



~~Office of River Protection~~

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DNFSB

05-WTP-056

APR 01 2005

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB) OBSERVATIONS
CONCERNING FIRE PROTECTION FOR HANFORD WASTE TREATMENT AND
IMMOBILIZATION PLANT

Reference: DNFSB letter from J. T. Conway to P. M. Golan, DOE, dated February 4, 2005.

This letter provides the U.S. Department of Energy (DOE) report in response to concerns identified by the DNFSB in the Reference letter. The Reference letter provided DOE with a report detailing DNFSB observations concerning fire protection for the Hanford Waste Treatment and Immobilization Plant. The report included three observations developed through document reviews and discussions with representatives of the DOE Office of River Protection and Bechtel National, Inc., on November 16-18, 2004 (meetings at Hanford), and December 20-23, 2004 (teleconferences).

The attached report provides DOE responses to the DNFSB observations discussed in the Reference letter. Thank you for providing your observations on this important topic. If you have further questions concerning DOE's response, please contact me.

Sincerely,

Roy J. Schepens
Manager

Attachment:
Response to DNFSB Letter

cc w/attach:

M. T. Sautman, DNFSB
M. B. Whitaker, DR-1
P. M. Bubar, EM-3

I. R. Triay, EM-3
C. S. O'Dell, EM-3.2
S. M. Hahn, RL

**Response to Defense Nuclear Facilities Safety Board (DNFSB)
Letter dated February 4, 2005**

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STRUCTURAL DIVISION

Reference

DNFSB letter from J. T. Conway to P. M. Golan, DOE, dated February 4, 2005.

Introduction

In their February 4, 2005, letter (Reference), the DNFSB provided the U.S. Department of Energy (DOE) with a report detailing observations of the DNFSB staff concerning fire protection for the Hanford Waste Treatment and Immobilization Plant (WTP). The report included three observations developed through document reviews and discussions with representatives of the DOE Office of River Protection (ORP) and Bechtel National, Inc., (BNI) on November 16-18, 2004 (meetings at Hanford), and December 20-23, 2004 (teleconferences).

In their letter, DNFSB concluded that ORP and BNI personnel recognize the need for follow-up actions that would address the issues noted by DNFSB staff. A detailed discussion of these issues was provided in the report enclosed with the DNFSB letter.

This attachment provides the ORP position on each of the issues and observations documented in the DNFSB letter (Reference).

Background

The purpose of the DNFSB staff visit to Hanford on November 16-18, 2004, was to review the current state of fire protection at WTP facilities and receive an update on the status of open fire protection issues. During the visit, DNFSB staff observed the initial fire protection system installations and discussed the status of the pending structural steel fire resistance coatings with the installation contractor. DNFSB staff also reviewed the Preliminary Fire Hazards Analyses (PFHA) for the WTP facilities, International Building Code (IBC) Evaluations, Life Safety Code (National Fire Protection Association [NFPA] Standard 101) Evaluations, and the status of other specific fire protection issues.

Status of Design of Structural Fire Resistance Coatings

DNFSB concern:

At the time of the DNFSB staff visit to Hanford, BNI had prepared preliminary design drawings identifying the structural steel requiring fire resistance ratings, based on the requirements of the IBC, 2000 Edition, and DOE Standard 1066-97, *Fire Protection Design Criteria*. Three types of coating systems (intumescent, high-density cementitious, and low-density cementitious) and rated walls (gypsum board on steel studs) will be used in various areas, depending on cost and the physical characteristics of the coatings versus the intended applications.

During the meetings and conference calls with DNFSB staff, it was identified that the primary structural steel within the WTP Pretreatment building will be protected in accordance with the requirements of the IBC, 2000 for a type IB structure. It was further identified that primary

structural steel in the High Level Waste (HLW) and Low Activity Waste (LAW) buildings will be protected in accordance with the requirements for fire area separation per DOE STD-1066-97. Where no fire area separations are required (e.g., the roof/roof assemblies and isolated areas of the floors) and no fire exposures exist, DOE-STD-1066-97 does not require the primary structural steel to be protected from the effects of fires. Since ORP has accepted BNI's proposal to apply the requirements of IBC Section 503.1.2 for special industrial occupancies to the design of the HLW and LAW buildings, both buildings are classified as construction type IIB requiring no primary structural steel fire resistance rating. Other provisions of the IBC (e.g., occupancy separations, stairwell design, etc.) require fire-resistant design of some of the primary structural steel. The WTP Analytical Laboratory is classified as a type IIB structure per the IBC, without the use of Section 503.1.2 provisions. As such, primary structural steel in the Analytical Laboratory will be protected to the extent required by DOE-STD-1066-97 and the other provisions of the IBC (e.g., occupancy separations, stairwell design, etc.).

DOE response:

The DNFSB letter noted that staff review of drawings provided by BNI showing the extent of the structural steel fire resistance ratings concluded that the lack of protection for many of the areas is justified. However, as stated in the letter, BNI agreed to furnish additional documentation on the basis for exempting specific areas from protection. In addition, DNFSB staff review of the drawings is continuing.

The extent of structural steel fireproofing within WTP buildings has evolved since the set of drawings was provided to DNFSB and is still not final. BNI is completing their evaluation of span lengths and the potential for fire-induced structural collapse. In addition, BNI is performing a series of integrated safety management (ISM) meetings to ensure that unprotected structural steel members are adequate (i.e., building confinement systems and important to safety structures, systems and components are adequately protected) in light of potential fires involving fixed and transient combustible materials in the vicinity of the unprotected steel.

A video teleconference between ORP, BNI, and DNFSB staff on the subject of the fire resistant design for WTP structures was held on March 28, 2005. During the teleconference, ORP and BNI provided DNFSB staff with WTP fire protection requirements, the methodology for implementation of structural steel fireproofing, and responses to DNFSB staff questions on the HLW and LAW fire-proofing drawings. ORP and BNI intend to provide fire-resistant coatings to steel for:

- Fire barriers supporting slabs spanning fire-proofed members;
- Fire barriers supporting stairwells and vertical shafts;
- Truck bays; and
- Columns supporting building roofs.

At the conclusion of the meeting, ORP committed to provide the DNFSB staff with the following:

- Drawings showing the extent of fire-proofing within the HLW and LAW buildings;
- A schedule for the ISM meetings on structural steel fire-proofing;
- The revised Structural Design Criteria, when issued;

- An analysis showing why the design load combinations, including fires, from ACI-318 are more limiting for WTP design than the requirements from ACI-349; and
- The structural calculations accounting for the effects of fires, when they become available later this year.

Status of Installation of Structural Steel Fire Resistance Coatings

DNFSB concern:

DNFSB notes in their February 4, 2005, letter that BNI has contracted with Clayton Coatings, Incorporated to install the structural steel fire resistance coatings in WTP buildings. The letter further notes that Clayton is mobilizing and outfitting a temporary building where intumescent coatings will be applied to structural steel prior to its erection within WTP buildings. Clayton has begun the process of coating steel already installed within the WTP process buildings. As noted in the DNFSB letter, Clayton has evaluated the installed steel and concluded that application of the coatings, although difficult in some instances due to installed commodities, can be accomplished.

DOE response:

The status of the installation of structural steel fire resistance coatings as described in the DNFSB letter remains accurate. Application of the coatings to installed structural steel is progressing satisfactorily following resolution of a problem identified early in the process involving an incompatibility between the steel primer and the coating material. The problem occurred where the application of the primer resulted in an unduly thick primer coat. Based on test samples prepared, the identified solution involves light sanding of the thick primer areas and application of a wash coat to seal pores in the primer coat. The fire resistance coating materials have been successfully applied following the incorporation of the light sanding and wash coat into the process. Construction of the temporary building for the application of the intumescent coating on steel prior to erection into WTP buildings continues with projected operations to commence in June 2005.

Discussions with Hanford Fire Department

DNFSB concern:

The Hanford Fire Department (HFD) provides fire suppression services for the Waste Treatment and Immobilization Plant (WTP). The current HFD Baseline Needs Assessment (BNA) recommends construction of a new fire station on or near the WTP site to provide adequate long-term response to the site, anticipating future closings of HFD facilities as the Hanford site undergoes decommissioning and demolition work. This new fire station is not planned as part of the WTP project. DNFSB is concerned that, while existing response requirements for the WTP are being met, future reductions may challenge the HFD's ability to respond promptly to emergencies at WTP. Given the location and nature of the hazards involved, mutual aid from nearby municipal fire departments would be of little value. The HFD is planning to update the BNA in 2005 and will revisit the need for a new fire station. DNFSB staff will continue to follow the implementation of the BNA's recommendations.

DOE response:

At the recommendation of the DOE Richland Operations Office (RL), Fluor Hanford prepared an exemption request (FH-0302976A, Revision 1, dated August 27, 2003) asking for a permanent exemption to the NFPA 1710 emergency response time objectives for the WTP. Approval of this request would negate the need for a new fire station on or near the WTP site. The justifications provided for the exemption request were based on the non-combustible/fire-rated construction of WTP facilities (versus the 2,000 ft² single family occupancy basis for the NFPA 1710 response time objectives), very low to moderate quantities of combustible materials, separation and inventory of combustible material in separate fire areas, the presence of an automatic fire suppression system, the reduction in fire risk within WTP facilities through implementation of the required WTP Fire Protection Program, and guidance taken from DOD Instruction 6055.6 that addresses the appropriateness of extending response time based on a fire risk assessment, as contained in the WTP preliminary fire hazards analyses (PFHAs). The DOE ORP provided concurrence with the Fluor Hanford exemption request (03-ESQ-068, dated October 6, 2003) for essentially the same reasons identified in the exemption request. In addition, the WTP PFHAs and safety analyses concluded that WTP buildings are adequately fire safe without dependence on HFD intervention to accomplish safe facility shutdown or safe state conditions. For these reasons, DOE RL informed Fluor Hanford (04-ESD-0021, dated December 11, 2003) that the permanent exemption request was not required and the health and safety of WTP workers, the public, and the environment are adequately protected by the existing HFD fire and emergency medical responses.

As such, at this time, DOE has not identified a basis for constructing a fire station closer to the WTP site than the existing 200 Area fire station. DOE will revisit this decision, as necessary, based on the results of the planned 2005 update to the BNA.

Other Discussions (DNFSB Review of the Preliminary Fire Hazards Analyses, the International Building Code Evaluations, and the Life Safety Code Evaluations)

1. BNI's building code hazard classification of ceric nitrate.

During the DNFSB staff visit to Hanford (November 16-18, 2004), the staff questioned BNI's building code hazard classification of the ceric nitrate solution used in the decontamination of the HLW glass canisters as a less hazardous Class 1 oxidizer instead of the use of a more conservative Class 2 oxidizer classification. The DNFSB staff concern was based on research on ceric nitrate solutions conducted by Hughes Associates, Incorporated following a fire at the Rocky Flats Environmental Technology Site in May 2003. Following the DNFSB site visit, BNI provided DNFSB staff with additional technical justification for classifying the ceric nitrate solution as a Class 1 oxidizer. This information included:

- hazardous classification information from the chemical's manufacturer;
- Material Safety Data Sheet (MSDS) information showing that a stronger ceric nitrate solution was considered to be a Class 1 oxidizer that is corrosive and slightly oxidizing;
- the classification for another chemical considered to be an aggressive oxidizer, but classified per DOE-HDBK-1081-94 as a Class 1 oxidizer; and
- the project's intended use for the ceric nitrate solution, which does not involve allowing the solution to dry out on cloth or other combustible materials.

As noted in the DNFSB letter, the DNFSB staff now agrees that the ceric nitrate in solution with 0.5 molar nitric acid, as stored and used in decontamination of the HLW canisters, is properly classified as a Class 1 oxidizer. However, DNFSB recommended the HLW PFHA be updated to reflect any potential hazards from the ceric nitrate solution coming into contact with organic materials and the implementation of appropriate safety controls. DOE commits to performing the updated hazard analysis and implementing any safety controls required to prevent and/or mitigate the hazards as part of the next PSAR/PFHA update, currently scheduled for submittal to DOE in December 2005.

2. Electrical cabling flame-testing requirements.

The WTP PFHAs state that all electrical cabling is required to meet the flame-testing requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 383-1971, *Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations*, and IEEE Standard 1202-1991, *Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies*, as well as Underwriter's Laboratory (UL) standards, as applicable. During the DNFSB staff visit to Hanford (November 16-18, 2004), the WTP Contractor (BNI) informed the staff that some specialty tray cables for WTP may not be compliant with the requirements of these two IEEE standards, although they will be at least UL listed for cable tray use. All important-to-safety cabling will be rated in accordance with the two IEEE standards. During a follow-up conference call on December 23, 2004, the WTP Contractor provided the following information to DNFSB staff on the issue of project electrical cabling flame-testing requirements:

- All Safety Design Class or Safety Class and Safety Design Significant or Safety Significant cables will be qualified in accordance with IEEE 383-1971.
- All cables (important-to-safety [ITS] and not important-to-safety [non-ITS]) installed in cable trays will meet the 70,000 BTU/hr vertical cable tray flame test requirements of IEEE 383-1971 or IEEE 1202-1991.
- Special purpose exposed cables on equipment such as cranes will, as a minimum, meet the UL VW-1 flame test requirements.

DNFSB staff acknowledged that this approach to ensuring flame resistance for WTP electrical cabling appeared to be technically defensible; however, DNFSB staff intends to review the design further following its completion.

Conclusions

As discussed above, DOE considers the issues dealing with the classification of the ceric nitrate solution used in the HLW building and the flame testing requirements for project electrical cabling to be resolved, as discussed above. We are not aware of any residual DNFSB staff issues in these areas. DOE commits to performing the hazard analysis associated with use of the ceric nitrate solutions in HLW and to implement the safety controls identified as necessary to prevent and/or mitigate the hazards.

DOE will provide the additional information related to structural steel fireproofing described above to facilitate the DNFSB staff's further review.

Finally, for the reasons provided above, DOE has determined that, at this time, no basis exists for the construction of a new fire station on or near the WTP site. Should the BNA update planned for later this year result in a similar recommendation, DOE will revisit this decision for continued acceptability.