

# Nuclear Materials Committee

October 29-30, 2012

## MEMBERS

**Rose Hayes, Chair**

**Nina Hazen, Vice-Chair**

**John Snedeker**

**Ed Burke**

**Stan Howard**

**Paul Shieh**





# Nuclear Materials Committee Responsibility

- This committee was established to study issues which involve nuclear materials, generally uranium and plutonium, that have an impact on present or future SRS activities, including:
  - Used nuclear fuel program activities
  - Nuclear materials management
  - Nuclear materials integration
  - Disposition of Pu and other HLW from SRS

# NMC 2012 Annual Work Plan



- I. Nuclear Material Receipt & Storage
- II. Nuclear Material Reuse & Disposition
- III. Strategic Initiatives & Policy Discussions  
Related to Nuclear Materials

## 3 Open Recommendations forwarded to DOE



- Adopted 9/27/11
  - Open recommendations have been responded to and the recommendation response has been reviewed and agreed to by the committee, but not all DOE actions are complete.

# 280



- Concern for Receipt and Planning for Disposition of Research Reactor SNF

#281



- Disposition Costs for SRS Research Reactor SNF



## #282

- Impact of Blue Ribbon Commission Recommendation on SRS Programs



## 2 Pending Recommendations forwarded to DOE

- Adopted 5/22/12
  - Pending recommendations have been approved by the CAB full board and submitted to DOE, however the response has either not been received or reviewed by the CAB. The board may follow up for further information on a response that they find inadequate.



#286



- Yucca Mountain as Interim Storage Site

# #287



- Disposition Planning & Dry Storage of SNF

# Additional Pending Recommendations



- Adopted 9/25/12
  - Implementation of SNF Exchange with Idaho National Laboratory
  - SNF Processing Credit for H-Canyon Operations



## Draft Recommendation

# Advanced Preparation for Administrative Strategies to Prepare, Process, Containerize and Disposition High-Level Nuclear Waste from SRS

Committee moved to make this a joint recommendation with the Waste Management Committee. Will be discussed at the next WM meeting on November 13.

# Presentations

- Tuesday, October 30th:
  - “Update on L-Basin ‘Cobweb’ Materials”
    - Maxcine Maxted, Department of Energy, Savannah River, Spent Fuel Program Manager



## New Draft Recommendations

- Disposition of SNF From L-Basin Through H-Canyon Considering the Plutonium Processing Impacts Likely to be Encountered
- Contingency Budget Planning Input for Severe Budget Cases



## Disposition of SNF from L-Basin Through H-Canyon Considering the Plutonium Processing Impacts Likely to be Encountered

- Background.
- Both defense and commercial nuclear waste have been stored in interim sites across America since the 1950s, without a consent-based process. The Savannah River Site (SRS) has served as one such site. It has become clear that a disposition path for the radioactive materials stored at SRS will not have a disposition path for many more years.
- The 1982 Nuclear Waste Policy Act (NWPA), amended in 1987 to designate Yucca Mountain as the national site to be developed for America's permanent waste repository, has been bypassed. The Obama administration has directed the Department of Energy Secretary, Dr. Steven Chu, to withdraw its application from the Nuclear Regulatory Commission (NRC) for licensing the site for that function.

- Following the withdrawal action for licensing Yucca Mountain, the President established a Blue Ribbon Commission (BRC) for the purpose of identifying alternatives to Yucca Mountain that could accommodate America's current and future nuclear waste. The BRC released its final report in July 2012 with general recommendations that must be evaluated by various relevant federal and state agencies. Recommendations emerging from those evaluations will then be subject to consideration by effected agencies in order to select actions that may constitute a national waste management program. The BRC also included the recommendation that actions to establish interim or permanent repositories be consent-based.
- Compounding the issue is the likelihood that, with any administrative policy change, Yucca Mountain could again come under consideration as a permanent deep geologic repository for America's commercial and defense nuclear waste. A recent Government Accountability Office report found that there appears to be no scientific evidence supporting claims that the Nevada site is geologically inappropriate as a national waste repository.





- Further compounding the issue is the history of consent-based attempts to site nuclear waste storage systems in America's states, Indian Reservations, and other communities. A Nuclear Negotiator Office was established through the 1987 amendment of the 1982 NWPA congressional act. That office approached a series of state governments, Indian Reservations and economically depressed communities with financial incentives to volunteer for nuclear waste storage. All offers were ultimately rejected and the Nuclear Negotiator Office was closed in 1994.
- Discussion.
- The SRS has been the interim storage site for defense waste (in the form of Defense Waste Processing Facility (DWPF) canisters) and other nuclear waste (both domestic and foreign SNF) for half a century. A series of disposition campaigns to process the SNF have been considered, with some funded and implemented, but without being integrated into a cradle to grave nuclear waste management system and without a federal repository to receive shipments of the processed waste. None of the SRS storage programs have been consent-based.



- One system, the DWPF, vitrifies radioactive waste from the SRS tank streams. The vitrified waste, in the form of glass logs, is then stored in an interim site that houses the glass logs in steel canisters surrounded by sub-surface concrete vaults.
- Another system involves utilizing the decommissioned L Reactor cooling pool, holding 3.4 million gallons of water, as an interim wet storage site for 15,000 assemblies containing both domestic and foreign research reactor SNF. The pool now contains 13,000 assemblies. Current planning for the management of L-Basin radioactive materials includes processing certain SNF through H-Canyon where the highly enriched uranium is captured (and reused) and the waste is processed through the High Level Waste System to the DWPF where it is also deposited in a glass matrix in canisters. There is a concern that this material is not scheduled for processing in the H-Canyon. If the delay continues the H-Canyon may not be available. The process time for this SNF is on the order of 10 years and there is a valid question whether the H-Canyon will be operated long enough to complete the materials in the L-Basin. The H-Canyon operability remains subject to such intervening variables as administrative policy changes and congressional funding.



- Additionally, as an interim wet storage site, L-Basin is reaching full capacity. There is an ongoing consideration for expanding storage capacity in the basin. The racks into which the assemblies are stacked must be designed around a fixed geometry for spacing the radioactive contents to control criticality. There are 3,650 available positions, with 3,174 positions filled and remaining space to add around 15 additional racks (or 450 storage positions) in the pool. Any rack designs must be seismically qualified in case of earth movement (quakes).
- Like all federal nuclear systems, L-Basin funding is subject to administrative and congressional discretion for operations funding. A 2011 study on fuel and basin life extension was conducted by the Savannah River National Laboratory which concluded that the fuel presently in the basin can be safely stored for an additional 50 years, contingent upon the continuation of existing management activities and implementation of several augmented program activities.



- The management and augmentation activities include periodic examination of the bundled fuel assemblies, assessment of fuel in isolation containers, and basin concrete assessment. There must also be a continuation of the basin water chemistry, corrosion evaluation, structural integrity evaluations, aging facility management assessments and infrastructure maintenance. These requirements for continued storage of spent fuels face serious challenges. Structural integrity of both fuel and their containers is a constant challenge. Another constant challenge to the L-Basin pool is the risk of basin contamination and requisite cleanup. There is presently such an invasion under study. The costs of operating L-Basin are currently around \$150 million per year.
- While consideration is also ongoing for dry storage alternatives at L-Basin, questions have evolved on the efficacy of dry storage considering such safety issues as terrorist threats. Internationally, materials that have been selected for dry-cask storage have been cooled for several years before entering the system.



- Considering the above cited problems for continued on-site storage of SNF, their costs, and the likelihood of a national nuclear waste repository becoming available in the near future, the most practical solution for dispositioning radioactive materials from L-Basin is to reconfigure process operations in order that these materials can be processed through H-Canyon for injection into the high level waste stream entering the DWPF vitrification system. Processing the materials through H-Canyon has the advantage of utilizing that unique facility and its skilled personnel for several years. Further, converting the L-Basin SNF fission products into vitrified glass logs has several advantages. They are more easily and safely stored than maintaining SNF in any other storage configuration presently available. The vitrified material is less subject to threat by terrorist actions. Finally, as a result of the other advantages, the option of canister storage for vitrified materials is a more pragmatic and practical option than extended wet storage of SNF or wet storage of SNF supplemented by dry-cask systems.



- There have been some complications to the possible processing of the SNF in H-Canyon due to a preferred alternative recently published in an on-going Supplemental Environmental Impact Statement for the Disposition of Surplus Plutonium by the National Nuclear Security Administration. It appears likely that H-Canyon will now be used partially for processing some surplus weapons-grade plutonium for use in the Mixed Oxide Fuel Facility (MFFF/MOX). If this is the case it is not clear to what extent the H-Canyon could process the SNF now on-site or how long it would take.
- However, it seems foolish to continue to keep SNF in a somewhat vulnerable storage configuration when such an attractive and reasonably affordable option is available (and in the immediate horizon may no longer be available) to configure SNF into the most stable, technically advanced, and attractive configuration possible. Further, it is noted that maintaining H-Canyon while there is no ongoing processing costs \$150 million per year. While operating at full capacity only costs \$170 million per year. From a relative standpoint, the cost increases for full operations seem modest.





## Recommendations.

Given the disadvantages of the current wet storage system, processing obstacles, lack of an available national repository for years to come, need for additional storage space facing SNF on the SRS site, and all the associated cost factors, it is recommended that DOE:

1. Authorize and fund the processing of L-Basin SNF in H-Canyon as a matter of urgency taking into account the considerable length of the SNF campaign and the possible limited life off H-Canyon.
2. Reassess the SNF processing time and capacities for H-Canyon considering that plutonium will likely be processed in H-Canyon (as a result of a related plutonium disposition program) and may possibly extend the end point for H-Canyon operations.
3. Establish the length of the processing campaign of the SNF in H-Canyon considering the parallel processing needs of the plutonium being processed for the MFFF/MOX Program.
4. Assess the impact of the SNF processing campaign on the High Level Waste System and the number of additional canisters that will likely be required.
5. Develop a System Plan to document the revised H-Canyon schedule and the impact on the DWPF schedule.
6. Prioritize the above recommendations so that processing the L-Basin SNF through H-Canyon and the DWPF can begin during the 2013 fiscal year.





## CONTINGENCY BUDGET PLANNING INPUT FOR SEVERE BUDGET CASES

### Background.

With the coming of the next election cycle and the existing spartan budget climate it seems entirely plausible that SRS could face severe budget cuts. In the view of the CAB, SRS may have to assess priorities in an unprecedented manner.

The CAB has consistently indicated to DOE that our top priority is addressing cleanup activities related to the liquid radioactive waste system. The CAB has also indicated strong support for processing existing on-site SNF inventories which will be continuously increased over the next few years by incoming foreign and domestic receipts. We also recognize that to maintain these high priority activities it will be necessary to maintain operability of the integrated production system, which includes:



- H-Canyon Processing
- Waste Tank Processing Activities
- Interim Salt Waste Processing activities
- Construction and Operation of the Salt Waste Processing Facility
- Continued Operation of the Defense Waste Processing Facility



Each of these individual systems listed above have surprisingly high costs even if operated at minimum safe operating conditions (safe, stable condition with no production throughput), compared to full operations. For example, the minimum safe operating condition costs for H-Canyon is on the order of \$150 million per year while full operations conditions increase these costs to \$170 million per year. Full operations costs over non-operating costs are a modest 13% increase and provide such return on investments as nuclear waste cleanup and support of nonproliferation. It is quite likely that the same relative costs for the other facilities listed above have comparable ratios of full operations to minimum operations costs.

### Discussion.

The CAB continues to reaffirm that we support dealing with all aspects of cleanup in the manner such as you have proposed in the plans set forth in FY 2011 and FY 2012, and earlier years. We also understand that we are making some input on hypothetical conditions which we hope will never reach reality. However, if deep cuts come, we encourage a “risk-based” approach to cleanup and in our view that would include dealing with the High Level Waste and the SNF first. This condition suggests that if faced with deep budget cuts we strongly recommend that these critical facilities be kept in some ongoing operational status. In no scenario would it be cost effective in our view to keep these facilities in minimum safe operating condition, as opposed to full operations.

These views are expressed in light of the well-known condition that “the SRS High Level Liquid Waste represents the largest hazard in the state of South Carolina.” We feel that continually addressing this high risk radioactive waste should be maintained even if some other credible environmental cleanup activities are impacted. We feel that no good purpose would ever be served by maintaining the facilities noted above in any minimum safe operating condition for any significant time period. The risks are real and the stakes too high to ever deal with these hazards without giving it our best effort as we have consistently done in past years.



# Recommendations



It is recommended that the Department of Energy:

- 1. Assess the contingency budget input provided herein and commit to dealing with the cleanup and the site waste inventories on a “risk-based” approach.
- 2. Make the CAB priorities and views on the urgency of addressing the liquid waste system cleanup well-known to HQ.