DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 15, 2008

The Honorable James A. Rispoli
Assistant Secretary for Environmental Management
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Mr. Rispoli:

The Defense Nuclear Facilities Safety Board (Board) has completed the first of a series of detailed reviews of corrective actions for the spill of waste from single-shell Tank S-102 at the Hanford Site. This review focused on the corrective actions related to emergency management. The Board's staff found that the contractor for the tank farms and the site-wide emergency response organization have improved their preparedness for responding to emergencies or abnormal situations at the tank farms since the spill, but that emergency preparedness still needs to be strengthened.

The Board's staff identified a number of issues that need to be addressed related to the corrective action plan for the Tank S-102 spill and an emergency preparedness drill observed at the tank farms. The two main issues are: (1) the corrective action plan does not include an update of the emergency planning hazards assessment, and (2) there is a need for additional planning to improve emergency preparedness. The Board plans to monitor these two issues, as well as the implementation and verification of the full suite of corrective actions for emergency management resulting from the spill.

The enclosed report details the issues identified above and observations of the Board's staff resulting from this review for your information and use as appropriate. Please contact me if you have any questions on this matter.

Sincerely,

A. J. Eggenberger
Chairman

c: Ms. Shirley J. Olinger
Mr. Mark B. Whitaker, Jr.
Mr. Robert J. McMorland

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

May 30, 2008

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: S. Lewis

SUBJECT: Corrective Actions for Emergency Management, Tank S-102 Spill at the Hanford Site

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the corrective actions for emergency management related to the Tank S-102 spill at the Hanford Site. The review included a site visit during March 25 -27, 2008. Staff members J. Deplitch, S. Lewis, J. Troan, and R. Quirk (Site Representative) met with personnel from the two Department of Energy (DOE) field offices at Hanford (Office of River Protection and Richland Operations Office); the contractor for the tank farms, CH2M HILL Hanford Group, Inc. (CH2M HILL); and two other Hanford contractors (Fluor Hanford, Inc. and AdvanceMed Hanford). The review focused on selected corrective actions for four findings, or judgments of need (JONs), related to emergency management and work control, included in DOE's Type A investigation. The staff also reviewed portions of other JONs related to emergency preparedness, such as those addressing health effects. The JONs reviewed, along with their corrective actions, are identified in the attachment to this report. In addition, the staff observed an emergency preparedness drill at the tank farms.

Background. On July 27, 2007, radioactive waste spilled onto the soil and equipment above single-shell Tank S-102 at the Hanford tank farms during waste transfer operations. DOE conducted independent reviews of the event, including a Type A accident investigation, and the report for that investigation was issued on September 19, 2007. The report identified a total of sixteen JONs, including the four evaluated during this review. The *Corrective Action Plan for Tank 241-S-102 Type A Accident Investigation Report*, dated November 29, 2007, integrated input from the two DOE field offices and three Hanford contractors mentioned above, and specifically addressed the recommendations from the Type A investigation report. For each JON, this plan developed several corrective actions and listed the responsible manager, specific action(s), deliverable(s), and due date. DOE-Headquarters personnel reviewed the plan and approved it on December 5, 2007. The two DOE field offices and each contractor are implementing the corrective actions. The two DOE field offices are verifying the completeness of their own corrective actions, as well as those of the contractors.

Issues. The Board's staff reviewed: (1) the adequacy of the corrective actions resulting from four Type A investigation JONs related to emergency management and work control, (2) the implementation of those actions completed to date, and (3) the actions taken during an emergency preparedness drill. This review led the staff to identify the following issues.

Emergency Planning Hazards Assessment (EPHA)—JON emergency management (EM)-1 identified the need to analyze events of higher probability but lower consequence in the EPHA for the tank farms, thereby covering the full range of possible initiators and severity levels as required by DOE Order 151.1C, *Comprehensive Emergency Management System*. This JON also noted that the analysis needs to provide adequate documentation of assumptions. The Type A corrective action plan addresses the EPHA in the section on causal factors, but does not explicitly call for completion of the analysis and supporting documentation before this JON is closed. The EPHA must be updated before the JON is closed. The staff is concerned that the corrective action plan for JON EM–1 is not comprehensive at this time.

When updated, the EPHA is required to include emergency action levels (EALs) for events of higher probability but lower consequence at the tank farms. CH2M HILL expects to update the EPHA, also known as RPP-23226, *Tank Farms Hazards Assessment*, by September 30, 2008, and DOE is expected to approve it by April 2009. In the interim, CH2M HILL is completing hazards analyses and evaluating the appropriateness of EALs for activities, such as retrieval of tank waste, on a case-by-case basis. The Board's staff believes these hazards analyses are acceptable compensatory measures until the EPHA, EALs, and procedures are completed, assuming this occurs in a timely manner.

Planning for Emergencies- The Board's staff is concerned that CH2M HILL is not conducting sufficient planning to prepare for emergencies and abnormal events. The staff reviewed JON EM-2 and observed a drill involving a waste transfer spill that was designed to validate some of the corrective actions developed as a result of the Tank S-102 spill. During the post-drill review, the drill controllers, evaluators, and participants discussed good practices and areas for improvement. The post-drill review and the drill report, *Emergency Preparedness Post-Drill Evaluation for AN-AP Transfer Spill (FDH-08-14)*, captured most of the issues noted by the staff with respect to the drill; the staff communicated additional issues to the contractor and DOE during its site visit.

One issue noted by the staff, which is raised in the drill report, is that several event scene responders failed to bring the appropriate equipment to the scene. A recommendation in the drill report is to determine "a method to appropriately equip personnel prior to coming to the scene." The staff believes that even further planning is needed to ensure that first responders have the appropriate equipment and resources. For example, lists of possible resources could be used to plan for the more likely abnormal events. Also, the equipment for first responders (e.g., personal protective equipment, boundary markers) could be prestaged more effectively.

Observations. The following are the staff's observations resulting from its review of the corrective actions related to emergency management, work control, and health effects. Addressing these observations would improve the emergency preparedness programs of both CH2M HILL and the site.

Exempt Activities in Process Hazards Analysis—The staff is concerned that the exemptions listed in CH2M HILL's current hazards analysis documents may unintentionally exclude hazards analysis of the high-probability, low-consequence activities identified by JON EM-1. As a result of the Tank S-102 spill and the root-cause analysis of the event, CH2M HILL inactivated all its retrieval operations and transfer procedures, and then revised several hazard processes and procedures.[1] The staff believes the new procedures address more fully the engineering and analysis issues identified as problems during the spill investigations; however, some of the activities the new procedures exempt from a process hazards analysis may not be appropriate. For example, for routine operations, the new procedures exempt all but a specified few from being subjected to a process hazards analysis. CH2M HILL personnel informed the staff that, to correct this shortcoming, they have been planning to evaluate various types of routine operations to determine whether any additional operations should be subjected to a hazards analysis under the new procedures. A memorandum to CH2M HILL's Chief Engineer reporting the findings of that evaluation and resulting recommendations is due in late July 2008.

Abnormal Operating Procedure—The staff noted weaknesses in the clarity and detail of the revised abnormal operating procedure TF-AOP-011, *Response to Chemical and/or Radiological Events*. This revision was a corrective action for JON work control (WC)-3, and was intended to require conservative leak response actions for the discovery of high radiation. Although the staff believes this revised procedure is an improvement, it could be further enhanced with more specificity. The staff plans to discuss the details of its comments on the procedure with the Office of River Protection and CH2M HILL.

Emergency Response Actions for Visitors—The staff is concerned that the corrective actions for JON health effects (HE)-3 are not comprehensive. JON HE-3 is "to improve medical monitoring, documentation, and accountability of individuals with health symptoms and/or complaints following an accident." The corrective actions for this JON address employees, but not visitors. The staff believes the intent of this JON is to include visitors to the Hanford Site. Under current access requirements, visitors may only be required to read the *Visitor Orientation* booklet, which does not address this topic. It is not apparent that the visitor's host or escort has the responsibility to require that the visitor report to an occupational service medical provider for evaluation after a potential exposure event.

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[1] The revised procedures that the staff reviewed are:

- TFC-ENG-STD-28, Rev B, *Process Hazard Analysis Standard*, January 23, 2008.
- TFC-ENG-DESIGN-C-35, Rev B-1, *Process Hazard Analysis*, February 26, 2008.
- TFC-ENG-DESIGN-C-36, Rev A, *Hazards Assessment Consequence Calculation Process*, January 22, 2008.

Emergency Preparedness Drill Program—CH2M HILL runs an emergency preparedness drill program to maintain and improve the emergency response skills and knowledge of tank farm employees. The drill program has improved significantly since previous reviews. CH2M HILL is conducting more types of relevant drills more frequently, as described in its drill program plan, RPP-27585, *Tank Farms Complex Emergency Preparedness Operational Drill Program Plan*. However, the Board's staff believes the program is still maturing. CH2M HILL managers intend to incorporate lessons learned from each drill into subsequent drills, but this feedback process appears to be informal. To increase its formality, response data from real events, drills, and exercises could be used to improve the scope, objectives, and frequency of future drills. During the staff's review, CH2M HILL managers indicated a desire to evaluate and trend data from emergency drills. The Board's staff agrees that incorporating such improvements into the program could lead to better design and setup of drills.

Conclusion. The Board's staff noted several issues and observations related to the corrective action plan and an emergency drill, as discussed above. The main issues are that (1) the corrective action plan does not include completion of the analysis and supporting documentation for the EPHA as a corrective action, and (2) more preplanning is needed to improve emergency preparedness. The Board's staff plans to review the updated EPHA when it is available, as well as the preplanning efforts for emergencies and abnormal events. The staff will also continue to monitor the implementation and verification of the corrective actions for emergency management. Observations if improperly or inadequately addressed could become issues.

The contractor for the tank farms and the site-wide emergency response organization have improved their preparedness to respond to emergencies or abnormal situations at the tank farms since the Tank S-102 spill. However, the Board's staff believes that addressing the issues and observations identified in this report would further improve the site's ability to respond to emergencies and abnormal events.

Attachment

The Defense Nuclear Facilities Safety Board's (Board) staff focused on the four judgments of need (JON) from the Type A accident investigation that covered the emergency management (EM) and work control (WC) programmatic areas—JONs EM-1, EM-2, EM-3, and WC-3. The staff also reviewed parts of other JONs related to emergency preparedness in such areas as health effects. Below are descriptions of these JONs and associated corrective actions quoted from their respective reports.

JON EM-1. Description: CH2M HILL [CH2M HILL Hanford Group, Inc.] needs to analyze events of higher probability but lower consequence in the tank farms emergency planning hazards assessment, covering the full range of possible initiators and severity levels as required by DOE Order 151.1C, *Comprehensive Emergency Management System*, and its predecessors. The analysis needs to provide adequate documentation of assumptions.

The corrective actions for this JON are as follows:

No.	Action
CHG-EM-1.1	Develop a documented process to evaluate the output of PHAs [Process Hazard Analyses] for higher probability, lower consequence hazards (see action CHG-ENG-2.2) in accordance with DOE Order 151.1C, *Comprehensive Emergency Management System*. The process will ensure that AOPs [abnormal operating procedures] and emergency response procedures adequately address high probability, low consequence events.
CHG-EM-1.2	Revise TFC-OPS-EP-D-04, *Emergency Management Program Assessment Plan Guidance*, to incorporate hazard assessment requirements of DOE G 151.1-2, *Technical Planning Basis*.
CHG-EM-1.3	Issue a lessons learned on potentially inadequate emergency action levels when high probability, lower consequence events are not evaluated.

JON EM-2. Description: CH2M HILL, Fluor Hanford, and AdvanceMed Hanford need to improve procedures used for responding to abnormal events at tank farm contractor facilities.

The corrective actions for this JON are as follows:

No.	Action
CHG-EM-2.1	Issue lessons learned on the importance of complying with procedural direction to call 911 and verify compliance with requirements through completed drills.

No.	Action
FH-EM-2.2	Conduct an EOC [extent of condition] review to determine if FH [Fluor Hanford] response procedures ensure: • The POC [Patrol Operations Center] is contacted via 911 at an appropriate time; • the necessary resources are requested and information is provided to the POC; and • the cause of a high radiation area be conservatively assumed to be a release, where appropriate, until determined otherwise.
FH-EM-2.3	Revise and implement POC QRC [quick reaction checklist] to ensure the crash phone announcement language is appropriate for the level of event.
FH-EM-2.4	POC QRCs will be reviewed and modified (if required) to ensure adequacy for responding to abnormal events.
FH-EM-2.5	Update and implement RLEP [Richland Operations Office Emergency Plan] 2.4, *Event Coordination Team*, to clarify and streamline notification steps.
AMH-EM-2.6	Update and implement AMH-ADM-130C, *Manager On Call* to ensure medical representation is sent to the Site ECT [Event Coordination Team] upon notification of its activation.
DOE-EM-2.7	Provide direction to Hanford Site contractors to review their procedures that direct 911 calls. Ensure calls are made at appropriate times and proper resources are requested.

JON EM-3. Description: CH2M HILL and Fluor Hanford need to correct weaknesses and inconsistencies in the implementation of take cover protective actions.

The corrective actions for this JON are as follows:

No.	Action
FH-EM-3.1	Revise and implement applicable DOE-0223 (Site-wide emergency response procedures) to include steps to evaluate the need for continued protective actions, provide criteria and processes to relax protective actions if conditions warrant, and provide appropriate information to those who may contact the ICP [incident command post] for direction.
FH-EM-3.2	Revise and implement associated emergency response organization training lesson plans.
FH-EM-3.3	Identify and train emergency response organization members impacted by the procedure changes.
FH-EM-3.4	Revise HGET [Hanford general employee training] to provide additional information to ensure the desired actions are taken during take cover conditions.

No.	Action
FH-EM-3.5	Develop and distribute a just-in-time bulletin to communicate the lessons learned addressing take cover actions.
FH-EM-3.6	Provide written instruction to Hanford Patrol and ECT/EOC [Event Coordination Team/Emergency Operations Center] regarding instructions to give employees during a take cover event.
FH-EM-3.7	Revise and implement POC QRC to identify access control points for take cover areas.
FH-EM-3.8	Perform an effectiveness review of JON EM-2 and EM-3 corrective actions.
FH-EM-3.9	Conduct a drill, or series of drills, to verify effectiveness of Actions FH-EM-2.5, AMH-EM-2.6, FH-EM-3.1, FH-EM-3.6, FH-EM-3.7, and AMH-HE-2.12.

JON WC-3. Description: CH2M HILL management needs to address radiological conduct of operations deficiencies that were evident during the S-102 response to abnormal operating conditions.

The corrective actions for this JON are as follows:

No.	Action
CHG-WC-3.1	Combine abnormal operating procedures (AOPs) with similar initial actions including TF-AOP-006 and -011, utilizing an enhanced work planning approach, including representatives from operations, as well as industrial hygiene, radiological control, and emergency preparedness.
CHG-WC-3.2	Review all abnormal operating procedures utilizing an enhanced work planning approach including representatives from operations as well as industrial hygiene, radiological control, and emergency preparedness. Implement revisions with focus on effective flow between alarm response procedures, AOPs, and emergency response procedures.
CHG-WC-3.3	Implement a process for safe AOP response such that planning time is minimized for event response and stabilization.
CHG-WC-3.4	Complete review of abnormal operating procedure changes utilizing table top drill format with all tank farm shifts.

JON HE-3. Description: CH2M HILL, Fluor Hanford, and AdvanceMed Hanford need to improve medical monitoring, documentation, and accountability of individuals with health symptoms and/or complaints following an accident.

One corrective action for this JON is as follows:

No.	Action
DOE-HE-3.13	Provide direction to Hanford Site contractors to review/revise their procedures, ensuring that all employees involved in potential exposure events are required to report to the contractor's OMSP [occupational medical service provider] for evaluation.