

POLICY ISSUE NOTATION VOTE

October 7, 2011

SECY-11-0140

FOR: The Commissioners

FROM: R. W. Borchardt
Executive Director for Operations

SUBJECT: ENHANCEMENTS TO THE FUEL CYCLE OVERSIGHT PROCESS

PURPOSE:

The purpose of this paper is to provide the Commission with recommendations for next steps to enhance the fuel cycle oversight process (FCOP). The paper also informs the Commission about the staff activities to provide fuel cycle licensees and certificate holders with credit for effective corrective action programs (CAPs).

SUMMARY:

In response to staff requirements memorandum (SRM) M100429, "Briefing on the Fuel Cycle Oversight Process Revisions," dated May 12, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML101320075), and SRM-SECY-10-0031, "Revising the Fuel Cycle Oversight Process," dated August 4, 2010 (ADAMS Accession No. ML102170054), the U.S. Nuclear Regulatory Commission (NRC) staff (1) developed and discussed with the Advisory Committee on Reactor Safeguards (ACRS) a paper comparing integrated safety analyses (ISAs) for fuel cycle facilities and probabilistic risk assessments (PRAs) for reactors (ISA/PRA comparison paper), (2) developed two approaches for cornerstones, and (3) developed a process to provide incentives for licensees to maintain effective CAPs. The staff integrated the knowledge gained from the ISA/PRA comparison paper and the cornerstone development to identify three conceptual types for a fuel cycle significance determination process (FCSDP). Based on this work, the staff developed recommendations for next steps.

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BACKGROUND:

Fuel facility oversight is currently performed in accordance with Inspection Manual Chapters 2600, "Fuel Cycle Facility Operational Safety and Safeguards Inspection Program," 2681, "Physical Protection and Transport of Special Nuclear Material and Irradiated Fuel Inspections of Fuel Facilities," and 2683, "Material Control and Accounting Inspection of Fuel Cycle Facilities," using a suite of inspection procedures in designated safety and security disciplines. Noncompliance is addressed under traditional enforcement. Inspections are performed by staff in Region II and the Offices of Nuclear Material Safety and Safeguards and Nuclear Security and Incident Response.

In March 2010, the staff provided the Commission in SECY-10-0031 a plan to develop an FCOP that is more risk informed and performance based. On April 29, 2010, the staff briefed the Commission on revising the FCOP. In response to SECY-10-0031 and the staff's briefing, the Commission directed the staff to: (1) provide a paper comparing ISAs and PRAs, including ACRS review; (2) develop a set of cornerstones that could be applied to the FCOP; (3) provide the Commission with an assessment of the work accomplished and recommendations for next steps once the project to develop cornerstones and the ISA/PRA comparison paper were completed; and (4) provide incentives for licensees to maintain effective CAPs.

Consistent with Commission direction, the NRC staff compared ISAs for fuel facilities and PRAs for reactors, documented the results of this comparison in "A Comparison of Integrated Safety Analysis and Probabilistic Risk Assessment" (ADAMS Accession No. ML110610195), and submitted it to ACRS for review. In the ISA/PRA comparison paper, staff concluded, and the ACRS agreed, that ISAs are acceptable for assuring adequate protection under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, "Domestic Licensing of Special Nuclear Material." ISAs are performed to identify potential accident sequences, designate items relied on for safety (IROFS) to prevent or mitigate those accident sequences, and describe management measures to be applied to assure the reliability and availability of IROFS to satisfy the performance requirements of Subpart H to 10 CFR Part 70. Because ISAs are not performed to support risk significance and usually contain conservatisms, the staff expects that modification of the conservatisms would be needed to obtain reasonable, consistent, and realistic evaluations of the risk significance of inspection findings. The staff also concluded that order-of-magnitude significance determination is sufficient for evaluating the risk significance of inspection findings.

In carrying out the Commission's direction, the NRC staff met with external stakeholders four times and received written comments from the Nuclear Energy Institute. The staff also met with the ACRS Subcommittee on Radiation Protection and Nuclear Materials and the Full Committee to discuss the ISA/PRA comparison paper and other elements of an enhanced FCOP.

DISCUSSION:

Upon completion of the ISA/PRA comparison paper, the staff developed proposed cornerstones and integrated the insights gained from those activities to develop three options for enhancing the FCOP. These options are described in Enclosure 1. The staff also developed attributes for an effective CAP and proposed a policy change that can give a licensee with an effective CAP credit in the Enforcement Policy.

Options for Enhancing the FCOP

Option 1: This option includes an FCOP with cornerstones, FCSDP, and action matrix based on FCSDP results. The staff would use cornerstones to risk-inform the core inspection program, to aggregate the inspection findings in the performance assessment process, and ultimately to feedback to the core inspection program for continuous improvement. The FCSDP would be used to assess the safety or security significance of inspection findings in an objective, predictable, and transparent manner. In developing Option 1, the staff considered two cornerstone approaches (hazards analysis-based and operations-based) and three types of FCSDPs (qualitative, case-by-case, and PRA-based). These are discussed below and in Enclosures 2 and 3, respectively.

Further, under Option 1, the staff would pilot the use of the performance deficiency concept and minor threshold criteria, and give credit to licensees with an effective CAP. The performance assessment process would contain a fuel cycle action matrix based on the FCSDP and consider the cross-cutting areas used in the Reactor Oversight Process (ROP). The cross-cutting areas would be informed by the Safety Culture Policy Statement. A supplemental inspection program, based on licensee performance, would be developed. Finally, the NRC Enforcement Policy would be revised to incorporate the FCSDP.

Option 2: This option does not include the use of cornerstones and FCSDP. In place of the cornerstones, the staff would use what was learned from the cornerstone development effort to inform the core inspection program. In place of the FCSDP, the staff would use the current issue disposition process (i.e., traditional enforcement), with improvements. Currently, the staff is developing guidance for inspectors to apply risk insights to inspection findings using the existing fuel cycle supplements of the Enforcement Policy (i.e., Section 6.2). Similar to Option 1, the staff would pilot the use of the performance deficiency concept, give credit to licensees with an effective CAP, develop a performance assessment process that would contain an action matrix based on traditional enforcement results and consider the cross-cutting areas used in the ROP (the cross-cutting areas would be informed by the Safety Culture Policy Statement), and develop a supplemental inspection program.

Option 3: This option entails making minimal, incremental enhancements to the existing oversight process, but not changing the overall framework. These incremental enhancements would give credit for CAPs in the existing oversight process and make improvements to the licensee performance review (LPR) process.

Although the current oversight process is adequate for verifying that fuel facilities are safely and securely being operated in accordance with NRC rules and requirements, the elements in Option 1 would provide the tools for inspecting and assessing licensee performance in a more risk informed, objective, predictable, and transparent way. Additionally, they would provide a systematic way for adjusting the inspection program based on licensee performance.

Under Option 2, some of the tools for inspecting and assessing licensee performance in a more risk informed, objective, predictable, and transparent way would not be available. For example, cornerstones would not be available to aggregate the inspection findings for use in the performance assessment process or to feedback to the core inspection program for continuous improvement. However, Option 2 could be considered as a part of a phased implementation of Option 1.

Option 3 would save the short-term resources that would be needed to make program changes under Options 1 and 2, and it can be carried out using current budgeted resources for program maintenance and updates. Option 3 creates the potential for unintended duplication of effort in inspection procedures. The current program does not provide a systematic way to adjust the inspection program based on licensee performance. In addition, the existing LPR process does not have standard criteria for assessment (i.e., less predictable) and there is no clear and consistent approach for determining the appropriate level of NRC oversight (i.e., less transparent). Duplicate inspections and inspection resources applied to areas of lower risk significance could continue. In addition, although the current LPR process is adequate, it would continue to produce assessments that would not be as objective, predictable, and transparent as under the other options.

Cornerstone Development

The staff developed two approaches for cornerstones: hazards analysis-based and operations-based. The hazards analysis-based and operations-based cornerstones are described in Enclosure 2, including a discussion of the pros and cons of each cornerstone approach. The hazards analysis-based cornerstones are based on the way licensees typically developed their ISAs: "Accident Sequence Initiators," "Safety Controls," "Emergency Preparedness," "Public Radiation Safety," "Occupational Radiation Safety," and "Security/Material Control and Accounting (MC&A)." The operations-based cornerstones are based on the way licensees typically organize their safety programs: "Criticality Safety," "Chemical Safety," "Radiation Safety," "Emergency Preparedness," and "Security/MC&A." The benefits of adopting either cornerstone approach would be to provide the foundation for a risk-informed and performance-based inspection and assessment program.

Although, the NRC staff prefers further development of the hazard analysis-based cornerstones, the fuel cycle industry has communicated a preference for the operations-based cornerstones because of its alignment with existing facility operations and analyses. The industry further communicated that use of the operations-based cornerstones would facilitate communications with their stakeholders and staff.

Integration of Knowledge from the ISA/PRA Comparison Paper and Cornerstone Development

The NRC staff integrated the knowledge gained from the ISA/PRA comparison paper and the cornerstone development to identify three conceptual FCSDP types that could be considered.

Development of an FCSDP would be an enhancement to the FCOP. For the ISA-related cornerstones, the FCSDP would consist of one of the three conceptual types discussed below. The ISA-related cornerstones in the hazards analysis-based approach are "Accident Sequence Initiators" and "Safety Controls." The ISA-related cornerstones in the operations-based approach are "Criticality Safety," "Chemical Safety," and "Radiation Safety" (the portion that addresses the requirements in Subpart H of 10 CFR Part 70). The three conceptual types of FCSDP described below could be applied to either set of cornerstone approaches.

For the non ISA-related cornerstones, the FCSDP would rely on deterministic processes that would be similar to the deterministic evaluation currently used within the ROP significance determination process (SDP). The non ISA-related cornerstones in the hazards analysis-based approach are "Emergency Preparedness," "Public Radiation Safety," "Occupational Radiation Safety," and "Security/MC&A." The non ISA-related cornerstones in the operations-based

approach are “Radiation Safety” (the portion that addresses the requirements in 10 CFR Part 20, “Standards for Protection Against Radiation”), “Emergency Preparedness,” and “Security/MC&A.”

The staff considered the following three conceptual types of FCSDPs:

- **Qualitative Type** – This type of evaluation would be based on qualitative criteria, not actual numerical risk quantification, but with similar risk and safety significance objectives as the case-by-case and PRA-based types. This process would be based on an evaluation of the deficient condition with respect to duration, the reduced number and quality of controls, and the potential consequences. Staff envisions that a refined risk-index method as in NUREG-1520, “Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility,” would be part of this approach along with consideration of licensees’ ISAs.
- **Case-By-Case Type** – As described in the ISA/PRA comparison paper, this type of evaluation would be performed on a case-by-case basis and be informed by the ISA. These evaluations would be performed by NRC staff, with information from licensees, and would evaluate the safety significance of each inspection finding when it occurs. The conservatism in the ISA results would be adjusted using standardized NRC guidance and data as needed. The staff considers that this type would be a simplified quantitative method.
- **PRA-Based Type** – This type of evaluation would be based on fully quantitative PRAs performed before an FCSDP process is applied. It is analogous to the ROP SDP and would require a full PRA for all processes at all facilities. This type would also require inspector notebooks, or similar guidance, for performing significance evaluations. These PRAs would have to be performed by licensees, due to the great variety of process designs and their unique and proprietary nature.

The pros and cons for each conceptual type of the FCSDP are described in Enclosure 3. The industry generally supports development of the qualitative type FCSDP. However, industry stated that more detailed discussions are needed on how the FCSDP would be developed and implemented.

Status of Activities to Provide Incentives for Licensees to Maintain Effective Corrective Action Programs

NRC regulations or licenses generally require fuel cycle licensees to implement some CAP elements for certain aspects of their licensed activities, such as the identification and implementation of corrective actions for IROFS or management measures failures, audit and assessment findings, and incident investigation results. Licensees have stated that they implement effective CAPs that go beyond the scope of current NRC requirements. To solicit stakeholder feedback, the NRC staff published a proposed policy change in the Federal Register (Volume 76 of the *Federal Register*, page 54,986; September 6, 2011) that can give a licensee with an effective CAP credit in the Enforcement Policy. This proposed policy change would provide licensees an incentive to implement effective CAPs by allowing the NRC to disposition a notice of violation for NRC inspection findings of very low safety or security

significance (Severity Level IV) as a noncited violation if a licensee enters the violation in its CAP and meets certain other criteria.

The staff's proposed process to provide licensees with credit for effective CAPs establishes objectives and attributes that licensees would be required to include in their CAP to enable the NRC to apply the proposed Enforcement Policy criteria. The staff presented the CAP objectives and attributes to stakeholders in public meetings, and there is general agreement among licensees that the objectives and attributes are applicable to an effective CAP. The basic objectives and attributes of an effective CAP are described in Enclosure 4.

The staff developed a conceptual process for the NRC to confirm that a licensee that wants the NRC to apply the revised Enforcement Policy at its facility has implemented an effective CAP. A licensee who voluntarily chooses to implement a CAP that includes the NRC's CAP objectives and attributes must request a license amendment to include a license condition regarding CAP objectives and attributes. This license condition enables the NRC to enforce the licensee's CAP commitments. Some licensees may already have an adequate license condition for the CAP objectives and attributes while others may need to amend their license to ensure they have a license condition for the objectives and attributes. When the NRC staff determines that a licensee is bound by a license condition to the objectives and attributes, the NRC staff would schedule an inspection to confirm that the licensee has implemented an effective CAP. If the NRC staff concludes the licensee's CAP is effective, the staff would inform the licensee that the NRC would apply the revised Enforcement Policy at the facility.

To enable implementation of this approach, the NRC staff would publish the effective CAP objectives and attributes, develop a license review process and guidance to ensure licensees are bound to the CAP objectives and attributes by license condition, and develop an inspection procedure to confirm that a licensee has implemented an effective CAP. In addition, the staff would make changes to the fuel cycle facility Inspection Manual Chapter and train staff on the CAP license condition review process and inspection procedure. An assessment of the CAP, as it applies to specific inspection areas, would be conducted during the implementation of inspection procedures. A focused inspection on the licensee's CAP would also be periodically performed. Both efforts would be used to evaluate the effectiveness of the CAP.

In the next Enforcement Policy update scheduled for 2012, the staff plans to revise the current noncited violation policy to allow NRC staff to not cite NRC identified Severity Level IV violations at fuel cycle facilities who enter these violations in an effective CAP.

The NRC staff recognizes that issuing noncited violations for NRC-identified Severity Level IV violations may not be a sufficient incentive for some licensees to propose a license condition for effective CAPs. Therefore, the NRC staff plans to implement an additional incentive for licensees to maintain effective CAPs as a part of the effort to enhance the FCOP. If the path forward for the enhanced FCOP is approved, the staff plans to include a means of adjusting the frequency of the focused inspection of the CAP based on the assessment of the licensee's CAP.

RECOMMENDATION:

The NRC staff recommends Option 1 for enhancing the FCOP.

If the Commission approves Option 1, the staff also recommends that the Commission approve:

- a) further developing cornerstones using the hazards analysis-based approach and revising the inspection procedures and Inspection Manual Chapters (Enclosures 1 and 2), and
- b) developing the qualitative type FCSDP (Enclosures 1 and 3)

The staff would use a measured approach to develop these enhancements with stakeholder input. The staff requests the early release of this paper to support the November 1, 2011, Commission meeting on the Fuel Cycle Oversight Process.

RESOURCES:

The resources needed in fiscal year (FY) 2012 and FY 2013 to carry out Option 1 with the qualitative type FCSDP are requested in NRC's FY 2012 Congressional Budget Justification and FY 2013 Performance Budget to the Office of Management and Budget, respectively. Further details regarding the required resources can be found in Enclosure 5.

SCHEDULE:

The staff recommends further enhancements to the FCOP while continuing to engage stakeholders. Initial development of Option 1 with the qualitative type FCSDP can be performed in FYs 2012 and 2013. With additional resources in FYs 2014 and 2015, the staff expects that Option 1 with the qualitative type FCSDP can be completed. With the development of Option 1 with the qualitative type FCSDP and inspector training completed, the staff expects to begin initial implementation of the enhancements in calendar year 2015.

COORDINATION:

The Office of the General Counsel has reviewed this Commission paper and has no legal objections to its content. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

/RA by Michael F. Weber for/

R. W. Borchardt
Executive Director
for Operations

Enclosures:

1. Options for Enhancing the Fuel Cycle Oversight Process
2. Cornerstone Development
3. Pros and Cons for Each Conceptual Type of the Fuel Cycle Significance Determination Process
4. Basic Attributes and Objectives of an Effective Corrective Action Program

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