

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

March 31, 1997

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director

**COPIES:** Board Members

**FROM:** W. Yeniscavich

**SUBJECT:** Review of Ongoing Work at the Savannah River Site  
Tritium Facility

**1. Purpose**

A review of the ongoing and planned work at the Savannah River Site (SRS) Tritium Facility with regard to safety of workers and the public was conducted by Defense Nuclear Facilities Safety Board (Board) staff members K. Fortenberry, J. Sanders, and W. Yeniscavich on March 19, 1997.

**2. Summary**

The unloading of expired reservoirs is continuing without incident, but completion will be delayed because the number of reservoirs being shipped to SRS exceeds the number previously used in planning the work. All expired Category A reservoirs, which represent the greatest potential for leakage, have been unloaded, and new Category A reservoirs are being unloaded before they expire. The remaining expired reservoirs (Categories B and C ) are now scheduled to be unloaded by March 2000. Some of these reservoirs have gone 7 years beyond their expiration dates. Since reservoirs have a greater potential to leak after they have expired, continued effort is essential to unload the expired reservoirs as quickly as possible.

Of the planned 42 Highly Invulnerable Encased Safes (HIVES), 21 have been installed in the reservoir storage vault, and the remainder will be installed by May 1997. However, when installation is complete, there will be insufficient storage space in the HIVES for all the reservoirs in the vault, and approximately 2000 reservoirs will continue to be stored in the old file cabinets. Over the next 18 months, the total inventory in the vault will be reduced to the level at which all remaining reservoirs can be stored in the HIVES.

**3. Background**

In January 1995, SRS identified a large inventory of expired reservoirs in storage that would have to be unloaded as quickly as possible. Expired reservoirs are reservoirs that have exceeded their stockpile or limit life, and have an increased potential to leak. Because of the large inventory, the design laboratories established categories within the expired reservoir population.

Expired reservoirs with the highest potential to leak were identified as Category A. The remaining expired reservoirs were put in Categories B and C, which are essentially indistinguishable and have been treated as one category. SRS presented a plan for unloading all of the Category A expired reservoirs by the summer of 1995; this was accomplished by September 1995. The remaining expired reservoirs were scheduled to be unloaded by the summer of 1998.

The previous Board staff review of ongoing work at the SRS Tritium Facility was conducted on July 29-30, 1996. During this 1996 review, it was found that the schedule for unloading expired reservoirs had slipped about 9 months; this was attributed to the late arrival of the Hydride Storage Vessels (HSVs) needed to store the gas unloaded from the expired reservoirs. The first HSV was loaded in April 1996, about 1 year behind the original schedule. The backlog of expired reservoirs was then rescheduled to be unloaded by March 1999.

Reservoirs and HSVs were stored in office-type file cabinets within the vault at the SRS Tritium Facility. Structural analysis indicated that the vault would collapse during a design basis earthquake or tornado, and that the file cabinets offered little protection. Consequently, HIVES, a storage container resistant to vault collapse, was designed, and the first unit was delivered to the SRS Tritium Facility in July 1996. The remaining HIVES were scheduled for delivery and installation by October 1996.

Starting around the year 2002, the excess tritium loaded into HSVs will be used to support the weapons stockpile. A new tritium production capability is also planned to come on line early in the next century, and will consist of either commercial light water reactor production of tritium by 2005 or accelerator production of tritium (APT) by 2007. Selection of the lead production process is scheduled for late 1998. For either process, a new Tritium Extraction Facility will be built at SRS, and construction is scheduled to start in FY 1999. The APT facility is being designed at the Los Alamos National Laboratory, and if APT is selected as the lead process, this facility will be constructed at SRS, with construction scheduled to start in FY1999.

#### **4. Discussion**

Unloading of expired reservoirs at SRS has continued without incident; however, an additional 1 year delay in completion of unloading has occurred. The completion date is now March 2000. This delay is attributed to a greater number of reservoirs being shipped to SRS than were included in the original plan. The increased number of reservoirs is attributed to a lack of information on reservoir expiration dates when the original plan was developed, and also to the use of grams of tritium inventory to represent the number of reservoirs. The grams of tritium inventory caused an error in the number of reservoirs because the tritium content per reservoir that was assumed to determine the number of reservoirs was incorrect.

The loading of HSVs continues without incident. Of the planned 30 HSVs, 16 have been loaded. Gas will be stored in the HSVs for up to 8 years, after which helium will no longer be retained in the titanium bed, and an internal gas pressure will begin to develop. Design pressure

will be reached about 3 years after helium starts being released, or about 11 years after initial loading. To identify a premature gas pressure increase, the lead HSV is instrumented and monitored, along with a series of titanium tritide samples. The lead unit, now 1 year old, and the samples show no helium gas release or unexpected behavior. The corrective action for a premature helium release is to bleed off the gas through an existing valve in the HSV.

The Board staff conducted a tour of the reservoir and HSV storage vault. Fire hazards had previously been reduced by eliminating combustibles and by isolating the air system from the adjoining building. The consequences of vault roof collapse are in the process of being mitigated by the use of HIVES for storage of the reservoirs. Of the 42 HIVES, 21 were installed in the vault and contained reservoirs and HSVs. The remaining HIVES are scheduled to be installed and loaded with reservoirs by May 1997. When all HIVES are installed and loaded, however, about 2000 reservoirs will still remain in the old file cabinets. This shortfall of reservoir storage space in the HIVES is attributed to the delay in unloading expired reservoirs and the greater-than-planned number of reservoirs being shipped to SRS. The present plan is to move reservoirs into HIVES as the vault inventory is worked down. Representatives from the Westinghouse Savannah River company indicated that all reservoirs in the vault will be in HIVES within 18 months.

## **5. Future Actions**

The Board staff will continue to follow ongoing work at the SRS Tritium Facility and the work related to a new tritium production facility. Specifically, the Board staff will:

- Follow the unloading of expired category B and C reservoirs until this work is complete.
- Follow the progress in installing reservoirs into HIVES until all reservoirs in the vault are in HIVES.