POLICY ISSUE
INFORMATION

September 12, 2008 SECY-08-0134

FOR: The Commissioners

FROM: R. W. Borchardt
Executive Director for Operations

SUBJECT: REGULATORY STRUCTURE FOR SPENT FUEL REPROCESSING

PURPOSE:

This paper informs the Commission of the staff's plans for developing the regulatory framework for reprocessing facilities based on the Staff Requirements Memorandum (SRM; ML071800084) to SECY-07-0081, "Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership" (GNEP; ML063240070).

SUMMARY:

In SECY-07-0081, the development of requirements specific for GNEP related facilities were recommended as a future path forward for regulatory development. In response to recent industry interest, the staff is shifting from this approach and developing a technical basis document to support effective licensing of a commercial spent fuel reprocessing facility, which would be a facility that is separate and distinct from GNEP.

Consistent with the Commission direction in the June 28, 2007 SRM regarding SECY-07-0081, this paper: 1) describes the staff's planned approach for implementing an appropriate regulatory structure, within the U.S. Nuclear Regulatory Commission (NRC) organization, to enable staff to respond effectively to industry initiatives associated with spent fuel recycling; and 2) discusses issues such as developing a technology-neutral regulatory framework for reprocessing facilities to establish regulatory requirements that would apply specifically to spent fuel reprocessing.

CONTACT: Kelli Markham, NMSS/FCSS/MB
(301) 492-3221

BACKGROUND:

In SECY-07-0081, the staff provided regulatory options and recommendations for licensing potential facilities associated with GNEP. The staff recommended a two-phased approach for regulatory framework development for GNEP facilities. Phase I consisted of a regulatory gap analysis. The task force's primary objective is to facilitate implementation of a regulatory structure to license reprocessing facilities and the associated fuel fabrication facilities {(i.e., where the current NRC regulations would need to be amended to provide for effective regulation of a spent nuclear fuel reprocessing facility and an advanced burner reactor (ABR)} and consideration of the necessary technical basis. Phase II would consist of the development of the regulatory framework, including the possible development of a new Part in the Code of Federal Regulations (CFR), i.e., 10 CFR XX. In the SRM to SECY-07-0081, the Commission directed the staff to proceed with a regulatory gap analysis and identify changes in regulatory requirements that would be necessary to license a reprocessing facility and an ABR. At that time, the Commission did not approve a future transition to develop 10 CFR XX. Instead the staff was directed to provide the Commission with supplemental information that discusses how the new or revised regulatory structure for GNEP-related facilities would be implemented within the NRC organization and to address issues such as the applicability of the technology-neutral framework for new reactors that the Office of Nuclear Regulatory Research (RES) has developed.

Initially, NRC believed that a new U.S. reprocessing facility would be the result of the Department of Energy's (DOE's) GNEP program. Commission direction to staff regarding GNEP initiatives was to await the Energy Secretary's decision regarding a path forward for the chosen spent fuel reprocessing technology. DOE, however, has deferred making any decision on GNEP until at least late 2008. Recently, NRC has been informed of industry interest in developing a reprocessing facility in the U.S through letters of intent/interest to the Agency. As a result, the staff believes it is no longer prudent for NRC to wait for DOE's decision before moving forward with spent fuel reprocessing regulatory development.

DOE has acknowledged that future GNEP funding remains uncertain, but expressed optimism that the U.S. will continue involvement in GNEP international activities. There are currently 21 countries that have agreed to be GNEP partners. Domestic research and development for reprocessing technology is likely to continue under DOE as part of the Advanced Fuel Cycle Initiative. However, with industry's recent interest in spent fuel reprocessing, the current need is to shift focus from developing GNEP specific regulations, to more broadly applicable spent fuel reprocessing regulations.

DISCUSSION:

Status of Gap Analysis and Technical Basis Development

The staff has completed a first-order gap analysis of applicable NRC regulations. To finalize the gap analysis, a second review of the results will be conducted to ensure alignment with using Part 70 as a regulatory framework model and the shift in focus in developing spent fuel reprocessing regulations. The overall gap analysis, including initial scoping work on a technical basis document, is currently planned to be completed by March 2009. The development of the technical basis document could be completed by the second quarter of Fiscal Year (FY) 2010, if resources are appropriately allocated.

In its preliminary assessment, the staff performed a comprehensive review of applicable regulations to complete the first order gap analysis, "Preliminary First-Order Gap Analysis" (ML082260223). The most significant issues identified thus far related to the regulation of a reprocessing facility, where the regulations may need to be amended or clarified (by guidance) to effectively and efficiently process an application for a spent fuel reprocessing facility, are provided below:

1. Definition of "reprocessing" and "recycling." A regulatory definition for the terms "reprocessing" and "recycling" need to be developed. As a starting point, the staff may consider the note entitled "Illustrative List of Reprocessing Plant Components Under NRC Export Licensing Authority" (Appendix I of 10 CFR Part 110).[1]

2. Physical Protection and Material Control and Accounting. 10 CFR 73 and 74 will need to be revised to include appropriate requirements for reprocessing facilities. Additionally, Category I versus Category II facility classifications could potentially affect reprocessing facilities and the resulting requirements that such facilities must meet.

3. Waste. Regulations may need to be amended or clarified (by guidance) for the handling and disposing of waste, with unique characteristics, resulting from reprocessing.

4. Combined Operating License. Industry has indicated that it will only pursue a reprocessing facility application if it can be approved using a one-step licensing process, which is needed to secure the funding for facility construction. Section 185.b. of the Atomic Energy Act of 1954, as Amended, allows for a one-step licensing. Therefore, no legislative change is necessary for inclusion of a one-step licensing process.

Industry Initiatives Associated with Spent Nuclear Fuel Reprocessing

In August 2006, DOE sought expressions of interest from industry for constructing spent fuel reprocessing and transmutation fuel fabrication facilities. The four proposals DOE received from various industry consortia range from aqueous based reprocessing methods with light water reactor (LWR) recycling of the fuel (as mixed oxide {MOX} fuel) to pyroprocessing technologies with ABR recycling of the fuel. The near term approach is likely to involve aqueous reprocessing methods with LWR recycling of the fuel. Industry has submitted letters to the NRC expressing interest/intent to develop commercial reprocessing facilities in the US. The letters of interest to the NRC are from the various industry consortia that submitted proposals to DOE, as described above. DOE has shared these proposals as part of the Memorandum of Understanding and Interagency Agreement between DOE and NRC to inform NRC staff of current reprocessing technology. The consortia submitting the letters of interest to NRC indicate aqueous reprocessing of spent nuclear fuel with LWR recycling of the fuel (as MOX fuel) in their proposals. This approach to recycling spent nuclear fuel is the most industrially mature and demonstrated technology, and is presently used in France, the United Kingdom and Japan.

[1] The two main methods of reprocessing used to date are aqueous separations and pyroprocessing. Aqueous separations involve solvent extraction techniques for purification. Pyroprocessing uses an electrochemical technique to purify spent fuel. Pyro techniques result in a fuel that is not as pure as aqueous reprocessed fuel, and as a result, pyro fuel is currently only suitable for ABR recycling, where these "impurities" can be burned.

In July 2008, NRC staff was made aware that the Nuclear Energy Institute had established its "Closing the Fuel Cycle Task Force." The task force's primary objective is to facilitate implementation of a regulatory structure to license reprocessing facilities and the associated fuel fabrication facilities. A secondary objective is addressing the regulatory framework for the ABR. The task force has determined that the primary objective needs to be implemented by 2012 to be in alignment with industry's interest/intent.

Regulatory Framework Development

Given the level of industry interest, and the present limitations of NRC's existing regulatory framework, it is important to continue to pursue development for licensing spent fuel reprocessing facilities. This approach would support and be consistent with the expressions of industry interest, as discussed above, in LWR recycling of spent fuel, and responds to NRC's current understanding of the industrial readiness of certain recycling approaches and technologies.[2]

Review of the first-order gap analysis at a high level indicates that although current regulations could be used to license a reprocessing facility, new regulations will be required to enhance the effectiveness and efficiency of regulatory oversight. The nature of these new regulations will be consistent with previous Commission communications. Initial review indicates that it would not be effective or efficient to revise Part 50 to license reprocessing facilities. Over the years, Part 50 has essentially evolved to be a LWR specific regulation and the resources needed to address a modern reprocessing facility in Part 50 would be extensive and not timely considering industry's interest. Part 70 is the next logical Part to consider for licensing potential reprocessing facilities. Details of the first-order gap analysis are indicated in ML082260223. Results of this analysis indicate that Part 70 currently does not address specific hazards with the reprocessing of spent nuclear fuel or any new reprocessing technology that may be proposed. Some of these hazards are, but are not limited to, an increase in radiological risk and different process streams than the uranium fuel processing facilities for which Part 70 was most recently revised in 2000. These hazards will manifest themselves in different ways throughout a reprocessing process and their contributions will be considered as staff prepares the technical basis document and begins the development of new regulations. The form of the new regulations will be detailed upon completion of the technical basis document.

NRC staff has considered examples of technology-neutral regulatory frameworks currently under development by RES. These examples were considered for their applicability for reprocessing facilities. Additionally, the staff considered that the existing Part 70 currently regulates many different types of fuel cycle facilities. 10 CFR 70 provides a model of a regulation capable of licensing several different types of facilities, yet adequately ensures safe facility operation. As such, the staff believes that it is possible to either include a new subpart to Part 70 that would provide new regulatory requirements for reprocessing facilities, or create a new Part specific for reprocessing. These new regulations could be capable of licensing aqueous separation techniques, as well as any potential pyroprocessing techniques. Further,

[2] ABR technology employment, a distinct aspect of GNEP, may also be an integral part of closing the fuel cycle in the future. However, that determination is unlikely to be made in the near term. Pursuing knowledge sharing is prudent among DOE and applicable industry, as ABR reactor technology continues to develop. The staff completed a regulatory gap analysis for ABRs (ML082260223) as directed in the SRM for SECY-07-0081. The staff will follow advances in fast reactor technologies as part of the advanced reactor program in NRO and RES.

the unique design and safety issues associated with a reprocessing facility could be efficiently tailored and consolidated in a new Part without unnecessarily complicating the existing 10 CFR Parts 50 and 70. The option to move forward with a new regulatory part was detailed in Phase II of SECY-07-0081. While a new part is still an option, future regulatory requirements will be determined based on the technical basis development, with the exception that the focus on the regulations will be only on reprocessing facilities, rather than GNEP related facilities.

The second review of the gap analysis can be completed by March 2009. The technical basis document can be completed by second quarter FY 2010. Staff will proceed to develop the regulatory framework at a pace commensurate with industry intentions, provided the appropriate resources can be prioritized and allocated. Future stakeholder feedback and industry interest will be factored into schedule estimates, which will be updated upon technical basis completion.

COMMITMENTS:

Staff can complete the second review of the gap analysis by March 2009. A technical basis document can be completed by second quarter 2010. These activities can be completed with the allocation of resources as indicated in the “Resources” section below. The staff will keep the Commission informed, and consult with the Commission, as appropriate, regarding industry progress associated with an application for a spent fuel reprocessing facility, the regulatory framework development, and the proposed rulemaking.

CONCLUSIONS:

The staff plans to proceed with a secondary review of the gap analysis results to ensure that they align with plans to develop a reprocessing specific regulation as detailed above. In addition, the staff will prepare a technical basis document, according to the schedule discussed above in “Commitments,” with the resources indicated below.

Industry has expressed an interest in the potential licensing of a spent fuel reprocessing facility. The staff concludes that it is now appropriate to devote limited resources, as indicated below, at a pace consistent with industry interest and commitment, to develop an appropriate, effective, and efficient regulatory framework for licensing a potential spent nuclear fuel reprocessing facility.

RESOURCES:

Currently no resources for these activities are budgeted in FY 2009 or FY 2010. As part of the FY 2010 budget preparation, the staff did not include resources for these activities because, at the time, the industry had not expressed interest in licensing a reprocessing facility.

In FY 2009 and the first half of FY 2010, a total of approximately four full-time equivalents will be needed to complete a secondary review of the regulatory gap analysis, and develop the technical basis document by March 2010. Based on current workload projections, the estimated resources per office are tabulated below. For FY 2009, participating offices will reallocate from within. FY 2010 resource requirements will be addressed through the shortfalls exercise that will occur as part of the FY 2011 budget process.

	NMSS	FSME	RES	NSIR	OGC	Total
FY 2009	2 FTE	0.2 FTE	0.1 FTE	0.2 FTE	0.1 FTE	2.6 FTE
FY 2010	1 FTE	0.2 FTE	0.1 FTE	0.1 FTE	0.1 FTE	1.5 FTE

The staff will assess the pace of industry and DOE recycling activities to inform the project schedule and necessary resources, and consult with the Commission, as appropriate.

The proposed path forward for rulemaking will contain a discussion of the resources that will be needed in the second half of FY 2010 and beyond.

COORDINATION:

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

/RA/

R. W. Borchardt
Executive Director
for Operations

	NMSS	FSME	RES	NSIR	OGC	Total
FY 2009	2 FTE	0.2 FTE	0.1 FTE	0.2 FTE	0.1 FTE	2.6 FTE
FY 2010	1 FTE	0.2 FTE	0.1 FTE	0.1 FTE	0.1 FTE	1.5 FTE

The staff will assess the pace of industry and DOE recycling activities to inform the project schedule and necessary resources, and consult with the Commission, as appropriate.

The proposed path forward for rulemaking will contain a discussion of the resources that will be needed in the second half of FY 2010 and beyond.

COORDINATION:

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

/RA/

R. W. Borchardt
Executive Director
for Operations

ML082110363 EDATS: SECY-2008-0232 WITS 200700203/ NMSS200800086

OFC	NMSS/FCSS/MB	Tech Ed.	NMSS/FCSS/GNEP	NMSS/FCSS	OGC
NAME	K. Markham	E. Kraus	T. Hiltz	D. Dorman	B. Jones
DATE	7/25/08	8/11/08	8/20/08	8/26/08	8/06/08
OFC	RES	FSME	NSIR	NRO	CFO
NAME	F. Eltawila	D. Brown	R. Zimmerman	E. Baker	J. Rand
DATE	8/20/08	8/25/08	8/15/08	8/11/08	8/22/08
OFC	NMSS	EDO			
NAME	M. Weber	R.W. Borchardt			
DATE	8/27/08	9/11/08			

OFFICIAL RECORD COPY