activities (see the detailed schedule at the WG's SharePoint site):

1) First WG Meeting—Everyone attends:

This introductory meeting will allow WG members to become broadly familiar with the newest information available to ARP about advanced reactors and SMRs. The WG members will set the pace and path forward to accomplish the objectives of the IIRP SMR-COI WG. Members will address the following items during this meeting:

a) Receive introduction to the initiative.
b) Hear presentation on SMRs and advanced reactor technologies.
c) Discuss the IIRP SMR-COI scope and definition of path forward.
d) Make level-of-effort commitments from each WG member (update Enclosure 2).

e) Brainstorm strawman and exploratory questions (see Enclosure 3).

2) Time gap for independent work:
WG members take time to brainstorm about the concept and issues with applicable personnel in their offices and to focus on drafting issue statements. This effort is supported by contributions via tools established on the WG's SharePoint page.

3) Second WG Meeting—Focus Group Session:
Some WG members may be absent or choose to participate or listen via teleconference because of the moderate involvement of their offices with SMR issues. Members will address the following items during this meeting:
a) Report and share findings.
b) Assess cross-linkage of issues between disciplines.
c) Develop issue statements for the draft report.

4) Third WG Meeting—Everyone attends:
The WG conducts a hands-on review of the draft final IIRP SMR-COI report. Members will address the following items during this meeting:
a) Engage in tabletop-style discussion.
b) Review issue statements in the draft report.
c) Complete a final draft of ranked issues and summarize the conclusions.

M. Resources/Budget

For the previously identified IIRPs (emergency preparedness, source term, security, and staffing), ARP has worked closely with NRC office managers and staff, finding applicable and appropriate TACs for labor charges. The IIRP SMR-COI initiative is likewise an emergent program in the budget cycle, and ARP management will look into the possibility of having this initiative funded similarly to the other IIRPs, as well as into the possibility of acquiring its own funding. It is also understood that participation by senior-level staff members implies investment of their time. Even though the invested time is spread out over a 5-month period, it is an increased burden added to the activities already assigned to their positions.

N. Charter Modifications

NRC senior management will approve the original IIRP SMR-COI charter, and WG members will obtain concurrence from ARP management for substantive changes to either the charter tasking (objective and scope) or the desired outcome.

Enclosure 1

Examples of Small Modular Reactor Cross-Organizational Issues

1) The financial process and procedures to charge annual license and inspection fees may require change or adjustments, when compared to current practices applicable to light-water reactors (LWRs).

2) Differing reactor fuel designs accommodate advanced reactor or small modular reactor (SMR) technologies. The Next Generation Nuclear Plant uses TRISO fuel in its reactor design, and a new facility to produce commercial fuel assemblies to support such technology may take many years to license and build. Other advanced concepts with fuel designs near 20-percent fuel enrichment present similar challenges.

3) Modifications to the U.S. Nuclear Regulatory Commission Operations Center and Region IV Backup Operations Center will be needed to accommodate new categories of reactor technologies. For example, RASCAL is designed to estimate dose assessment, and Emergency Response Data System transmission of prescribed sets of data points is only for LWR technologies.

4) Construction activities may not be similar when compared to those of LWRs, including different stages for inspections, tests, analyses, and acceptance criteria. There may be a need to address modular fabrication both on site and off site.

5) Plans and costs for resident inspectors (RI/module or site?) and the oversight programs may need to be changed. Applicants may request to use their remote monitoring capabilities to comply with regulations.

6) An applicant may wish to import an SMR from a foreign country. The implications of such a consideration range from the impact on nonexisting regulations to a possible use of a different type of reactor fuel such as thorium in an SMR.

Enclosure 2

Level of Effort for Office Working Group Members

Description of Activity	Level of Effort (hours)												
	NRO	RES	NRR	NMSS	NSIR	FSME	OGC	HR	IP	OI	OE	OCFO	Region II
1) Project Kickoff													
a. Introduction of project to Office Directors													
b. General briefings													
2) Individualized WG Member Briefings and Interviews													
3) Surveys													
4) Team Coordination and Communication													
a. Teleconferencing													
b. SharePoint site													
c. E-mail													
5) WG Meetings													
a. Preparation													
b. Meeting 1													
c. Meeting 2													
d. Meeting 3													
6) WG Documents Review													
a. Research													
b. Discussions via SharePoint													
c. Draft and final reports													
7) Other (Presentations, Briefings etc.)													
Total Hours													

*Blue underlined text are links to documents

Enclosure 3

Examples of Exploratory Questions for the Issue Identification and Ranking Project for Small Modular Reactor Cross-Organization Issues Working Group

Regions

- Resident inspectors at small modular reactor (SMR) sites? Number? Link to power level? Number of modules?
- Resident inspectors at fabrication sites? Number?
- SMRs could be installed in many more locations in all the regions. Not just a Region II issue?

Office of Human Resources

- Simulators at the Technical Training Center? All designs? Basis?
- Training courses for regional inspectors and Headquarters staff? Make part of a series? Basis for deciding to develop courses?
- When to expand training courses to nonlight-water-reactor technologies? Part of knowledge management?

Office of Nuclear Security and Incident Response

- Operations Center—what will it need to know about the designs and when?
- Do we need training for response teams on the designs? What level?

Office of International Programs

- Will export of these designs and fabricated reactors raise nonproliferation issues?
- Fast reactors are primarily an export market. With higher enrichment, is there a different role for the U.S. Nuclear Regulatory Commission (NRC)? What do we need to be doing, internally as well with USG, to deal with this?

Office of Nuclear Material Safety and Safeguards

- Fuel fabrication for fast reactor fuel? Is the office ready for this? Does it have a staff and infrastructure development path that needs to be in their long-term planning window?
- mPower wants to store 60 years of spent fuel in a pool in the basement of reactor building. Does this create new or additional challenges?
- Are there issues for independent spent fuel storage installations (ISFSIs) for half-height fuel assemblies? Would there be challenges if the utility wants to “stack” assemblies in a cask? How could or would the utility minimize the size of the ISFSI? Stacked casks? What issues would we have with this?
- What about waste confidence for fast reactor fuel?
- Does the office have what it needs in terms of training and regulatory structure if the U.S. Department of Energy (DOE) were to move forward with a burner reactor? Are the two offices in sync?

- USG agencies are now discussing a fuel take-back program, going beyond the highly enriched uranium from research and test reactors. This is an important issue for the SMRs, particularly fast reactors. Is the Office of Nuclear Material Safety and Safeguards engaged with the Office of International Programs? What role would the Office of New Reactors have, if any, based on the agency issuing a design certification or, worse yet, a manufacturing license?

Office of the General Counsel

- Legal implications from all of this?
- Tentacles?

Office of Nuclear Regulatory Research

- What more does the office need to be doing and when?

Office of Federal and State Materials and Environmental Management Programs

- State and tribal link? SMRs could be installed in areas not previously considered for nuclear power plants. What outreach does the office need to be thinking about?

Office of Investigations/Office of Enforcement

- Factory fabrication has a lot more potential for mischief. What do the offices need to be doing? Training?
- If we put resident inspectors in the fabrication facilities, how would this change the relationships with the regions? Or would it?

Agencywide

- Think about John Kelly's (DOE) vision of a thousand SMRs. What would that mean to the NRC? Even if it is only a couple hundred SMRs?

Enclosure 4

Process for the Issue Identification and Ranking Project for Small Modular Reactor Cross-Organization Issues Working Group

This initiative will make use of the applicable principles of the phenomenon identification and ranking table (PIRT). The working group (WG) members will determine the process to accomplish the purposes of the Issue Identification and Ranking Project for Small Modular Reactor Cross-Organization Issues Working Group (IIRP SMR-COI WG) using a process **similar** to the steps below:

1. **IIRP SMR-COI Objective**—Clearly define the specific objectives of the issue identification and ranking project (IIRP) while considering Advanced Reactor Program management guidance. This is strongly oriented to the intended use of the IIRP outcome (i.e., issue identification is more regulatory and programmatic and less technical).

2. **Database/Background**—Compile and review background information that captures relevant knowledge (e.g., SECY papers and relevant studies and reports). The accuracy of the IIRP process improves with quality, quantity, and availability of applicable information.

3. **Facilities and Scenarios**—Specify plant and key plant systems and components and identify and define relevant scenarios (completeness is a primary goal). The details in scenario descriptions varies with intended use (e.g., regulatory for IIRP vs. technical for PIRT).

4. **Figure of Merit (FOM) or Evaluation Criteria**—Select and clearly define key FOMs (e.g., safety significance, regulatory significance, impact on staffing and schedule and on applicant go/no go decisions) against which the relative importance of each issue is judged. Note that these are different in nature from FOMs used in the PIRT process since the focus here is regulatory rather than technical. The FOMs should relate directly to the issues being identified or evaluated. They should be easily comprehended, explicit, and measurable, and they are often born or driven from regulations. This step is critical since WG members often struggle with FOMs that are poorly defined or difficult to apply.

5. **Issues**—Systematically identify and define all plausible issues (completeness is a primary goal). At this stage, issues can be compartmentalized but they should not be evaluated or ranked yet relative to FOMs. A draft list with draft issues (strawman) will be provided to stimulate thinking before the WG meetings and in order to save time and resources.

6. **Importance Ranking**—Assign importance to identified issues relative to FOMs and document the rationale for the ranking. The IIRP process is designed to result in importance ranking, and all previously described steps are used in preparation for the importance ranking activity. This effort may also result in moving some issues from one

compartment to another. The quality of the resulting ranking is based upon collective expertise and the expertise of individual panel members, as well as on a correct and common understanding of FOMs. A scale of high, medium, or low (H, M, L) importance is often sufficient, but a scale of 1 to 5 can also be used.

7. **Knowledge Level**—Assess the current level of knowledge for each identified issue and document the rationale for the selected level. This includes knowledge and understanding of the issue itself, as well as how it impacts the FOMs. A scale of known, partially know, or unknown (K, PK, UK) is often sufficient, but a scale of 1 to 5 can also be used.

8. **Documentation**—Document the overall effort of the IIRP SMR-COI WG with sufficient coverage such that a knowledgeable reader can understand the process and outcome.