Department of Energy

Washington, DC 20585

MARCH 7, 1997

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

Dear Mr. Chairman:

Enclosed is a detailed response to your November 6, 1996, letter forwarding an August 15, 1996, Board staff trip report regarding storing and handling of spent nuclear fuel at the Idaho National Engineering Laboratory. Response to the Savannah River trip report was provided in a December 13, 1996, memorandum. The attached response to the Idaho trip report is in addition to further detailed information that the Board's staff have requested concerning fuel handling and storing operations.

Schedules for delivering additional information or performing calculations are included in the enclosure where required. Discussions with your staff will continue until all requested information is delivered.

If you have any further questions regarding this matter, please contact me or have your staff contact Helen Bilson of my staff at (301-903-4483).

Sincerely,

Alvin L. Alm
Assistant Secretary for
Environmental Management

Enclosure

cc:
M. Whitaker, S-3.1

RESPONSE TO DNFSB TRIP REPORT

Summary

Fuel handling operations at Idaho are being performed in a safe manner. Idaho has been moving fuel out of Chemical Processing Plant (CPP)-603 and has had no handling incidents in over two years of fuel transfers. The Department of Energy (DOE) facility representatives are closely involved in all spent fuel handling and storage operations. DOE Idaho Field Office approves readiness to transfer for each distinct fuel batch that is moved out of CPP-603. DOE facility representatives periodically observe all aspects of spent fuel operations at the Idaho facilities and are responsible to ensure safe operations in the spent fuel storage and handling facilities.

I. Fuel Cask Handling at the Idaho Chemical Processing Plant (ICPP)

A. Basin Design

Comment 1:

"First, cask engineers could not say whether pipes are located under the cask path in the 666 basin. However, system engineers not involved in cask operations told the Board staff that a recirculation return line is under the path. A break in this line could cause total Basin drainage. The DOE Idaho Field Office stated they believe siphon holes were added to the line during construction; these holes would prevent drainage. However, no evidence was provided to confirm the existence of the holes, which can be validated by field observation."

Response:

Fuel and fuel cask handling at ICPP is performed in accordance with the approved Plant Safety Document (PSD). The PSD addresses the facility design basis and takes into account the design and operational details necessary to ensure safe operation. The basin recirculation return line located in the pipe trench at the south end of the CPP-666 basins has a low point 44 inches below normal basin water level. This piping runs across the cask path to the unloading pools. A worst case cask drop could potentially rupture this line and drain the top 44 inches of basin water into the pipe trench. The Authorization Safety Basis allows the loss of 4 feet of water without violating an existing Technical Standard. Prior to entering the basin area this return line has a low point in the water treatment rooms of 7'-4" below water level. A piping failure in the water treatment area, although not possible due to cask drop, could potentially drain the top 7'-4" of basin water. Neither of these scenarios could result in total basin drainage, nor would they endanger the stored fuel. Also if the basin water level was to drop 7'-4" there would still be approximately 12'-8" of water over the currently installed racks. It has been calculated that with 10 feet of water cover over the fuel, the radiation level would be less than 0.125 mrem/hr which is the level for which continuing occupancy is allowed. Therefore, the reduction of water level in the basin will have negligible radiological effect on personnel in the area. Also, due to the low activity level (5×10^{-5} µCi/mL obtained by recent water sampling) of the basin water, contamination consequences would be minimal.

For both drainage scenarios, the loss of water would take place over a 5 to 15 hour period. This would allow problem identification and corrective actions, such as manual opening of the plug valve to stop the siphon effect. Readily available operation support includes engineering personnel and plant drawings in the facility to support expeditious resolution to nonroutine conditions. In summary, there is no significant increase in radiological concerns resulting from the above basin drainage scenario, and the operator has the ability to break the siphon, so no modification to existing procedure is necessary.

Comment 2:
"Second, cask engineers stated that the 666 Basin floor is designed for a 65-ton cask drop. Cask drop analysis is dependent on both weight and cask geometry. The engineers did not know what geometry was assumed in the calculations. Thus, they could not know whether operations are within design limits. Additionally, they did not know whether the design calculations examined structural pool damage or only local floor damage. If structural damage was neglected, one cannot know whether a drop near the pool corner can induce leakage."

Response:
An evaluation of the existing drop analysis of the 666 basin floor was completed on February 6, 1997. Results of this evaluation addressing the possibility of 666 basin leakage due to a cask drop was also forwarded to the Board on Feburary 6, 1997. Any potential cask drop induced leakage is enveloped by the evaluation discussed in the response to the cask drop analysis Comment 3.

Comment 3:
"Third, there is no cask drop analysis for the 603 Basin. Consequently, INEL does not know whether its make-up water capacity is sufficient for accident conditions. Additionally, engineers expressed concern that a cask drop on a particular wall could result in 2-ft drop in pool level. Yet no one has corrected this simple problem by limiting the cask lift height. Board staff observed a lift in which there were no procedural limits on how high the operator could raise the cask."

Response:
Postulated damage from a seismic overstress in CPP-603 envelopes potential basin damage from cask drops. An analysis performed in 1994 estimated a maximum water loss of 145 gallons per minute (GPM). This analysis used soil percolation rates from local United States Geologic Survey data and flow rates from nearby french drains. The loss of the entire south transfer station walls and floor, from a cask drop in that area, represents only 65 percent of the damaged surface areas used in the 1994 analysis. Available water mains (used to supply water for fire fighting) can provide basin make-up water at 2900 GPM.

The length of the cask lifting gear required to place a cask onto the basin floor limits the maximum cask lift height. This physical restriction has been considered to be sufficient without adding administrative controls. However, procedural controls have been added for CPP-603

CPP-603 casks lifts. Other lifting configurations at CPP are being evaluated on a case-by-case basis.

B. Lifting Equipment

Comment 1:

"Lifting Equipment, INEL personnel did not know essential information on certain critical lifting equipment. This information is needed to estimate the fatigue life of cranes. Old cranes not built to a design code might have limited service lives. The quality of cranes and yokes varies between the two ICPP basins. The 666 Basin is a new facility that came on line in 1984. Its cranes meet industry standards, including *The Crane Manufacturers Association of America Specification No. 70,* and its cask equipment meets American National Standards Institute (ANSI) N14.6. In contrast, the 603 Basin is much older (1954). INEL engineers did not know the design standards or the safety factors on the 603 cranes which will be used frequently until December 2000. A detailed inspection by a crane manufacturer could give important safety information regarding the cranes' fatigue life."

Response:

The original design criteria for the CPP-603 south truck bay crane CRN-SF-035 is not entirely known. However, a 1983 study conducted by Argonne-West entitled "Evaluation of Overhead Cranes, Exxon Idaho Nuclear Company, Inc." concluded that crane CRN-SF-001 and CRN-SF-035 exceeded ANSI B30.2, CMAA 70, and Occupational Safety and Health Administration (OSHA) 1910.70 standards in place in 1983. Structural integrity of the crane was confirmed by the associated inspection. A second set of full crane/hoist inspections was performed by consultant C.F. Simmers in 1990. This evaluation covered physical inspection of the cranes/hoists for defects such as cracked or bent members and loose or worn parts, as well as thoroughly evaluating them against OSHA safety criteria. Problems indicating potential for fatigue were not identified from this set of inspections for either South Basin Truck bay cranes. Additionally, the regular yearly CPP preventative maintenance program inspections are sufficient to identify any cracked or deformed members.

The original purchase specification for the CPP-603 60-ton crane, CRN-SF-001, has been retrieved. The crane manufacture's rating was 75 tons with a design factor of safety of five to one. The maximum cask weight for the remaining 603 south basin transfers is 14.25 tons. Fatigue should not be considered a problem for this crane. Design criteria for the 15-ton crane, CRN-SF-035, has not been found. The crane was manufactured by a reputable crane manufacturer still in business (P&H Harnischfeger). This manufacturer has been contacted and is currently researching their records to locate information on this crane. A determination whether an additional vendor evaluation conducted by a Harnischfeger engineer is required will be made by February 28, 1997.

Comment 2:

"Additionally, the design of special lifting devices may be inadequate relative to industry standards. INEL uses the *DOE Hoisting and Rigging Manual,* which requires that cask yokes be designed to ANSI N14.6. This standard requires two different safety factors for critical and noncritical lifts. INEL contractors use the lesser, noncritical requirements. They justify this interpretation by stating that any basin drainage resulting from a cask drop is not a safety concern because no off-site release should result. The DOE Idaho Field Office has disagreed, stating that a drop that causes gross basin water loss is unsafe. No analysis was presented showing the occurrence is safe. Consequently, if a cask drop is viewed as unsafe, special lifting devices must be designed with higher safety factors to meet ANSI N14.6."

Response:
CPP-666 is designed to withstand a postulated cask drop into the cask unloading pools. No postulated cask drop in the pool will lead to unacceptable consequences with respect to on-site or off-site personnel or environmental contamination. CPP-603 could experience a basin leak with a cask drop. The consequences of this accident are bounded by the seismic analysis done in the facility. Radionuclide concentrations in the CPP-603 water are low and, given the low leakage rate that may result from this type of accident, environmental damage would be minimal. Based on the possible consequences from this type of accident, cask lifts are not considered critical lifts per ANSI N14.6.

C. <u>Operations:</u>

Comment 1:
"Operations, INEL does not require a qualified rigger to be present for pre-engineered critical lifts. A crane operator is expected to complete the rigging by following an engineered drawing. However, crane operators are not necessarily trained in rigging. The presence of a rigger increases the safety margin. Errors in rigging specifications do occur, and sometimes rigging equipment is in poor condition. Board staff observed a 603 lift in which crane operators were given a simplistic drawing that was outdated and inconsistent. In this case, the operators found the problem. Other lifts are more demanding, and a qualified rigger has a significantly greater chance of finding problems."

Response:
CPP fuel handling operators receive certain rigging training during the crane operations course concerning daily rigging equipment condition inspection, rated capacity determination, tagging, and proper preventative maintenance (PM) inspection date. Since the operators are not involved in selection of rigging, this training is entirely adequate for the type of work performed. The pre-engineered lift form has been previously reviewed by three independent persons (industrial safety, H&R Engineer, H&R Coordinator) cognizant in the area of good rigging practice for proper rigging configuration, weight lifted, sling angles, rated capacity of equipment, etc. Rigging has already been chosen for the lift by the requesting engineer. The remaining problems (inspection for adequate condition, rated capacity, and current PM dates) are those issues for which the operators have been trained. Cognizant supervisors or foremen are the "Person in Charge" of the lift, and supervision has been through rigger training. Fuel handling operators can successfully identify and solve problems pertaining to rigging operations required by pre-engineered lifting plans.

Comment 2:
"In addition, transfer routes for cask shipments are not specified in a procedure. Current practice for fuel shipments entering the ICPP is to drive a truck over the shortest route to the 666 Basin. The traditional route takes the casks past chemical tanks and oxygen dewars and over utilities and chemical trenches. INEL has not considered using another route that would avoid these hazards."

Response:
With the exception of the straddle carrier, cask transport vehicle axle loadings are less than the design criteria for ICPP roadways. It is appropriate to constrain the transport path for a loaded straddle carrier. The approved pathway for the loaded straddle carrier is prescribed by current procedures.

The need (and associated costs) for procedural instruction and/or control is based on the complexity of the task, the frequency of performance, and consequences of error. Cask transport is a routine task performed by trained professionals using a standard over-the-road tractor/trailer rig. Additionally, credible accident scenarios and associated risks have been analyzed in Section 4.5 of the Idaho Chemical Processing Plant Safety Document and are determined acceptable.

II. Operations at the Irradiated Fuel Storage Facility (IFSF)

Comment:
"Operations at the canning operations at the dry storage facility are planned to begin soon. Yet there is no solid technical basis for these activities. Before storage, fuel must be treated to eliminate pyrophoric hydrides. However, the treatment process has not been formally designed. It relies on diffusion rates for uranium oxide rather than the compound of concern, uranium hydride. Additionally, the calculations used have never been independently reviewed or approved."

Response:
The technical basis for drying operations at the IFSF canning station has been documented. This documentation was provided to the Board on January 24, 1997.

III. Seismic Concerns at the IFSF

Comment:
"Seismic concerns at the facility racks and canisters meet the seismic requirements of DOE Order 5480.28 and DOE-STD-1020, but the facility structure does not. INEL will strengthen the structure to eliminate critical seismic overstresses. The project is targeted for completion in fiscal year 1997."

Response:
The IFSF seismic concerns are currently being addressed and resolution is being discussed with DNFSB staff.