



## Accident Prevention: Hanford Tank Farms S-102 Waste Spill

2008-02

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### IMPACT

The July 27, 2007, spill of high level waste at the Hanford Tank Farms S-102 Tank resulted in a major setback to a very visible environmental restoration project with substantial public visibility. The mission impacts for this small (85 gallon) spill include costs in excess of \$8 million for cleanup and corrective action, and eight months of schedule delay to waste retrieval operations. This Advisory will highlight the insights into prevention of future spills identified in the Type A accident investigation.

### BACKGROUND

On July 27, 2007, the Hanford Tank Farms experienced a spill of about 85 gallons of highly radioactive mixed waste from the S-102 Tank, located in the 200 West Area of the Hanford Site. The cause of the accident was an over pressure of a hose in a dilution line. Although required, the pump system did not have a mechanism (e.g., a backflow device) to prevent a backflow and subsequent overpressure of the hose and the dilution line was not designed to handle the pressure that could be generated by the installed pump.

### IMPLICATIONS

The Accident Investigation Board identified weakness in engineering, work processes, emergency management, industrial hygiene, and management and oversight. DOE site management should review operations to ensure that these precursors have been evaluated at their sites.

**Engineering:** The accident was directly caused by an engineering oversight, failure to provide a back flow prevent device between a contaminated system and a non contaminated utility. This produced a latent error which lay dormant during operation of two previous pump systems. As incremental improvements were made to the pump design, the stage was reached where the latent error became the accident precursor. The failure to communicate the proper use of increment design features to operations personnel, such as the new sparge ring, also contributed to the accident.

**Work Processes:** The accident was not identified as a spill until the next morning due to work process deficiencies; the radiation control technicians did not fully understand that both closed window and open window readings were required to allow identification of a spill. While open and closed window readings are similar for

high level waste contained in piping, the open window will show high beta fields from a spill. While not directly causal to the accident, conduct of operations issues which had been present in previous incidents were found to still be present despite previous corrective actions.

**Emergency Management:** Once the spill was identified, the emergency management system functioned well. Recommendations were made to strengthen the system for dealing with spills and other events that are below the Emergency Action Levels.

**Industrial Hygiene:** The monitoring program did not provide data on chemical vapor releases from the spill consequently exposure estimates were based solely on atmospheric monitoring. Coupled with the delay in identifying the spill, a number of workers complained of respiratory exposure symptoms. This resulted in difficulty resolving whether or not the spill actually resulted in personnel exposure. The monitoring in place was appropriate for tanks in the storage mode but questionable for tanks in active retrieval.

**Management and Oversight:** The most significant management issue was the failure of past corrective actions to resolve conduct of operations issues and similar design deficiencies identified in a previous Hanford Tank Farms event. Management oversight of the engineering review process was also questioned, particularly in regard to resolution of design review comments and application of design basis analysis requirements.

### ACTIONS

The Type A accident report is available at:

[Accident Investigation Report](#) - Volume 1

[Accident Investigation Report](#) - Volume 2

If you have specific questions regarding the accident, the accident investigation, or this Advisory, contact Dave Pegram (HS-31) at (301) 9840 or e-mail [David.Pegram@hq.doe.gov](mailto:David.Pegram@hq.doe.gov).

Signed by

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