



SRS Citizens Advisory Board

Nuclear Materials Management Subcommittee

Meeting Summary

July 22, 1999
Aiken Federal Building
Aiken, SC

The Savannah River Site Citizens Advisory Board (SRS CAB) Nuclear Materials Management (NMM) subcommittee held a meeting on Thursday, July 22, at the Aiken Federal Building to discuss the Defense Nuclear Facilities Safety Board (DNFSB) TECH-22 report on stabilizing Savannah River Site spent nuclear fuel.

CAB Members

Tom Costikyan
Barbara Murphy
Brendolyn Jenkins
Ed Tant
Ken Goad
Karen Patterson

Stakeholders

Mark Stewart, SCDHEC
Lee Poe
Bill McDonnell
Bob Overman
Chuck Keilers, DNFSB
Todd Davis, DNFSB
Russ Messick
Allen Blancett

DOE/Contractors

Randy Ponik, DOE
John Anderson, DOE
Jean Ridley, DOE
George Klipa, DOE
Jim Giusti, DOE
Drew Grainger, DOE
Donald Bridges, DOE
Gerri Flemming, DOE
C.E. Sessions, DOE
Marc Woodworth, DOE
Dave Huizenga, DOE-HQ
Craig Martin, WSRC
Donna Martin, WSRC
Ray Conatser, WSRC
Mark Dupont, WSRC
Rick Geddes, WSRC
John Lindsay, WSRC
Mark Barlow, WSRC
Mary Flora, WSRC
N.C. Iyer, SRTC

Introduction

Tom Costikyan, CAB NMM chair, opened the meeting with reference to a recent report (TECH-22) completed by the Defense Nuclear Facilities Safety Board (DNFSB) that focused on the melt and dilute and chemical processing options for stabilizing spent nuclear fuel. Costikyan then introduced Chuck Keilers and Todd Davis, the DNFSB site representatives, who developed a presentation for the CAB.

Keilers began the presentation with a basic statement that the motivation to write the TECH-22 report arose from concerns about the Department of Energy's stated preferred alternative of melt and dilute to stabilize SNF. Keilers said the DNFSB believes DOE should maximize the use of existing facilities—the canyons—rather than develop a dependence on a new technology that has not yet matured.

Keilers then gave a brief summary of the DNFSB role as providing independent technically qualified safety oversight at defense nuclear facilities. Congress established the board in 1988 to act as an external action-forcing agency. It reports to the Congress and the President, but is not a regulatory agency. He said the staff currently consists of about 90 people—with 57 of them technical staff members. Ten members of the technical staff have onsite offices at DOE facilities. The DNFSB performs the following activities as established by Public Law: (a) reviews and evaluates standards, (b) conducts investigations, (c) analyzes design and operational data, (d) reviews facility design and constructions, and (e) makes recommendations to the Secretary of Energy.

Keilers emphasized that the report is not a recommendation. Karen Patterson, CAB, asked what weight does a report have in relation with a recommendation. Keilers said a response is not required from DOE for DNFSB reports, although if DOE chooses not to address a highlighted situation, the DNFSB could move forward with a formal recommendation to the Secretary of Energy. DOE is required by law to formally respond to DNFSB recommendations, and such recommendations have always carried a great deal of weight.

Keilers reviewed the DOE decision history on SNF. Between the mid-1950s to the late 1980s, the SRS canyons were successfully used for chemically separating the HEU from the high level waste (HLW). In 1992, DOE decided to not reprocess SNF for weapons production but to plan on chemically processing the existing SNF inventories and fuel receipts. In 1994, the DNFSB observed that progress in restarting the canyons and stabilizing these materials was slow; therefore, the DNFSB included in Recommendation 94-1 that DOE should expedite processing the large inventory of deteriorating SNF into a form suitable for safe storage.

Between 1995 and 1997, DOE restarted key facilities and chemically processed the Mark-31 targets, damaged Taiwan research reactor fuel, and a leaking EBR-II canister. DOE also began to reprocess the Mark 16/22 defense-related spent fuel. In 1995, DOE decided to consolidate stainless-steel and zirconium SNF at INEEL and aluminum-based SNF at SRS. Hanford fuel was to remain essentially at Hanford. In 1996, DOE issued the Foreign Research Reactor Spent Fuel record of decision (ROD) to bring this fuel to the United States. In 1998, DOE issued a draft environmental impact statement discussing what to do with SNF at SRS.

Keilers pointed out that the DOE Foreign Research Reactor spent fuel ROD stated that DOE would pursue one or more new technologies to put fuel in a form or container eligible for geologic disposal. Keilers highlighted the statement in the ROD in which DOE says "Should a new treatment or packaging technology not be ready for implementation by the year 2000, DOE has under active consideration chemical separation of some of the foreign research reactor spent fuel in the F Canyon at the Savannah River Site, where it would be blended down to LEU and potentially placed under International Atomic Energy Agency safeguards." Keilers said that there is some uncertainty in exactly how this statement is to be interpreted, particularly the phrase, "ready for implementation". The DNFSB questioned whether the phrase meant the technology is ready for testing or design or construction.

Keilers then discussed the current picture of SNF at SRS. DOE intends to ship all of the 20 MTHM of non-aluminum fuel now at SRS to INEEL. The aluminum defense-related fuel (7 MTHM of production reactor SNF) is being chemically processed to convert the HEU to LEU for use as commercial reactor fuel. The HEU is to be blended down to LEU in H-Canyon, and the HLW will be vitrified in the Defense Waste Processing Facility (DWPF), consistent with DNFSB Recommendation 94-1. The remaining inventory of SNF at SRS is anticipated to be 20 MTHM of aluminum research reactor fuel from foreign and domestic sources. He pointed out the ROD on the disposition of foreign and domestic fuel is yet to be made.

Keilers outlined the vulnerabilities of HEU aluminum-based SNF. This type of fuel was generally not intended for long storage times and is more susceptible to corrosion in wet storage than other fuel types, even with improved water chemistry. The lower strength and melting point of the cladding may make it more susceptible to accidents compared to other fuel types. It requires criticality and security controls. Some fuel assemblies are in weak material form or are degraded (e.g., loose oxides, damaged elements).

In discussing future projections, Keilers said that, after the defense-related spent fuel is chemically processed (expected during the next few years under DNFSB Recommendation 94-1), the only aluminum-based SNF remaining to be dealt with by SRS is the research reactor SNF from foreign and domestic sources. The research reactor fuel inventory at SRS has been projected to increase by almost 24 MTHM as the fuel is returned. Keilers said the return will likely not be as much as projected in 1996, when the Foreign Research Reactor ROD was issued, and most of it will arrive before 2010. Keilers said there is high uncertainty with the returns after 2010, since most of it is projected to come from reactors that are now about 4 decades old. Furthermore, if new research reactors are built, it is unclear what type of fuel they would use and whether the new technology options being discussed now would be compatible with those types.

Costikyan asked where the SNF would be handled if it was not returned to the U.S. Keilers said the SNF could be processed overseas, as many countries have already elected to do. Keilers also pointed out that the tail end of the SNF receipts, between 2009 and 2015, would include a substantial number of aluminum assemblies from Idaho. The DNFSB staff have suggested that DOE accelerate the movement of the Idaho fuel to SRS and consider processing the fuel. Such an action would support three main DNFSB points: (1) maximize use of the canyons while they are still available; (2) minimize the dependence on new technology until it matures and the requirements are better identified; and (3) obtain the greatest net risk reduction, from a safety standpoint, as soon as practicable.

Keilers said DOE has conducted many studies and a major EIS to determine the best way to stabilize SNF. A flowchart from the DOE Cost Study (12/98) was shown that depicts the melt and dilute process and the canyon process. The figures indicate that the melt and dilute process would result in about 400 waste packages at the repository, while canyon processing through 2010 would require about 23 waste packages (excluding the small post-2010 tail). The DOE SNF DEIS has estimated the additional HLW from canyon processing would result in about 150 more DWPF canisters. Keilers said considering the total SRS HLW volume, canyon processing would add only a small fraction to the total projected output from DWPF (i.e., 2-3%).

Keilers then referenced several reports. The SNF Task Team report was cited, in which processing was considered among about 13 technologies but not listed in the final report because it was not a new technology. The National Research Council report concluded that melt and dilute would likely be an acceptable waste form. It also stated that DOE should give more careful consideration to conventional canyon processing since it has been demonstrated, its costs and risks are well known, the necessary facilities are currently in operation, and its waste form is likely to be acceptable for disposal at the repository. The Nonproliferation Report was also cited. It stated that all the alternatives considered in the draft EIS have the potential to support nonproliferation actions, yet chemical processing would send a contradicting message overseas.

Keilers said that cost does not appear to be a determining factor in choosing a preferred alternative. Keilers referred to the National Research Council report that stated that the lowest life cycle costs occur when existing facilities are used. Chemical processing in H-Canyon until FY 2010 has been estimated to have a higher life-cycle cost than direct co-disposal or melt and dilute in L-Area, but several reports have concluded that, given the uncertainty in these estimates, there is no significant difference in the life-cycle costs of these alternatives.

The DNFSB's major responsibilities involve safety of the public, the workers, and the environment, considering nuclear hazards, Keilers said. He described the melt and dilute process in a preconceptual design phase, and listed some of the considerations given in the TECH-22 report that impact safety:

- Lack of experience, coupled with DOE history of difficulty in bringing new technology on-line
- Lack of a building confinement system or building features intended for this purpose
- New accidents (e.g., steam explosions)
- Contamination of the process room
- Criticality
- Melter offgas and fissile material carryover
- Handling unique fuel types (e.g., powdered fuel)

Other technical challenges could include ensuring that the melt and dilute facility would work for all potential fuel types; that it could be remotely operated and acceptably maintained; that molten fuel could be sampled without a release; and that the product would be acceptable at the repository, since repository requirements are still being defined. Keilers pointed out that canyon processing also has hazards but, during four decades of operation, those hazards have come to be understood and appropriate safety design features and controls put in place. To safely implement new technology such as melt and dilute in an existing facility likely would not be a straight-forward process. Steps required include technology development and demonstration, facility backfit and modification, system testing, startup preparation, operator training and qualification, safe operation, and eventually decommissioning. Keilers said it is difficult at this stage to anticipate all the problems that could arise in bringing a new process online in a production capacity.

Keilers emphasized that the technical issues can be resolved; however, considering the DOE record (e.g., DWPF, In-Tank Precipitation Project, Americium-Curium Vitrification Project), new technology projects usually take longer and cost more than originally intended and are subject to false starts. Furthermore, delay in implementing a new project can become a safety issue. When capabilities and facilities already exist, it appears prudent to rely on those existing facilities rather than develop a primary dependence on new technology that has not matured.

Keilers concluded his presentation by referring to the DNFSB letter to DOE that forwarded the TECH-22 reports and highlighting the letter's conclusion that DOE should, as appropriate, protect and capitalize on its existing capability where safety assurance has already been demonstrated rather than hasten to replace it.

Karen Patterson asked why the DNFSB waited to release the report. Keilers said the DNFSB has frequently discussed the concerns of melt and dilute and the minimum use of the canyons with DOE. Keilers did not believe DOE would have been surprised by the issuance of the report.

Lee Poe, public, asked why the report did not become a recommendation. Keilers said the DNFSB goes through a deliberate process before issuing recommendations. Part of the process is a thorough review of the issues, communicating those issues with DOE at multiple levels, and if possible, allowing DOE and its contractors an opportunity to resolve the issues early. Although there is always a chance for an issue to be elevated to a recommendation, Keilers stated the report is currently not a recommendation.

Patterson then asked if the DNFSB would still provide oversight on SNF activities if DOE built a new, non-defense-related facility rather than modifying the L Reactor. For example, the DNFSB jurisdiction does not include the Receiving Basin for Offsite Fuel (RBOF) since it is a non-defense-related facility. Keilers said the DNFSB maintains awareness of the nuclear facilities at SRS and identifies any safety issues that it finds, regardless of the nature of the facility. For example, during a tour of RBOF, the previous DNFSB site representative noticed corrosion of aluminum-based foreign research reactor fuel and brought it to the attention of senior DOE management. This eventually led to expedited processing of this fuel.

Bob Overman, public, asked if the delay of returning some of the domestic fuel from university reactors results from political decisions. Overman cited the fact that SNF was removed from Georgia Tech before the Olympic Games came to Atlanta. And concerning foreign fuel, Overman asked why DOE did not require some countries to return all fuel to the U.S. for nonproliferation purposes. Keilers said

nonproliferation issues were outside the purview of the DNFSB, especially if they do not deal with defense facilities.

Dave Huizenga, Associate Deputy Assistant Secretary of Fissile Materials and Facility Stabilization, EM-60, said DOE made a very specific commitment to allow the foreign research reactor operators until 2009 to decide to send fuel back to the U.S. After that time, the countries would have to manage the SNF themselves. There is no endpoint for return of domestic fuel, although DOE expects to receive fuel until 2035.

Overman asked why the countries had such a long time to decide on whether they will send fuel back to the United States. Huizenga clarified that foreign countries had only until 2006. Huizenga said the timelines for return of fuel were specified to honor South Carolina's request not to receive fuel indefinitely.

Patterson asked if DOE is pursuing the melt and dilute technology because of nonproliferation issues, then why is DOE giving the foreign reactor operators a deadline on making a decision to participate or not to participate at all. Huizenga said most of those who will participate have already stated so, which will take care of most the fuel containing HEU.

A question was asked if the canyons could begin processing fuel already at SRS and fuel scheduled to come to SRS before 2010. Huizenga said the canyons are fully scheduled until 2006, with only a small window available to stabilize other fuel. Keilers said that after processing the defense-related spent fuel (2003), it appeared that DOE was considering using H Canyon to dilute non-SNF HEU from other DOE sites (i.e., material with negligible fission products). Keilers observed that DOE might achieve a greater net risk reduction by instead accelerating the INEEL SNF shipments and using H Canyon to stabilize SNF.

Costikyan said there appear to be philosophical differences on using the canyons even though both the DNFSB and DOE have stated the canyons should be used to the maximum when possible. Huizenga said, however, DOE must function under many constraints and policies, including the effort not to convey misconceptions about its nonproliferation stance. Many national organizations believe the processing of SNF would send the wrong message. Huizenga also stated currently there is no room in the canyon schedule to process foreign research reactor fuel. In addition, he said DOE must deal with funding issues and he believed that since the bulk of the SNF would be shipped before 2009, a smaller facility would be more cost effective than the canyons. According to Huizenga, the cost per year of running the canyons is about \$100 million.

Ken Goad, CAB NMM vice-chair, asked how could canyon costs be much higher than melt and dilute. Goad said he believed costs would be comparable if DOE looked at the life-cycle of the melt and dilute process from cradle to grave. Goad also asked what would be the technical advantage of developing a new process instead of building a small canyon. Huizenga said DOE has no future need for the capability to separate HLW from uranium in SNF.

As discussion turned again to differences in the options, Keilers said the DNFSB's questions on melt and dilute dealt with technical uncertainties of all aspects of the process—from the safety issues to when the process could actually come on line to stabilize SNF.

Huizenga said DOE is trying to balance its approach to stabilizing nuclear materials by utilizing existing capabilities like the canyons, but also planning for the future by developing new technology such as melt and dilute.

Brendolyn Jenkins, SRS CAB, asked when the melt and dilute process would be operational. Huizenga said the dates have slipped from 2003 to 2005 or later due to funding issues. Huizenga added he is not concerned about the delay because the fuel is being safely stored in wet basins that have upgraded water chemistry.

Keilers said leaving fuel in wet basins if melt and dilute is delayed should not be an indefinite scenario, especially while DOE currently has the option to address the fuel quickly. Huizenga said DOE is dealing with much more material than SNF and stabilizing fuel in the canyons is not a black and white issue. For example, he said a draft DOE plan (the Nuclear Materials Management Integration Plan), which has inventoried nuclear materials across the DOE complex and recommends stabilization activities, lists the canyons as being used to their maximum through 2010. If DOE chooses to process SNF through the canyons, it would displace other material.

Keilers said DOE will have to make trade-offs, but from a safety standpoint, it may make more sense to process the SNF in the canyons before processing HEU without fission products, since this would achieve the most risk reduction sooner.

Huizenga said DOE is constrained to operate all facilities throughout the complex safely and to put materials in proper form for storage. However, the budget caps force DOE to make major decisions on which activities are most important and which ones will get funded. Huizenga said DOE appears to be able to avoid problems in 1999 and barely in 2000, although he has strong concerns about the 2001 budget.

Costikyan and Patterson both asked why DOE would consider building a new facility while facing so many budget constraints. Huizenga said the cost to simply maintain H Canyon is over \$100 million per year. In addition, there will be great expenses when closing the facility. Huizenga emphasized that DOE must not miss the opportunity to sequence all of the activities and have a new stabilization technology ready to go online.

Patterson said this situation reminded her of the In-Tank Precipitation scenario where in the middle of the process, DOE admits it does not work. Huizenga said the statements made in the TECH-22 report about DOE's lack of success in new technologies and concerns with the melt and dilute process could not be substantiated. Huizenga lauded the efforts of DOE-SR, the Savannah River Technology Center (SRTC) and WSRC in its work on melt and dilute. Randy Ponik, DOE-SR manager for Alternate Technologies, also pointed out that a very similar process to melt and dilute was utilized in the past at Argonne West, and the fission products were successfully captured by filters.

Patterson said the public had heard many times that the melt and dilute process works, but people simply do not have the confidence in the process. Jenkins asked Huizenga what he thought was the right thing for DOE to do. Huizenga said DOE must operate a facility safely and pace R&D and design work to have a technology to replace the canyons. He did emphasize that DOE had learned to conduct such new projects in two phases if the projects experienced reduced or lack of funding.

Keilers said the melt and dilute process may be a viable one, and it is being worked by talented people. He said the DNFSB's point is that DOE should not depend on the process until it is more mature, which may take a while because of the budget situation and cost uncertainties.

Costikyan said he is most concerned with when the technology be tried, tested and available. He pointed out that an earlier CAB recommendation suggested the canyons be used and considered as a backup if melt and dilute does not come to fruition.

Lee Poe said he would like to make two points: (1) He does not feel the public has received the entire story on melt and dilute and they should hear from DOE why melt and dilute is such a good technology; (2) It appears that the major issue on how to manage the fuel is in the out-years and a Record of Decision on managing SNF should be delayed until DOE clearly states its position and status on melt and dilute.

Costikyan emphasized that the CAB reviewed the draft EIS and although members are laymen, melt and dilute did seem plausible. He also pointed out that the National Academy of Sciences also said it was an

achievable technology. Poe said anything could be engineered if you have the time and money. However, time and money are the obstacles in putting melt and dilute online.

At this point, Costikyan suggested the group consider what, if anything, should be said about the TECH-22 report. All agreed it was a well-written report. Jenkins asked Huizenga when or if DOE would respond to the DNFSB report. Huizenga said the report did not contain any new information that would cause DOE to change its mind on stabilizing SNF. Therefore, DOE will likely respond with a thank you but there is no reason for movement.

Huizenga also suggested that the CAB make the opportunity to review information on melt and dilute, before responding to DOE about the DNFSB report. Poe agreed that since there is no new information, the public needs to hear more about the melt and dilute program. He added that DOE should consider looking at the other side of the coin--bringing fuel to SRS early and processing--before implementing a new technology.

Huizenga said such actions would require much more dialogue and there would be a lot of "ifs". Todd Davis, DNFSB, said there are no "ifs" about the canyon's capabilities and that the DNFSB is pointing out the uncertainties of melt and dilute. Davis emphasized that the DNFSB is concerned with the timing issues—it has always supported research of new technologies. Huizenga said he wants the SNF stabilization program to be a success and will do everything in his power to avoid another situation like ITP.

Poe asked when the ROD for stabilization of SNF would be announced. Huizenga said plans are to have the ROD by the end of September to avoid rescheduling and down time in the canyons. John Anderson, DOE-Materials and Facility Stabilization Deputy Assistant Manager, said the EBR II spent fuel is scheduled to be stabilized in the canyon shortly after the SRS SNF EIS ROD.

Poe said again that DOE should delay the ROD and educate stakeholders on the melt and dilute process and why DOE is choosing it over processing in canyons. Patterson said she believes cost is the major obstacle to the melt and dilute program, not technical problems.

Huizenga said he was not against the canyons but DOE could not operate them forever. He said \$75 million is being spent now to upgrade the exhaust system. He also stated that it would take at least \$200 million to ramp down and take the canyons out of service. Money has to be budgeted for those years in advance.

Costikyan asked why would the DNFSB say there were safety issues, while DOE says there is no problem with the process. The DOE representatives confirmed that the process has only been tested in small scale. Huizenga defended the melt and dilute process and said the foreign reprocessing company, Cogema, was interested in assisting DOE in developing the melt and dilute technology.

Jenkins suggested that the SRS CAB receive a presentation on melt and dilute in order to hear all sides of the stabilization issue. At this point, Costikyan distributed a draft recommendation he developed after reading the TECH-22 report. He said the concern is not that melt and dilute can be a viable technology, rather, many people simply stress the many uncertainties around the timing. Costikyan again pointed out that there appear to be philosophical differences among DOE and other groups on using the canyons for SNF stabilization.

Huizenga said DOE is determined to process what needs to be processed and it does not believe foreign and domestic research reactor fuel needs to be processed. This thought goes along with the DOE Nonproliferation Office that says DOE should phase-out processing to avoid proliferation issues.

Keilers suggested that DOE should reconsider its position and use the canyons to their full potential while they are available, especially if there are gaps in the schedule when more material can be stabilized. Huizenga stated H Canyon would not be shut down until melt and dilute is proven.

Discussion then turned back to the SRS SNF EIS ROD and whether the CAB should ask for a delay. Poe suggested that DOE issue multiple RODS so that the EBR II fuel could be stabilized while other decisions are made. Huizenga said DOE would prefer to avoid a delay or multiple RODs. He emphasized that in the draft EIS, DOE planned to stabilize an equal amount of volume of materials with melt and dilute and the canyons.

After several minutes of discussion, Costikyan said he would revise the draft recommendation to ask for (1) a copy of the DOE response on the DNFSB report, (2) a presentation on melt and dilute and nuclear material integration, and (3) a statement the CAB will comment on the melt and dilute program after the presentation.

In closing, two additional comments were aired. Bill McDonnell, public, said that although he believes processing the SNF in the canyons is the most logical choice, DOE's policy on nonproliferation is the heart of the reason for choosing melt and dilute. Huizenga stated funding for the melt and dilute process was restored for 1999 and 2000.

Issues: The SRS CAB and other stakeholders have not heard detailed presentations on why melt and dilute is supported by DOE. Funding and timing appear to be the biggest uncertainties of melt and dilute.

Actions: Request DOE to provide a presentation to the SRS CAB on August 26. DOE to provide information to Lee Poe for a previous request. Costikyan to rework draft recommendation to capture discussion in July 22 meeting.

Meeting handouts may be obtained by calling 1-800-249-8155.