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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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98-0002150



June 16, 1998

The Honorable Joe Barton
Chairman
Subcommittee on Oversight and Investigations
Committee on Commerce
U. S. House of Representatives
Washington, DC 20515-6115

Dear Mr. Chairman:

During the hearing on May 12, 1998, regarding the Department of Energy's Hanford Spent Nuclear Fuel Project you asked when the last time tornadoes had been experienced within 50 miles of the Hanford Site. Enclosed information reflects one occurred on August 26, 1997, and an earlier one on May 9, 1956.

Also there was discussion with regard to polychlorinated biphenyls (PCBs) and their presence causing delay to the schedule. Enclosed information indicates there is no technical basis for the PCBs presence to have contributed to schedule delays.

The following listed enclosures, responding to the above and other information requested, are furnished for inclusion in the printed record:

Enclosure 1: A Defense Nuclear Facilities Safety Board's (Board) staff "Contact Report" documenting the Board's visit to Hanford on September 24, 1997.

Referenced on pages 59 and 60, lines 1275 through 1306 of the record.

Enclosure 2: A Board's staff "Information Report" providing an answer to Mr. Barton's question regarding tornadoes near the Hanford Site.

Referenced on page 63, lines 1375 and 1376 of the record.

Enclosure 3: A Board's staff "Information Report" providing information related to groundwater contamination and the consequences of a leak from the K Basins.

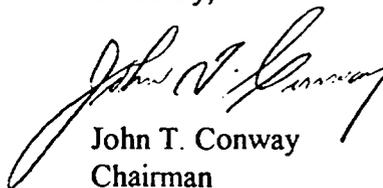
Referenced on page 64 and 65, lines 1400 through 1414 of the record.

Enclosure 4: A Board's staff "Information Report" providing information related to the effect of the discovery of PCBs in the K Basin sludge on the schedule for the Spent Nuclear Fuel Project.

Referenced on pages 69 through 71, lines 1509 through 1566 of the record.

Should there be any questions regarding this material, please do not hesitate to call me.

Sincerely,



John T. Conway
Chairman

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Enclosures

Enclosure 1

DNFSB Technical Staff Travel/Contact Report

TO:	G.W. Cunningham S. L. Krahn	<u>PURPOSE/DATE</u>		<u>PROPOSED ACTION/DUE DATE</u>	
FROM:	R. Arcaro	Site Visit Conference	9/24/97	None Board Briefing	<u> X </u> _____
VIA:	R. Barton	Meeting Training	_____ _____	Staff Briefing Trip Report	_____ _____
DATE:	November 5, 1997	Telephone	_____	w/o ltr to DOE w/ltr to DOE	_____ _____
Location:	Hanford				
Subject:	Plutonium Finishing Plant, Spent Nuclear Fuel Project				
DNFSB Participants:	Ralph Arcaro, Donald Wille				

On September 24, 1997, Board Members John T. Conway and A.J. Eggenberger visited the Hanford Site to discuss activities at the Hanford Plutonium Finishing Plant (PFP) and the Spent Nuclear Fuel Project (SNFP). Each of these projects is experiencing significant delays in meetings milestones in the Department of Energy (DOE) implementation plan for Board Recommendation 94-1. The PFP stood down from fissile material handling in December 1996 because of criticality infractions and procedural compliance issues. Efforts to resume fissile material handling had been discordant and ineffective. The SNFP recently announced an additional 14-month delay in removing deteriorating fuel from the K-Basins. Highlights of the meeting included:

Plutonium Finishing Plant

- The Board expressed great dissatisfaction with the state of activities at PFP and the inability of the contractor to take necessary actions to resume fissile material handling.
- The Fluor Daniel Hanford (FDH) representative stated that FDH at first did not recognize the magnitude of the problem. Then a chain of events, including the explosion at the Plutonium Reclamation Facility (PRF), further delayed corrective actions required to resume operations.
- FDH stated it would not perform an independent readiness assessment, but rather would parallel Babcock & Wilcox Hanford Company's (BWHC) efforts and decide whether to endorse BWHC's readiness declaration. FDH later (October 23, 1997) decided to perform its own readiness assessment.

Enclosure 1

- The DOE-Richland Operations Office (DOE-RL) Assistant Manager for Facilities Transition (Knollmeyer) asserted that they would identify the risks, correct root causes of issues, and show sufficient management attention to fixing the problems.
- DOE-RL stated that erosion of staff capabilities, both of the contractor and DOE, contributed to the current problems.

Spent Nuclear Fuel Project

- The Board expressed great dissatisfaction with the length and timing of the delays announced for the SNFP.
- DOE-RL Assistant Manager for Solid Waste (Hansen) cited an inadequate project proposal by the previous contractor and preoccupation by DOE-RL with the project's Environmental Impact Statement as reasons for allowing the project to reach its current state.
- FDH and Duke Engineering Services Hanford representatives identified management changes and greater visibility of the critical path as near term fixes to prevent recurring schedule slippages. However, they stated that the schedule delays presented were not likely to be made up.

Enclosure 2

FOR INFORMATION ONLY
Staff Information Paper

June 3, 1998

TO: G.W. Cunningham
S.L. Krahn

FROM: R. Arcaro

SUBJECT: Tornadoes in the Vicinity of the Hanford Site

DNFSB Ralph Arcaro
Participants:

During a Congressional hearing on the Hanford Spent Nuclear Fuel Project before the Commerce Committee's Subcommittee on Oversight and Investigations, Congressman Barton asked Mr. Conway and representatives from the General Accounting Office if they knew when the last time a tornado occurred within 50 miles of the Hanford Site. This question was asked in conjunction with a discussion regarding the need for tornado hardening of the Canister Storage Building.

The Defense Nuclear Facilities Safety Board's staff reviewed National Weather Service data and other sources of information and found that two tornadoes have occurred near the Hanford Site since 1950. One tornado occurred on August 26, 1997, in Yakima County, approximately 50 miles west of Hanford, another tornado occurred May 9, 1956, in Benton County, the same county as the Hanford Site.

While historical tornado information is valuable when developing standards for tornado hardening requirements, it is not prudent to eliminate such hardening based on relatively infrequent occurrences of tornadoes. This position is well-illustrated by the June 1998 tornado which struck western Maryland in an area where there has been only one tornado occurrence since 1950.

Enclosure 3

FOR INFORMATION ONLY
Staff Information Paper

June 10, 1998

TO: G.W. Cunningham
S.L. Krahn

FROM: R. Arcaro

SUBJECT: Potential Consequences of a Leak from the Hanford Site K Basins

DNFSB R. Arcaro
Participants:

During a Congressional hearing on the Hanford Spent Nuclear Fuel Project before the Commerce Committee's Subcommittee on Oversight and Investigations, Congressman Ganske asked the Defense Nuclear Facilities Safety Board Chairman, Mr. Conway, about the current levels of groundwater contamination at Hanford and the consequences of a leak from the K Basins. This report provides a response to Congressman's Ganske's questions.

The *Hanford Site Environmental Report for Calendar Year 1995* (June 1996) provides data regarding measured levels of groundwater contamination across the Hanford Site. In the 100-K Area, which includes the K Basins, environmental monitoring has detected contamination from radioactive tritium in concentrations as high as 1,560,000 picocuries per liter. Other radionuclides, such as Strontium-90, have also been detected in the K Area groundwater, but in much lower concentrations. By comparison, the drinking water standard for tritium contamination is 20,000 picocuries per liter. The concentration of radioactivity in the K East Basin water is approximately 10,000,000 picocuries per liter. Approximately one third of this activity is tritium, another third is cesium.

Accidents involving a loss of basin water from the K Basins are analyzed in the *K Basins Safety Analysis Report* (SAR). Although the analysis assumes the basin leaks as a result of a seismic event, the consequences of this leakage are not calculated. (The analysis calculates the doses that result from uncovering the fuel.) However, the SAR does include an analysis of a basin overflow event that results in contamination of the Columbia River. The analysis assumes that more than 90,000 gallons of basin water containing 3.4 curies of radioactive material are released to the river. The calculated dose to a member of the public at the site boundary resulting from this release is about 0.4 mrem. Assuming that all of the basin water is released to the river (as might be possible in a seismic event), the calculated dose is about 6 mrem.

The SAR assumes none of the sludge is released to the river. There are nearly one million curies of radioactive material in the basin sludge. Some of this material is extremely fine and is likely to be released from a leaking basin. Extrapolating the data from the SAR analysis, assuming effects from the sludge particles are similar to those from contaminated water, it can be

Enclosure 3

estimated that if approximately 1% of the sludge activity were released to the river, a dose of approximately 1,200 mrem might be received by the maximally exposed person at the site boundary.

The levels of radiation mentioned above are all below those that have been shown to cause any deleterious effects in humans or other animals. (For comparison, from such sources as cosmic rays and medical x-rays, an average person in the United States gets about 360 mrem per year from radiation — about 27,000 mrem in a 75 year lifetime.) It is not known if these low levels of radiation are detrimental, of no effect, or even beneficial. However, it is not possible to rule out the possibility of detrimental effects even at such low doses. Therefore, to estimate the maximum potential effect, it is often assumed that the effects seen at higher doses can be pro-rated to lower doses. On this basis, a dose of 1,000 mrem might increase the risk of fatal cancer by 0.05%. In other words, an exposed person's risk of dying from cancer might be increased from a normally expected 20% to 20.01%. Hereditary (genetic) effects of radiation have not been observed in humans, but are seen at higher doses in experimental animals. For purposes of bounding the hereditary effects of radiation on humans, animal data are often extrapolated to lower doses. Using this relationship, it can be estimated that 1,000 mrem might result in an increased probability of hereditary effects in all succeeding generations of up to 0.01%¹.

The analysis in the SAR does not describe the environmental consequences of contaminating the groundwater and the Columbia River. While the immediate health effects resulting from this contamination may be minor, the environmental consequences from a catastrophic leak from the K Basins would be significant. The *Environmental Impact Statement for the Management of Spent Nuclear Fuel from the K Basins at the Hanford Site, Richland, Washington* (EIS) describes these consequences as the following:

- local (onsite) effects on ecosystems or individual members of some sensitive species
- temporary closure of the Columbia River, shorelines, and affected islands (including restrictions on traditional fishing rights and recreational use of the river for boating and fishing)
- temporary local restrictions on use of river water for agricultural or domestic purposes
- possible loss of agricultural crops
- temporary restrictions on land use for agricultural purposes
- costs associated with cleanup of environmental contamination.

¹ ICRP Publication 60 - *1990 Recommendations of the International Commission of Radiological Protection*.

Enclosure 4

FOR INFORMATION ONLY
DNFSB Staff Information Paper

June 2, 1998

TO: G.W. Cunningham
S.L. Krahn

FROM: R. Arcaro

SUBJECT: Effects of Polychlorinated Biphenyls in K Basin Sludge

DNFSB Ralph Arcaro, Steven Stokes
Participants:

Background. As part of the Hanford Spent Nuclear Fuel Project in 1996, seven (7) samples of sludge in the K Basins were analyzed for organic compounds. Polychlorinated biphenyls (PCBs) were identified in three samples. The maximum concentration detected was 220 ppm. This concentration is in excess of the Toxic Substance Control Act (TSCA) limit of 50 ppm for discharges to the environment. During a congressional hearing on the Hanford Spent Nuclear Fuel Project (SNFP), members of the Commerce Committee's Subcommittee on Oversight and Investigations asked questions concerning the effect on the project schedule from the discovery of PCBs in the K Basins sludge. This discovery was characterized by John Norris, President Duke Engineering & Services, and Ernest Moniz, Undersecretary of the Department of Energy (DOE) as a technical challenge and a contributing cause of the delay currently encountered.

Summary. The discovery of PCBs in the Hanford K Basins sludge should have little to no effect on the schedule to begin removal of the spent fuel from the Hanford K Basins. This position is based on the following:

- Resolution of issues associated with PCBs in the sludge is not on the critical path for fuel removal.
- Pretreatment of the sludge is required prior to transfer to the tank farms, whether or not PCBs are present. This pretreatment, which is designed to ensure compatibility with tank waste, will also remove PCBs.

Discussion. Resolution of any issues associated with the PCBs in the sludge is not prerequisite to beginning removal of the deteriorating spent fuel from the aging basins since the sludge removal activities are being managed as a separate project under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Therefore, while resolution of these issues are prerequisite to beginning sludge removal, these actions are not currently on the SNFP's critical path and should have no effect on the project schedule.

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The SNFP has long assumed that the sludge in the basins will be transferred to the tank farms for vitrification by the Tank Waste Remediation System (TWRS). The discovery of PCBs has been described as causing delays because of the need to now pretreat the sludge prior to transfer to the tanks. Unless the PCBs are destroyed or removed prior to transfer to the tank farms, transferring the sludge would require that the TWRS storage and treatment facilities coming in contact with PCB contaminated wastes be compliant with TSCA. This option is undesirable because of the uncertainty and added costs associated with TSCA permitting and in the reduced management flexibility associated with tank to tank transfers, etc.

However, by 1997, it was clear that pretreatment of the sludge would also be required to ensure chemical compatibility with the tank waste. Because the sludge contains an appreciable amount of uranium metal and hydrides, the sludge must be pre-treated to resolve criticality, pyrophoricity, and flammable gas generation concerns. To resolve these concerns, DOE will subject the K Basins sludge to acid dissolution followed by peroxide oxidation and then a caustic addition. Although the treatment would be required whether or not PCBs were present, this treatment will also remove PCBs from the effluents destined for tank farms and reduce PCB concentrations in the solid low-level radioactive wastes expected to be generated to levels acceptable for disposal in the site's environmental restoration disposal facility (a TSCA compliant landfill). The Board's staff does not consider the demonstration of the Hanford proposed chemical treatment process a major technical hurdle.

Since DOE has elected to pursue sludge removal under CERCLA, several procedural steps will be required that ultimately result in a record of decision. This will likely involve completion of a remedial investigation/feasibility study which contains the technical basis used to demonstrate that applicable regulatory requirements have been met. These include substantive requirements from TSCA for disposal of PCBs in approved land fills in 40 CFR 761.60 (a)(4)(ii), and alternative treatment approval procedures pursuant to both TSCA and CERCLA contained in 40 CFR 761.60 (e) and 40 CFR 300.430 (e)(3)(I) respectively. Currently, tests to demonstrate the efficacy of the acid dissolution/peroxide treatment process are underway at Pacific Northwest National Laboratory. The Environmental Protection Agency has provided DOE with test boundaries for this demonstration and does not currently foresee any major hurdles in preventing approval since this method is similar to other acceptable processes.