POLICY ISSUE
NOTATION VOTE

November 18, 2011 SECY-11-0163

FOR: The Commissioners

FROM: Catherine Haney, Director
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REPROCESSING RULEMAKING: DRAFT REGULATORY BASIS AND PATH FORWARD

PURPOSE:

To provide the Commission with a summary of staff progress and a path forward on establishing a regulatory framework and to provide a draft regulatory basis document that addresses the regulatory gaps for licensing and regulating a reprocessing facility.

BACKGROUND:

In August 2006, the U.S. Department of Energy (DOE) altered its approach to the Global Nuclear Energy Partnership (GNEP) from small-scale demonstrations to focusing on an industry-based approach to developing spent nuclear fuel (SNF) reprocessing, fuel fabrication, and advanced burner reactor (ABR) facilities. In response, the U.S. Nuclear Regulatory Commission (NRC) staff prepared SECY-07-0081, "Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership (GNEP)," dated May 15, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML063240070), which addressed four options for developing a regulatory framework to support the revised DOE GNEP program. On June 28, 2007, the Commission directed the staff (SRM-SECY-07-0081, "Staff Requirements—SECY-07-0081—Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership (GNEP)" (ADAMS Accession No. ML071800084)) to proceed with a regulatory gap analysis and identify changes in the requirements for licensing a potential reprocessing facility that included an ABR.

CONTACT: John Sulima, NMSS/DSFAS
301-492-3180

In 2008, three commercial entities informed the Commission of their interest in moving forward with SNF reprocessing outside the GNEP framework. The staff deferred work on other components of the GNEP concept, including regulatory activities on the ABR, and focused on the technical bases needed to support rulemaking for potential commercial SNF reprocessing facilities, in response to DOE and industry needs (SECY-08-0134, "Regulatory Structure for Spent Fuel Reprocessing," dated September 12, 2008 (ADAMS Accession No. ML082110363)). In SECY-08-0134, the staff described three approaches to rulemaking for licensing and regulating a reprocessing facility: (1) revision of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," (2) revision of 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," or (3) the development of a new 10 CFR Part 7x. The staff recognized that because 10 CFR Part 50 had evolved into a regulation specific to light-water reactors (LWRs), it would be difficult to modify this part into an effective and efficient regulation for a production facility that reprocessed SNF. Additionally, the materials utilization requirements in 10 CFR Part 70 do not address potential fission product hazards associated with SNF reprocessing. Thus, the staff envisioned that integrating applicable requirements from 10 CFR Part 50 and 10 CFR Part 70 into a new regulation (i.e., 10 CFR Part 7x) might best address the unique safety and design issues for commercial SNF reprocessing facilities.

On May 28, 2009, the staff identified 23 regulatory gaps and assigned each gap a qualitative priority for resolution to support rulemaking (SECY-09-0082, "Update on Reprocessing Regulatory Framework—Summary of Gap Analysis" (ADAMS Accession No. ML091520280)). In SECY-09-0082, the staff considered the resolution of the 14 high-priority and the 5 moderate-priority gaps essential to the development of an effective and efficient regulatory framework. The staff also determined that the resolution of the remaining 4 low-priority gaps was not essential to move forward with rulemaking.

The staff discussed its fiscal year (FY) 2015 rulemaking schedule in "Annual Update on Reprocessing Activities—Timeline for Completion of Regulatory Framework," dated May 14, 2010 (ADAMS Accession No. ML101110446). Since the staff will not begin rulemaking and the associated environmental impact statement (EIS) until it completes the regulatory basis, it began developing an environmental topical report (ETR) to progress toward developing the EIS in parallel with completing the regulatory basis. The ETR will identify the framework and technical considerations and will support more efficient and effective development of an EIS.

DISCUSSION:

To set a foundation for rulemaking, the staff completed a draft regulatory basis document that provides the technical information needed to develop a regulatory framework for potential commercial SNF reprocessing facilities that ensures the protection of public health and safety and the environment and promotes the common defense and security. As discussed in SECY-08-0134, the staff considered including a new subpart in 10 CFR Part 70 or creating a new part specifically for reprocessing. After thorough consideration, the staff determined that the development of a new, reprocessing-specific regulation (i.e., 10 CFR Part 7x) provides the most effective and efficient approach to licensing and regulating a reprocessing facility. The staff is developing a risk-informed, performance-based approach, coupled with the technical basis for defense in depth (e.g., general design criteria), to ensure the safe handling of SNF,

special nuclear materials (SNM), separated fission products and actinides, and associated waste streams from reprocessing operations. The staff's effort will be further informed by a Commission decision on the results of the task force on the "Assessment of Options for More Holistic Risk-Informed, Performance-Based Regulatory Approach" led by Commissioner Apostolakis. The staff will also consider applicable findings arising from the Commission's decision on the staff's response to the Fukushima Dai-ichi event, such as station blackout, spent fuel safety, and protection of emergency response equipment.

In the enclosed draft regulatory basis document, the staff developed resolution paths for 17 of the 19 high- and moderate-priority gaps. For 3 of the 17 gaps with resolution paths (Gap 16—"Waste Incidental to Reprocessing," Gap 8—"Risk Informing 10 CFR Part 73 and 10 CFR Part 74," and Gap 4—"Exclusion of Irradiated Fuel Reprocessing Facilities in 10 CFR 74.51"), the staff has leveraged ongoing rulemaking activities for 10 CFR Parts 61, 73, and 74, respectively. The new 10 CFR Part 7x would reference these completed rulemakings. Based on current schedules, the staff currently projects completing rulemaking actions for 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," and 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," by the end of calendar year 2012. The staff anticipates that it will complete rulemaking action on 10 CFR Part 73, "Physical Protection of Plants and Materials," for fuel cycle facilities during FY 2016. The staff recognizes that significant delays of these ongoing rulemaking actions could adversely affect the overall schedule for the development of regulations for reprocessing facilities.

Two high-priority gaps, "Safety and Risk Assessment Methodologies and Considerations for a Reprocessing Facility" (Gap 5) and "Regulatory Framework" (Gap 1), need additional work to reach resolution. To determine an appropriate path of resolution for Gap 5, the staff is investigating the use of a hybrid approach involving a probabilistic risk assessment (PRA) and an integrated safety analysis (ISA), as well as a standard PRA approach. The staff will continue to develop analytical methods that may allow the application of quantitative risk insights in the development of a reprocessing rule. It would apply these methods to appropriate reprocessing processes and event sequences to gain fundamental risk insights on likely reprocessing operations. The staff plans to gather data from international and domestic analogous facilities to support development of these quantitative methods. The staff will use these risk insights to develop appropriate risk criteria and risk guidelines for SNF reprocessing facilities, which have a range of potential hazards that differ significantly from the hazards at other U. S. production, utilization, and commercial fuel cycle facilities, caused in part by the presence of actinides and byproduct material in SNF.

SECY-09-0082 did not previously identify some issues, such as emergency planning, seismic safety, and fire protection, as part of the regulatory framework gap (Gap 1). However, the staff has considered these issues in the development of the enclosed draft regulatory basis document. For these issues, 10 CFR Part 50 and 10 CFR Part 70 provide different requirements for reactors and fuel cycle fabrication facilities, respectively. As discussed in the enclosed draft regulatory basis document (Chapter 1), the staff determined that while sufficient technical bases exist for facilities regulated under 10 CFR Part 50 and 10 CFR Part 70, it needs to assess which of these requirements would be appropriate for reprocessing facilities. The staff expects that the preliminary risk assessments being conducted under Gap 5 would provide

more clarity on these issues. The staff will also leverage international data and analogous designs to estimate the hazards from both internal and external events, such as fires, flooding, and earthquakes.

The path forward over the next 4 years includes developing resolution paths for the two remaining gaps (Gaps 1 and 5), assessing a framework for addressing various industry-proposed technologies, and initiating a 4-year rulemaking effort upon completion of the regulatory basis. The staff will evaluate any new information, including stakeholder views, regarding the approach for rulemaking in the final version of the regulatory basis document that incorporates a risk-informed and performance-based program. Once the staff completes the final regulatory basis (expected to be in 2015), it will begin developing a proposed rule that it will forward for Commission approval. The staff will also work on an ETR that will help inform the development of the EIS. Completion of this report is currently scheduled for FY 2012.

Stakeholder Outreach and External Considerations

In addressing the gaps, the staff held three public meetings in FY 2011 and considered stakeholders' views in the development of the enclosed draft regulatory basis document. The staff also considered information from international counterparts as part of interagency agreement (DE-A101-07-NE24496/005) with DOE. Under this agreement, the NRC and the DOE participate in technical exchange activities related to the recycling of SNF.

Industry groups have taken an active interest in reprocessing during the development of a regulatory framework for reprocessing facilities. The industry continues to express support for commercial SNF reprocessing and to request clear, stable regulatory requirements that are technology-neutral. In recent months, potential applicants have submitted several letters urging the NRC to continue rulemaking efforts (ADAMS Accession Nos. ML11132A015, ML11125A069, and ML11200A157). In particular, AREVA suggested that facility construction could begin as early as 2020, assuming a 2015 final rule by the NRC (ADAMS Accession No. ML11132A015). In addition to submitting letters, industry groups have actively participated in stakeholder public workshops. Because industry groups are pursuing two distinct types of reprocessing technologies (aqueous and electrochemical), the industry supports a rulemaking that will apply to both types of processes, as well as to potential emerging technologies.

During the development of the final regulatory basis and the rulemaking process, the staff will also consider applicable recommendations from the Blue Ribbon Commission on America's Nuclear Future (BRC). The BRC draft report recommended additional research in fuel cycle technology (http://brc.gov/sites/default/files/documents/brc_draft_report_29jul2011_0.pdf). These recommendations support improving existing methods and developing innovative techniques to enhance the nuclear fuel cycle, which includes SNF reprocessing. Should these recommendations remain in the final version of the BRC report and/or should new recommendations or issues be identified, the staff will inform the Commission of any potential policy implications that may arise from these considerations. The BRC is scheduled to complete its final report to DOE in January 2012.

COMMITMENTS:

The staff will continue to provide annual reports on its progress towards a proposed rule on reprocessing and will update its resource estimates for out-years (FY 2014 to FY 2019) through the annual budget development process as the staff continues to work towards completing the final rulemaking by 2019. The staff will brief the Advisory Committee on Reactor Safeguards on its activities for developing a reprocessing regulation (e.g., hazards analyses and insights). Lastly, the staff will raise any policy issues, when appropriate, for Commission consideration, in advance of submitting a proposed rule.

RESOURCES:

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COORDINATION:

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

The staff requests that this document be treated as “Official Use Only – Sensitive Internal Information” because of the presence of predecisional budget-related information.

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Enclosure:
1. Draft Regulatory Basis for Licensing and Regulating Reprocessing Facilities

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OFFICE	DSFAS	DSFAS	DSFAS	TechEd	DSFAS	DSFAS	DSFAS	FCCS
NAME	RIyengar	JSulima	JGuttmann	JDougherty by email	JDavis	AMohseni	LKokajko	JKinneman
DATE	11/01/11	11/04/11	11/04/11	11/07/11	11/04/11	11/09/11	11/09/11	11/04/11
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