0082818

**Department of Energy**
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

04-OES-0138

SEP 28 2004

Mr. Nicholas Ceto, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352



Dear Mr. Ceto:

TOXIC SUBSTANCES CONTROL ACT (TSCA) DEMONSTRATION OF ALTERNATIVE POLYCHLORINATED BIPHENYL (PCB) DECONTAMINATION OF SPENT NUCLEAR FUEL

Enclosed is an application for alternative PCB decontamination of spent nuclear fuel requested under 40 CFR 761.79(h). This application and the activity described herein are outside the scope of the Framework Agreement for Management of PCBs in Hanford Tank Waste signed on August 31, 2000. Through the information provided in the enclosed application, the U.S. Department of Energy, Richland Operations Office, requests that the U.S. Environmental Protection Agency agree that after packaging of the fuel into multicanister overpacks (MCOs), neither the fuel nor the MCOs are subject to TSCA regulation.

The 105K East (KE) and 105K West (KW) Basins have been used to store spent nuclear fuel from Hanford's N Reactor since June 1975 and February 1981, respectively. The floor sludge in the basins has been found to contain TSCA regulated levels of PCBs and the fuel has been in direct contact with canister sludge which also contains TSCA regulated PCBs. The major steps involved in processing the fuel include packaging in MCOs, drying in the Cold Vacuum Drying Facility, storage in the Canister Storage Building, and eventual disposal at the National Repository. However, material subject to 40 CFR 761 cannot presently be accepted at the National Repository and the fuel cannot be decontaminated through the standard TSCA methods described in 40 CFR 761.79(b) and (c). Therefore, it is proposed that the process being used to move and package the fuel into the MCOs results in sufficient removal of the sludge and sludge particulates from the fuel to meet the requirement for alternative decontamination under 40 CFR 761.79(h).

If you have any questions, please contact me, or your staff may contact Joel Hebdon, Director, Office of Environmental Services, on (509) 376-6657.

Sincerely,

Shirley J. Olinger for
Keith A. Klein
Manager

OES:ACM

Enclosure

cc: See page 2

cc w/encl:
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Environmental Portal, LMSI

# TOXIC SUBSTANCES CONTROL ACT DEMONSTRATION OF ALTERNATIVE POLYCHLORINATED BIPHENYL DECONTAMINATION OF SPENT NUCLEAR FUEL

## PURPOSE

The purpose of this document is to demonstrate that spent nuclear fuel from the 105K Basins is not regulated under the *Toxic Substances Control Act* (TSCA) *of 1976* as the spent nuclear fuel, as stored, is not in contact with the basin floor sludge and because through an alternative method of decontamination, it has been decontaminated.

## SUMMARY

The U.S. Department of Energy, Richland Operations Office (RL) proposes that the process described below to move and package the fuel into the multi-canister overpacks (MCOs) is capable of decontaminating the fuel to the level set out in 40 CFR 761.79(b)(3)(i)(B). The decontamination method described does not pose an unreasonable risk to human health or the environment. RL requests that U.S. Environmental Protection Agency (EPA) approve this process as an alternative decontamination method under 40 CFR 761.79(h) and agree that after packaging of the fuel into MCOs, neither the fuel nor the MCOs are subject to TSCA regulations.

## BACKGROUND

The 105K East (KE) and 105K West (KW) Basins have been used to store N Reactor fuel since June 1975 and February 1981, respectively. Currently this fuel is being packaged into MCOs to be removed from the basins and placed in dry storage as a Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) remedial action. The fuel initially in KE Basin is being moved to KW Basin, from which all fuel is being packaged and moved to dry storage.

In 1996, sample analysis of KE Basin floor sludge revealed the presence of polychlorinated biphenyls (PCBs). A PCB Spill Cleanup Plan (DOE/RL-95-53) for the sludge was prepared and submitted to EPA in July 1996. The spill cleanup plan noted that the source of the PCBs is unknown. While the plan focused on the cleanup of the floor sludge from the KE Basin, it included characterization of the sludge residing within the fuel canisters. The PCB concentrations in the sludges were found to be:

- KE Basin:
  - Canister sludge:
    - 0.013 parts per million (ppm) to 0.88 ppm, wet/settled
    - 0.043 ppm to 2.9 ppm, dry*
  - Floor sludge:
    - 31 ppm to 140 ppm, wet/settled
    - 100 ppm to 470 ppm, dry*

- K West Basin:
  - Canister sludge:
    - less than detectable (<0.02 ppm) to 5.7 ppm, wet/settled
    - <0.07 ppm to 19 ppm, dry*

*Dry weight calculated based on the wet/settled sludge being 70% water by weight.

As a result of positive samples for PCB in KE Basin floor sludge, it was assumed that the KW Basin floor sludge would also be positive. Accordingly, the decision was made to manage KW Basin floor sludge as PCB remediation waste without obtaining additional samples. The plan concluded that the requirements governing disposal of the sludge from the basin, based on its radiological properties, are equally protective of human health and the environment as those prescribed in 40 Code of Federal Regulations (CFR) 761, Subpart G.

Due to contact of the fuel with the PCB sludge, there is concern about the TSCA regulatory status of the fuel during dry storage and disposal. The regulatory status of the fuel and other elements in the basins were previously discussed in the *Focused Feasibility Study for K Basins Interim Remedial Action* DOE/RL-98-66, April 1999, which included a PCB Risk-Based Disposal Approval for the debris in the basins. A CERCLA Record of Decision for K Basins Interim Remedial Action was issued, September 1999, which presented the selected interim remedial action for the fuel, sludge, water, debris, and deactivation of the basins.

The fuel is a non-porous material covered by a porous surface; the PCBs are non-liquid, therefore, the decontamination standard of 40 CFR 761.79(b)(3)(i)(B), National Association of Corrosion Engineers (NACE) Visual Standard No. 2 applies. NACE Visual Standard No. 2, a Near-White Blast Cleaned Surface Finish, is defined as one from which all oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for very light shadows, very slight streaks or slight discolorations caused by rust stain, mill scale oxides, or light, tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all visible residues, and the remainder shall be limited to the light discoloration mentioned previously.

The fuel cannot be decontaminated through standard methods. All activities must be conducted with the fuel underwater to provide shielding to protect the workers from the dangerous radiation levels emitted. Also, the brittle nature of the fuel makes blasting the surface of the fuel impossible. Blasting the surface would destroy the fuel and produce large volumes of highly reactive sludge that readily reacts with water to form hydrogen and uranium oxide.

However, it is proposed that the process used to move and package the fuel into the MCOs results in sufficient removal of the sludge and sludge particulates from the fuel to meet the requirement for alternative decontamination under 40 CFR 761.79(h). The fuel is visually inspected using underwater video cameras during either of the two cleaning processes.

PROCESS DESCRIPTION

The fuel canisters in KE Basin are sitting in storage racks on the basin floor. As was previously mentioned, the fuel canisters are also sitting in sludge that contains PCBs. The fuel is removed from the racks and sludge to be shipped to the KW Basin. This is accomplished through use of a pick-and-pause process. In the pick-and-pause process, a hoist is attached to the canister and the canister is lifted for 5 seconds followed by a pause of 10 seconds until it reaches the desired height for transport (about 4 feet off the floor). This method of retrieving a canister results in the canister sludge cascading through the holes in the bottom of the canister.

After the canisters arrive at the KW Basin, the fuel canisters can go through one of two processes. In the first process, the canisters are placed into the primary cleaning machine (PCM). In the PCM, a canister is placed in a basket that rotates the fuel to mechanically agitate it by sliding it out and into the canister to dislodge sludge. At the same time, pressure water rinsing occurs to carry the sludge away from the fuel. Following washing in the PCM, the fuel is subjected to a statistically based remote visual inspection.

The second process that the canisters can go through is placement in the decapper, particulate flush from the canister, removal of the canister from the decapper and placement of the canister on the primary processing table. The fuel is then removed from the canisters and a 100% visual inspection of the surface area of each fuel element is performed. Any canister sludge that is present is brushed or rinsed away.

The water with the sludge from both of these processes is directed to the integrated water treatment system (IWTS) where the suspended/colloidal sludge is collected. The IWTS is in operation for all fuel cleaning operations. The IWTS is designed to capture particles $\geq 5$ μm that enter the system.

After cleaning, the fuel is directed to the process table where it is inspected and sorted to be placed into MCO baskets. The fuel assemblies go directly into the MCO baskets. Any debris or scrap that is present along with the fuel is separated from the fuel and placed into separate MCO baskets designed specifically for managing scrap.

The following work practices (and experience with over 800 baskets of KE Basin fuel) serve as the basis for the alternate decontamination standard under 40 CFR 761.79(h).

- Vertical movement of the baskets from the loading queue. The baskets are lifted with a hoist a distance of approximately 4 feet (1.2 meters) at a speed of approximately 1 foot per second (0.3 meter/second). This relative vertical velocity is sufficient to cause much of the small (<10 micron) low density (<1.5 grams/cubic meters) particles to be washed out of the basket.

- Horizontal movement of the baskets from the storage location to the loading shuttle. The basket is transported horizontally to the loading shuttle through the water at approximately 2 feet/second (0.6 meter/second). This relative horizontal velocity is sufficient to remove the particles that have been suspended by the earlier (within 15 seconds) vertical movement.

- Movement of the baskets on the loading shuttle. The loading shuttle is a platform that rolls on rails. The movement is at a speed of approximately 2 feet per second (0.6 meter/second) and the travel is a vibrating type travel rather than smooth. This vibrating travel is sufficient to jar settled particles loose and the relative velocity between the basket and the water is sufficient to drive the resuspended particles out of the basket. Additionally, the initial acceleration is rapid, causing particles to be resuspended. The particles are also resuspended by the deceleration at the end of travel that is basically an impact of the cart with the support structure. All these events tend to wash particulate out of the basket thereby performing a decontamination function.

- Vertical movement of the baskets from the loading shuttle to the loading gantry. Within seconds of the basket coming to a rest at the end of the shuttle, the basket is lifted vertically approximately 10 feet (3 meters) at 19 inches/minute (0.48 meter/minute) by the MCO loading system.

- Horizontal movement of the baskets on the loading gantry to the MCO. Within seconds of completing the vertical lift, the basket is moved horizontally approximately 10 feet (3 meters) at 2 feet per second (0.6 meter/second) where it is lowered into the MCO.

The movements of the baskets through the water is expected to, and has been observed to, remove settled sludge from the surface of the fuel, thereby decontaminating the fuel of PCBs. Water currents in the basin are very slow relative to the water current over the fuel during fuel movement. The current that could transport sludge onto the fuel is much slower than the current that would rinse the sludge from the fuel.

The visual inspections performed are proposed as comparable to the NACE visual inspection standard. The process of managing the fuel remotely and under water limits full application of the NACE standard. Given that there is no chemical or physical bonding of the sludge to the fuel, the ease with which the sludge is brushed away from the fuel, the configuration of the fuel in the baskets, the repeated movement of the fuel through the water, and the inspections performed give a sufficient indication of the absence of PCB-bearing sludge remaining on the fuel. This amount is comparable to that which would be detected using the NACE No. 2 visual standard required by 40 CFR 761.79(b)(3)(i)(B).