



## **SRS Citizens Advisory Board**

### **Nuclear Materials Management Subcommittee**

#### **Meeting Record**

January 25, 1999  
Holiday Inn  
Hilton Head Island, SC

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The Citizens Advisory Board (CAB) Nuclear Materials Management (NMM) Subcommittee met Monday, January 25, 7 - 9 p.m. at the Holiday Inn Oceanfront in Hilton Head, SC.

#### Citizens Advisory Board

Tom Costikyan, Chair  
Jimmy Mackey  
Ed Tant  
Ken Goad  
Brendolyn Jenkins

#### Stakeholders

George Minot

#### DOE/Contractors

Carl Waltzer, DOE-SR  
Mark Woodworth, DOE-SR  
Ranky Ponik, DOE-SR  
Julie Peterson, DOE-SR  
Gary Little, ADDFO  
Donna Martin, WSRC  
Ray Conatser, WSRC  
Mark Dupont, WSRC  
Tim Mettler, SCDHEC  
Tom Rolka, SCDHEC

Tom Costikyan, chair, opened the meeting by stating that the meeting objectives were to ask clarifying questions on the SRS Spent Nuclear Fuel Management draft Environmental Impact Statement (SRS SNF DEIS), then develop a recommendation for the full board's consideration.

Costikyan said the NMM subcommittee had followed issues surrounding the management of SNF at SRS for several years in anticipation of the release of a draft EIS. Costikyan said the subcommittee also had strong interest in a nonproliferation (NN) study released in conjunction with the SRS SNF. In his cursory review of the NN report, Costikyan said the report did not point out proliferation concerns except that processing would set a bad example to the rest of the world.

Dealing specifically with the melt and dilute process, Costikyan said the National Academy of Sciences report on SNF treatment stated the technology appeared to be technically sound with relatively few issues on its suitability for the repository. Concerning cost effectiveness of the technologies, Costikyan, said all technologies ranked basically the same in costs, although an earlier cost study stated processing was the lowest cost technology.

Costikyan then asked Karl Waltzer, DOE-SR document manager for the SRS SNF DEIS to discuss the reasoning behind choosing the melt and dilute preferred option. Waltzer said that DOE stated in the Record of Decision on the Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign

Research Reactor Spent Nuclear Fuel Environmental Impact Statement (FRR SNF EIS) it would pursue developing a non-chemical separation technology to treat the fuel.

In an extension to that decision, a special task force looked at nine different technologies and the most viable ones were included in the SRS SNF DEIS, Waltzer explained. Melt and dilute was chosen as the preferred alternative because it offered the best way to manage domestic and foreign research reactor spent nuclear fuel sporadically trickling into SRS for storage and treatment until 2035. Chemical separation was selected as the preferred alternative to stabilize material with safety and health concerns.

Waltzer then said the fuel is measured in two ways:

- (1) Metric Tons of Heavy Metal, MTHM, (mass)
- (2) Materials Test Reactor Equivalent, MTRE, (volume)

In looking at material by mass, Waltzer said 50 percent of the SNF would be stabilized with the melt and dilute process and the other 50 percent would be stabilized using chemical separation. Using MTRE measurements, (volume), 97 percent of the material would be stabilized with melt and dilute and the remaining 3 percent would be chemically separated.

Costikyan asked if DOE is optimistic the melt and dilute technology would be successful. Randy Ponik, DOE-SR Alternate Technology programs manager, said surrogate test fuel has already been melted and diluted in a small induction furnace. Lab work has also proven that the material can be diluted to less than 20 percent Uranium-235. Ponik added that the technical obstacle of offgases, primarily cesium, coming off the fuel could be addressed with a filter trap system.

Costikyan pointed out that according to a National Academy of Sciences report on treatment technologies for aluminum-based fuel, the melt and dilute process was not a new technology to DOE. He asked if this process was used in the commercial industry.

Waltzer said the NAS study principal investigator, Milt Levenson, was the director of melt and dilute technologies at Argonne National Laboratory in the 1960s. The technology has also been conducted on a small scale at SRS. Waltzer added that a melt and dilute pilot program, using actual irradiated fuel elements, would be conducted through October 2000.

Brendolyn Jenkins asked about the significance of volume versus mass. Waltzer said 3 percent of the volume of the spent nuclear fuel represents 50 percent of the mass of the material due to the high mass of the metallic uranium and thorium SNF. Only the aluminum clad fuel with high mass would be chemically separated in the canyons. Ray Conatser added that the volume ratio of melt and dilute to chemical separation is 97 percent to 3 percent.

Waltzer said the melt and dilute process forms ingots that could eventually be placed in a Defense Waste Processing Facility (DWPF) canister. The spent fuel rods would be diluted with depleted uranium, which is in abundance at SRS, to dilute the high enriched uranium to low enriched uranium.

Responding to a question on the suitability of melt and dilute for disposal in a geologic repository, Waltzer said the melt and dilute process could be engineered to meet repository waste acceptance criteria.

Waltzer emphasized that DOE is working closely with the Nuclear Regulatory Commission (NRC) to develop the waste acceptance criteria to ensure that final disposition forms meet guidelines. The waste acceptance criteria will not be finalized until 2006; the melt and dilute technology is not scheduled to go online until 2005.

CAB member Jimmy Mackey asked how would DOE capture gases from the melt and dilute process, and, how much waste was generated. Waltzer said filters would be used to capture the radioactivity

(cesium) and would result in about a cubic foot of radioactive waste being placed in the site's solid waste system.

Costikyan questioned the uncertainty of the melt and dilute process and asked if there was a fall-back process if DOE discovered the melt and dilute process did not work after the canyons were shut down.

Waltzer said he did not foresee any technical uncertainties that could not be resolved. He ensured the subcommittee DOE would not put itself in the situation of not having a fall-back technology. He added the H canyon is currently scheduled to operate to 2005 and it could stabilize all of the material, if necessary.

Costikyan said the fact that DOE would consider using the canyons as emergency back-up—while they were in operation—was a significant statement. Costikyan added that the SNF stabilization form resulting from chemical stabilization was the only form currently acceptable for disposal at Yucca Mountain.

Mackey asked how DOE would deal with corroded SNF after the canyons are shut down. Waltzer said SRS sends personnel locally and overseas to inspect the fuel before it is shipped to SRS. DOE would not accept fuel that could not be stabilized with melt and dilute once the canyons are shut down. Waltzer said several processing facilities located overseas could process compromised fuel elements.

Conatser said the SRS SNF DEIS does not determine how long the canyons would be used. DOE is stabilizing other materials such as plutonium residues from Rocky Flats in the canyons. Conaster also said DOE is in the process of identifying disposition routes for nuclear materials at other sites that do not have the capability to stabilize materials.

Concerning stabilizing SNF from a political standpoint, Waltzer emphasized that DOE will not back away from focusing on nonchemical separation processing.

George Minot asked how the preferred alternative of chemically separating 50 percent of the mass of the total SNF through the canyons would affect the canyon schedule. More importantly, he asked what are the risks of adding more volume to the canyons as a result of the additional processing. For example, Minot asked if a furnace in the canyons could (not sure what he meant, but perhaps a different choice of words would be appropriate here) with the extra workload.

Waltzer said many different accident scenarios were evaluated in the EIS. Conclusions show low releases and minimal impact to safety and health. Minot then asked about affects to workers. Waltzer said radiation dose to workers would also be low.

A question of the possibility of criticality was asked. Waltzer explained criticality occurs when too much fissile material is in one area. He said criticality occurring would be highly unlikely because SRS would know the amount of fissile material in every rod (pedigree). Additionally, elements were expertly designed to avoid criticality.

Brendolyn Jenkins asked how workers would be protected from radiation of increased operations. Waltzer said all workers wear dosimeters to measure their radiation exposure. If a worker's exposure to radiation reached the SRS limit, which is 25 percent less than the federal limit, the worker would no longer be allowed to perform in a radiation work environment.

In a question on the differences in the conclusions of the cost study reports, Waltzer said the changes occurred due to changes in the canyon schedules and the expectations of recovering costs from the sale of diluted highly enriched uranium. Currently, the local market is awash in highly enriched uranium, Waltzer added. Now, all of the costs of stabilization are relatively the same. The most significant costs deal with capital money to construct the melt and dilute facility.

Costikyan said for the recommendation, the CAB could possibly suggest that the funding of the melt and dilute facility not be detrimental to or penalize other activities at SRS, such as environmental remediation and waste management.

Ponik said the cost of the melt and dilute project is \$18.5 million, with \$11 million already earmarked for fiscal year 2000.

Another point Costikyan said could be included in a recommendation is that the CAB would have frowned on direct disposal/co-disposal because it is less likely to meet waste acceptance criteria for Yucca Mountain. Thus, there would be a larger uncertainty that the material would leave South Carolina.

Ponik emphasized again that DOE and NRC are developing a memorandum of agreement to allow both organizations to move forward without fear of insurmountable issues. Another point focused on the fact the ingots from the melt and dilute process could be more easily verified for nonproliferation reasons than direct disposal.

Responding to a statement by Ed Tant that the repository "is not a sure thing", Waltzer said the SNF and the stabilized material could be dry stored for 50 years or more without degradation.

In final comments before developing a recommendation, Costikyan said he felt reassured that the canyons would not be shut down before the viability of melt and dilute was clearly established.

Ken Goad agreed with concerns about what would occur if the canyons shut down in 2005 but the melt and dilute process was not in place. Goad said he would prefer for the melt and dilute facility to be constructed before 2005.

Minot agreed with an earlier statement that money for the melt and dilute should not be taken away from remediation dollars. He also strongly stated that his primary concern is moving the material at SRS out of the state of South Carolina.

Development of the recommendation proceeded at 9 p.m.

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