

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 8, 2005

**MEMORANDUM FOR:** J. Kent Fortenberry, Technical Director  
**FROM:** J. S. Contardi, SRS Site Representative  
**SUBJECT:** SRS Report for Week Ending April 8, 2005

**Defense Waste Processing Facility:** Contractor personnel recently discovered the potential for confined hydrogen at the Defense Waste Processing Facility (DWPF). Since the confined hydrogen represents a new accident initiator, the contractor has declared a Potential Inadequacy in the Safety Analysis (PISA). A review to determine locations in which confined hydrogen may be present has begun. Thus far, approximately 80 locations have been identified. Once the contractor has identified all potential confined hydrogen locations, calculations will be performed to determine if an explosion would compromise the integrity of the pipes or vessels. For those scenarios in which the pipe or vessel integrity is compromised, an additional analysis will be conducted to determine if the event could affect control systems that are important to safety.

As stipulated in the PISA, the current Authorization Basis bounds the postulated explosions. Thus, the contractor does not anticipate the addition of new controls. The majority of the events would occur within the canyon structure and allow subsequent mitigation through the sand filter. However, several scenarios could occur outside of the canyon structure, which would not involve significant radiological material (e.g., cooling water hold tank). For these scenarios the hydrogen explosion has been labeled a standard industrial hazard. Although the radiologic consequences from these events would be small, the accident recovery could require significant time and resources and compromise the ongoing risk reduction activities afforded by DWPF operations.

Similar issues in the design of the Waste Treatment Plant at Hanford led to the identification of potential new hydrogen initiators at DWPF.

**Tritium Operations:** As earlier reported (Site Rep. weekly 2/4/05), a header pipe from a zeolite bed recovery operation unexpectedly failed. The contractor has developed an investigative team to identify the root cause of the failure. Preliminary work performed by the Savannah River National Laboratory indicates the failure was due to chloride induced stress corrosion cracking. Low chloride concentrations, approximately 40 ppm, have been found in portions of the system. When maintenance personnel removed a similar header, significant corrosion was also found. In both cases the corrosion was limited to systems that support zeolite bed operations.

In addition to work performed by SRNL, the team is also pursuing: internal inspections of piping systems with the use of a video scope, reviews of similar operations at other tritium facilities to determine if the operational envelop has accelerated the corrosion, identification of the corrosion mechanism, and selection of alternative materials of construction. A report documenting the team's findings is expected later this month.