

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Semi-Annual National Spent Nuclear Fuel Strategy Meeting; Project Number 20.06002.01.081; AI 06002.081.303

DATE/PLACE: October 29–30, 2002
Las Vegas, Nevada

AUTHOR: V. Jain

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PERSONS PRESENT: V. Jain, Center for Nuclear Waste Regulatory Analyses (CNWRA), and approximately 50 representatives from various organizations supporting Department of Energy (DOE) National Spent Nuclear Fuel Program (NSNFP).

BACKGROUND AND PURPOSE OF TRIP:

The objective of the Semi-Annual NSNFP strategy meeting is to discuss the management of DOE spent nuclear fuel (SNF) currently stored at various DOE sites and its potential disposition at the Yucca Mountain (YM) Repository.

SUMMARY OF PERTINENT POINTS:

The semi-annual meeting was composed of a series of presentations by personnel currently supporting the NSNFP. Copies of their presentations will be available on the web at <http://nsnfp.inel.gov/> within two weeks.

In the opening remarks, Mark Arenaz (NSNFP, Program manager) indicated that DOE-Environmental Management (EM) is in the process of redefining its priorities, and there is a proposal to transfer NSNFP to the DOE-Radioactive Waste (RW) Branch. A possibility was raised that if NSNFP goes to RW, there could be a new set of priorities for the program.

Paul Wheatley went through the last semi-annual meeting's open items. A short discussion was focused on the generic fuel objects (GFOs). GFOs are concentrated sources (hot-spots) that are found during de-inventory and whose origin is unknown. GFOs were mostly found at Argonne National Laboratory-West (ANL-W). None were identified at the Savannah River Site (SRS) during de-inventory of K-basin.

Paul Harrington [Yucca Mountain Project (YMP) supporting NSNFP] described the new organization chart that divides the Office of Civilian Radioactive Waste Management (OCRWM) into east and west coast offices. The west coast office will be called Office of Repository Development and will be responsible for repository licensing, while the east-coast office will be called Office of Strategy and Program Development and will focus on policy development separate from development of the repository. Anything outside the scope of the license application (LA), (e.g., consideration of alternative solutions or waste forms) will be a function of the Office of Strategy and Program Development. This will allow the Office of Repository

Development to concentrate on the LA. Some of the dates provided for the YMP were October 10, 2002 to approve preliminary baseline range; January 30, 2003 to complete interim LA design review; August 21, 2003 to freeze total system performance assessment (TSPA)-LA; and December 23, 2004 to submit the LA. Paul Harrington also highlighted recent facility changes. The preclosure facility now includes use of multiple smaller buildings—the first dry building will be online in year 2010, and the second dry and remediation buildings will follow; reduction in storage capacity from 5,000 MTHM to 150 commercial SNF assemblies and 10 DOE SNF or high-level waste (HLW) canisters with an additional 1,000 MTHM on a storage pad; and reduction in crane lifts through the use of an omnidirectional lift transporter. The first dry building will have no ability to handle degraded fuel. The estimated through-put will be 500 MTHM/year. The post-closure facility will have similar foot print to the site recommendation (SR) footprint but with a modular layout and much smaller first panel. It will also have a third access ramp for northern construction. Modular design allows implementation of lessons learned between phases. A portion of the first panel will also be used for scientific and engineering studies. Harrington also high-lighted changes in the waste package closure design, welding methods, and stress mitigation methods. These were discussed in recent trip report by D. Dunn.

Bill Hurt discussed repository licensing strategy, FY 2002 accomplishments, and FY 2003 plans. He indicated that EM and RW have been discussing the repository licensing strategy for the last four years. RW has issued several documents that provide YM licensing strategy, an approach for implementing and defending the safety case for the DOE SNF, and potential waste acceptance criteria for SNF. Several workshops were held last FY to define the strategy for DOE SNF. The DOE SNF excludes Navy SNF, Commercial SNF, and Na-bearing HLW. The workshops were focused on criticality, preclosure, and post-closure. The DOE approach for SNF relies on engineered solutions, bounding values, and use of stylized approaches and hypothetical fuels for demonstration. A DOE SNF preclosure workshop was held in June, 2002 and discussed the options such as a canister handling system designed to avoid drops, canisters that survive drops without breaching, and HEPA filtration for defense-in-depth. The ultimate aim is to show that Category 2 performance objectives will not be exceeded even with drops, breaches or HEPA failures. DOE plans to combine low breach probability with the use of an ASME code and analysis which includes dynamic testing, proof testing, and drop-testing with leak detection. DOE believes that NRC will accept this methodology because they have accepted similar methodology for the Private Fuel Storage (PFS) facility. The consensus between NSNFP and BSC at the workshop was that the DOE SNF and canister handling system are important-to-safety and that a description based on existing information without additional characterization is adequate.

The DOE SNF workshop on criticality was held in August, 2002. To avoid criticality, the surface facility will have moderator controls, the loss of SNF water tightness will be a low probability event, the storage racks will neutronically isolate canister arrays, all canisters will be 10 CFR Part 71 compliant, and will rely on geometry controls during transport.

The third workshop was focused on post-closure performance. For post-closure performance, criticality will be excluded based on moderator exclusion, the preclosure basis will be used to demonstrate that criticality will not occur without moderator, and a degraded mode with poisons analysis will be performed. No consequence analysis is planned for pre- or post- closure before LA. Under the nominal scenario strategy, DOE will ensure that the SNF is adequately dried based on an ASTM standard, and if early failures are not screened out, sensitivity analysis will

be conducted. For human intrusion, no calculations are planned because it will be screened out based on frequency. For disruptive events caused by igneous activity, DOE believes that the sensitivity analysis will meet the performance objectives by a wide margin. In summary, Bill Hurt indicated that BSC and NSNFP have reached a consensus on these matters. After obtaining DOE's consensus, the strategy will be presented to the NRC. Similar thoughts were provided by Joe Price on planned interactions between the DOE and NRC. According to Mr. Price, NSNFP plans to meet with RW in the December/January time frame to obtain its consensus, followed by a request to Tim Gunter for a meeting with NRC.

Markus Popa provided an update on waste acceptance. He indicated that Margaret Chu has directed them to explore the possibility of alternate waste forms without impacting a 2004 LA deadline. He talked about various constraints such as availability of staff, and approval of NRC to accept alternate waste forms such as calcined waste with little or no treatment in a standardized canister.

Larry Vaugen indicated that EM does not want to recognize documents such as waste acceptance preliminary specifications (WAPS) and would like RW to consolidate them with other related documents. A team was formed at the meeting to explore this. Several questions were raised on the current MOU between EM and RW (e.g., roles and responsibilities between EM and RW). EM's opinion is that since RW will have the final say on waste acceptance, it should have the related responsibilities.

Christine Gelles is leading one of nine corporate teams that DOE has put together to develop a new paradigm for EM under the leadership of Jesse Roberson. The Integrated/Risk Driven SNF Disposition team is focused on the development of a corporate strategy for management of EM SNF activities. The team will develop a plan for the transition of the NSNFP management to RW. The DOE SNF management is complex: the cost is over \$12 billion in the next 35 years; and it covers four program offices, six major sites, and various other facilities and diverse contracts. According to EM, despite significant analysis and review, there has been little integration or leadership. The sites are conducting activities in their own ways. The team will integrate and improve management of SNF using project management tools.

Mark French (Hanford Site) provided an overview of Hanford SNF activities. Several SNF consolidation activities at the Canister Storage Building (CSB)/200 Area (Interim Storage Area) are in progress. Removal of SNF from K Basin is expected to be completed by July 31, 2004. To date, 674 MTHM contained in 129 Multi Canister Overpacks (MCOs) have been loaded and removed from K West Basin. The Shippingport Core 2 Blanket fuel stored in pool at T Plant is being moved to the CSB. This will require 18 MCOs with modified shield plugs. To date, 5 MCOs have been transferred to the CSB. In addition, transfer of 101 TRIGA SNF elements to the CSB was completed during the week of October 14, 2002. Commercial origin LWR SNF which are typical end-of-life pressurized water reactor (PWR) and boiling water reactor (BWR) assemblies/pins and left overs from some commercial SNF experiments are being transferred into NAC-1 casks and moved to the CSB for interim storage. The Fast Flux Test Facility (FFTF) SNF is stored in liquid sodium after discharge from the reactor. Plans are to load FFTF fuel into storage casks and transfer them to the CSB. To date, 18 storage casks have been loaded and staged in Area 400. This fuel will be transferred to ANL-W for treatment. Transfer of FFTF SNF will require a license for a T-3 cask, and the funding situation is uncertain.

Randy Ponik [Savannah River Site (SRS)] indicated that in FY 2002, SRS received 11 casks and 53 assemblies from domestic research reactors (DRR) and 30 casks and 1,102 assemblies from foreign research reactors (FRR). SRS SNF is being consolidated in L-Basin. K-Basin has been deinventoried and will be deactivated in October 2002. The annual maintenance cost for K-Basin will be approximately \$20K. The receiving Basin for Offsite Fuels (RBOF) facility is planned for deinventory in FY 2004 and deactivation in FY 2005. To date 363 out of 792 storage units at RBOF have been deinventoried. A major challenge and risk is meeting Yucca Mountain SNF receipt criteria.

Pete Dirkmaat (Idaho Site) provided a summary of Idaho National Engineering and Environmental Laboratory (INEEL) DOE SNF activities. Accelerated site closure plans include no vitrification for INEEL HLW and moving calcined HLW as is to YM. This will accelerate clean up by 35 years. Discussions are continuing for the path forward for low-level waste. Vitrification or grouting are options currently under consideration. In FY 2002, SNF has been moved from two basins amounting to a total of 42 shipments. The Three Mile Island fuel has been consolidated. In FY 2003, one satellite fuel pool containing 2,500 assemblies will be closed and moved to the Idaho Nuclear Technology and Environment Center (INTEC) which is a centralized interim storage facility. All SNF except Navy SNF will be transferred to INTEC. The accelerated closure plan includes a transfer of Fermi Fuel to DOE-NE and commitment from the Navy to receive its fuel back. This will accelerate closure from year 2035 to 2023. In addition, the INEEL plans to ship graphite fuel directly to YM. Major issues at this time include the future of the licensing of Foster Wheeler Environmental Corporation Interim Storage Facility. A decision analysis team is working on the need to have this facility operational. Pete Dirkmaat also mentioned 225 questions received from NRC on the Foster Wheeler facility. Hot-Cells for drying and cutting Navy Fuels are complete. However, the Navy has decided not to cut any fuel dry.

Bob Pahl (ANL-W) discussed the MOA between DOE-ID and DOE-CH relating to the transfer and receipt of SNF and HLW between INEEL and ANL-W. In addition, an MOA between DOE-NE and DOE-RW regarding QA of the electro-metallurgical treatment of HLW is under discussion. Under re-organization of DOE-NE, responsibilities for sodium bonded SNF have been changed from NE-40 to NE-20 (advanced fuel recycle program). Currently, both Blank and Driver fuels are Na bonded and require treatment at an electro-metallurgical treatment facility. The capacity of the electro-metallurgical treatment facility is 2,200 kg heavy metal/year based on 24 hour-7 day-10.5 month operation. In FY 2002, 600 kg were produced. The process produces two types of waste form—a ceramic waste form bonded with glass, and metal waste form. It is expected a total of 51 and 5.85 tons of ceramic and a metal waste forms will be produced and will require 59 standardized canisters. Qualifications similar to those for vitrified waste form are being performed at Argonne National Laboratory. An ongoing project includes a feasibility and life cycle cost study for a metal drain evaporate carbonate process (MEDEC) for Fermi Blanket fuel. The plan is to treat 26 metric tons using an electro-metallurgical process and 34 metric tonnes by MEDEC.

Bob Blyth [Quality assurance (QA) for NSNFP] introduced Denny Brown (YMP) as QA Director for RW. Denny Brown ensured that he will make the QA program simple and have senior management involved in the program. He plans to integrate all YM activities and develop an oversight plan in the next few weeks. Bob Blyth indicated that in FY 2002 he issued a revised QA program that allows approval of procedural changes within 2-3 hours. The vast number of findings in 2002 were related to human factors (64 percent) and procedure compliance

(22 percent). In FY 2003, QA will work to transition the NSNFP QA program to the RW-0333P QA program, and prepare QA records for disposal of DOE SNF. Bob Blyth indicated that in FY 2003 there will be a strict compliance culture, an effective site QA program, faster corrective action implementation, and open communications.

Tom Hill (INEEL) summarized canister and weld development activities related to the DOE standardized canister. These canisters will be designed to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Subsection WC, Case N 656. Further N-stamping is proposed for standardized canisters. However, there is disagreement among sites on the N-stamping as well as on use of standardized canisters, which are very expensive. It was suggested that NSNFP should perform a cost-benefit analysis. FY 2003 plans include development of remote welding procedures for closure welds and complete demonstration of welding and weld repair equipment for the Foster Wheeler facility.

There were two breakout sessions. One was for federal employees and the other for contractors. In the contractor's session questions were raised regarding the path forward if the standardized package is not used for DOE SNF because of the cost. How will this impact YM licensing? What if bare SNF is sent to the YM preclosure facility? Can the preclosure facility handle DOE SNF? Staff from Oak Ridge indicated that the SNF stored at their site requires 19 different tools for handling. The amount of fuel at Oak ridge is very small compared to the total fuel stored at various DOE sites. SRS staff indicated that since melt-dilute technology has been indefinitely postponed, they don't see any need for Oak Ridge to send Al-clad fuel to SRS for processing. Oakridge can directly send SNF to YM. Currently, SRS does not have a facility to canisterize SNF. The Idaho Foster Wheeler facility could be a centralized facility for packaging. In the summary provided for the federal employee session two main topics were discussed. First, what the transition of NSNFP from EM to RW will look like; and second, what will be the new performance measures.

The final presentation was given by H. Loo (Idaho) on source term development for DOE SNF. Evaluation indicates that different codes are being used at different sites for estimating source terms for SNF. To support preclosure safety analysis and TSPA-LA, a uniform representation of the source terms is required and was accomplished by SNF categorizing into 15 templates. A report (DOE/SNF/REP-078) containing inventories of all DOE SNF is under review and will be issued in November 2002. Methodology has been applied to all 600 SNF databases for the years 2010 and 2030 and includes heat-generation rates. The estimated source term is almost 2 orders of magnitude higher than previously estimated for certain isotopes. This is largely attributed to conservative assumptions for the 2.3 percent of SNF with the highest inventory. This 2.3 percent SNF accounts for 95 percent of the total calculated inventory.

In the closing remarks, Mark Arenaz mentioned that the next meeting is scheduled for April 11-12, 2003 in Baltimore, Maryland.

CONCLUSIONS:

The meeting provided an opportunity to review updated information regarding DOE SNF. In addition, the format of the meeting allowed time for discussion when needed.

PROBLEMS ENCOUNTERED:

None.

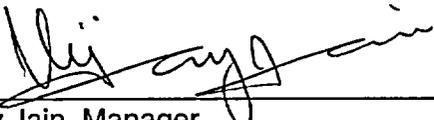
PENDING ACTIONS:

None.

RECOMMENDATIONS:

The Semi-Annual NSNFP Strategy meetings are important and a good source to obtain valuable information. Future attendance at these meetings is highly recommended.

SIGNATURES:



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11/5/02
Date

CONCURRENCE:



Budhi Sagar
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