C080714

Tri-Party Agreement

Change Notice for Modifying Approved Documents/ Workplans In Accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records*

Change Number	Document Submitted Under Tri-Party Agreement Milestone	Date:
TPA-CN-270	_____	**March 26, 2009**

Document Number and Title:	Date Document Last Issued:
Remedial Design Report and Remedial Action Work Plan for the K Basins Interim Remedial Action, DOE/RL-99-89, Revision 1 Operable Unit: 100-KR-2	December 2001

Originator:	Phone:
D. J. Watson / N. J. Sullivan For N. Sullivan 3/26/09	373-3250 / 373-5643

Description of Change:

_____ and EPA agree that the proposed change modifies an approved
DOE **Lead Regulatory Agency**

Work plan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records*, and not Chapter 12.0, *Changes to the Agreement.*

This change describes the design details for the washing of knock-out pot (KOP) sludge to remove fine particulate matter and PCBs. KOP sludge was generated during the washing of spent nuclear fuel (SNF) and collected in the 105-K West (KW) Basin Integrated Water Treatment System (IWTS) KOPs, strainers, and canisters. The KOP sludge will be washed as described in the attached design change (Attachment A). The change does not affect the overall intent of the work plan.

The change adds design information to the existing design in Section 2.2, *Sludge*; (page 2-3) and adds a discussion concerning an alternative PCB decontamination method per 40 CFR 761.79(h) to the Applicable or Relevant and Appropriate Requirements (ARARs), Section 3.1.4, *40 CFR Part 761, "Regulation of PCBs," Subpart D, "Storage and Disposal'* (Pages 3-5 and 3-6). The washing of the KOP sludge is a precursor activity to the removal of KOP sludge from the KW Basin. Remedial design details associated with the removal of the KOP sludge will be provided in a future remedial design change.

Justification and Impacts of Change:

The washing of KOP sludge is necessary to remove fine particulate matter and PCBs from the KOP sludge to the extent it will not be regulated under the *Toxic Substances Control Act* (TSCA) *of 1976.* A similar strategy was used to wash sludge from the K Basins spent nuclear fuel in a previously approved alternative decontamination request (DOE-RL, 2004).

Approvals:

DOE Project Manager	3-27-09 Date	✓ Approved	__ Disapproved	
EPA Project Manager	3-27-09 Date	✓ Approved	__ Disapproved	

Once all the above steps have been completed, the originator sends a copy of the signed change notice to the FH TPAI organization (E6-28), the Administrative Record (H6-08) (refer to TPA Action Plan, Section 9.3), lead regulatory agency, affected Hanford contractor, DOE Project Manager, project/contractor Document Custodian, and others as appropriate. Maintain the original Change Notice per approved Records Management procedures.

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Attachment A

Change Notice for Modifying Approved Documents/Workplans - Remedial Design Report and Remedial Action Work Plan for the K Basins Interim Remedial Action

Knock-Out Pot Sludge Washing

1.0 INTRODUCTION

The conceptual design for sludge retrieval and removal from the 105-K East (KE) and 105-K West (KW) Basins is described in the *Remedial Design Report and Remedial Action Work Plan (RDR/RAWP) for the K Basins Interim Remedial Action* (DOE/RL, 2001), Section 2.2, *Sludge*. The remedial design for the retrieval and removal of sludge from the KE Basin has previously been submitted and approved. The conceptual design for the retrieval and removal of knock-out-pot (KOP) sludge from the KW Basin is currently under development.

This remedial design change describes details for washing KOP sludge to prepare the KOP sludge for removal from the KW Basin. The washing of KOP sludge is necessary to remove fine particulate matter and polychlorinated biphenyl (PCB) contaminants to the extent that washed KOP sludge to be removed from the basin (sludge that will pass through a 0.25 inch (0.64cm) screen, but is retained by a 0.0236 inch (600 micron) strainer) will not be regulated for storage for disposal, or disposal under the Toxic Substances Control Act (TSCA) of 1976.Washing of the KOP sludge is one of the first steps in the preparation of the KOP sludge for removal from the KW Basin.

This remedial design change is organized in three sections that correspond to the organization of the *RDR/RAWP* (DOE/RL, 2001):

1.0 Introduction: Provides general background information and describes KOP sludge and its generation.

2.0 Remedial Design Change Description: Describes remedial design details for the KOP washing process.

3.0 Compliance with ARARs and TBC Materials: Describes additions to the analysis of Applicable or Relevant and Appropriate Requirements (ARARs) in the 2001 *RDR/RAWP* (DOE/RL, 2001) by providing design features associated with conducting an alternative PCB decontamination process.

1.1 BACKGROUND

1.1.1 KOP Sludge Generation

The KE and KW Basins were used to store N Reactor fuel since June 1975 and February 1981, respectively. This fuel has since been removed, but the sludge remains in the form of three sludge streams (i.e., KOP sludge, settler tank sludge and container sludge). Collectively, K Basin sludge has been defined as any material in the K Basins water that will pass through a screen with 0.25 inch (0.64cm) openings (DOE-RL, 2001). KOP sludge represents the largest particle size of K Basins sludge and is defined as sludge that will pass through a 0.25 inch (0.64cm) screen, but is retained by a 0.0236 inch (600 micron) strainer.

The KOP sludge was generated during the in-basin underwater spent nuclear fuel cleaning process. The spent nuclear fuel cleaning process included steps to wash the fuel in a Primary Cleaning Machine (PCM) followed by sorting on a Primary Process Table (PPT) to remove sludge or non-fuel debris. Washed fuel was no longer considered subject to TSCA per a 2004 alternate PCB decontamination approval (EPA, 2004). Wash water from the PCM was directed to the Integrated Water Treatment System (IWTS). The KOPs operated as part of the IWTS and

were designed to accumulate sludge smaller than 0.64cm screen size, but greater than 600 microns. Settler tanks then collected sludge <600 microns (i.e., settler tank sludge).

Besides the actual KOPs, two other process components in the spent nuclear fuel cleaning process were used in combination with the KOPs to collect material 0.64cm to 600 microns in size. These process components are described below.

- IWTS strainers – These are the 600 micron strainers that were situated downstream of the KOPs. After removal from operation these strainers were placed in open canisters for storage.
- PCM strainers – These are strainers that were used to collect solids in the outlet of the PCM. Following operation of the PCM, material was removed from the strainer in the bottom of the PCM and was placed in open canisters for storage.

In addition to material from the above strainers, material on the PPT, which may include KOP sludge, was collected following fuel washing and sorting activities. This material was placed in open canisters for later disposition.

Inefficiencies in the original separation process and subsequent basin activities resulted in larger and smaller fractions of sludge and debris being comingled with the KOP sludge. The presence of fine material with the KOP material has been demonstrated by in-basin examinations. When this material is disturbed, persistent clouding of the basin water is observed. Separating the larger and smaller fractions from the KOP sludge is necessary for final disposition of the KOP sludge.

1.1.2 PCB Contamination and Regulatory Actions

In 1996, sample analysis of KE Basin floor sludge revealed the presence of PCBs. A PCB Spill Cleanup Plan for the sludge was prepared and submitted to EPA in July 1996 (DOE, 1996). The spill cleanup plan noted that the source of the PCBs is unknown. Subsequent sludge sampling efforts 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*

- KW 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.

Spent nuclear fuel from the KE Basin was transferred to the KW Basin for washing and packaging prior to removal from the KW Basin. PCB contaminated sludge removed from the spent nuclear fuel during the washing was directed to KOPs and settler tanks. The KE Basin

floor and pit sludge was subsequently transferred to underwater containers in the KW Basin for interim storage. The KW Basin floor and pit sludge was also containerized in separate containers in the KW Basin. As a result of the sludge transfers, the finer fraction of these sludge streams was suspended in the basin water and potential commingling of the settled sludge with the KOP sludge could have resulted. As a result of these activities the KOP sludge is considered a PCB remediation waste. Decontaminating the KOP sludge of PCBs for management as a non-TSCA regulated material is needed for final disposition of the KOP sludge.

2.0 REMEDIAL DESIGN CHANGE DESCRIPTION

The information below supplements the remedial design described in Section 2.2 of the *RDR/RAWP for the K Basins Interim Remedial Action* (DOE-RL, 2001).

The purpose of this remedial design change is to describe the KOP sludge washing process and by approval of this remedial design change, obtain acceptance of the process as an alternative PCB decontamination process per 40 CFR 761.79(h) for the subsequent management of the material as not regulated for storage for disposal, or disposal under TSCA. KOP sludge washing will be performed using the PCM and IWTS described in the *RDR/RAWP* (DOE-RL, 2001). The system is currently located in the KW Basin and was used during prior spent nuclear fuel washing as described in the *RDR/RAWP* (DOE-RL,2001) and in a previously approved alternative PCB decontamination request (DOE-RL, 2004).

Operation of the KOP sludge washing process includes a decontamination process, a visual examination process and packaging process to protect the washed KOP material from recontamination.

2.1 DECONTAMINATION PROCESS

KOP sludge is currently stored in open canisters, in IWTS strainers placed in open canisters, and in KOPs and is comingled with other sludge, debris, and possibly scrap spent nuclear fuel. The KOP material will be washed in the PCM. The wash will be done with a 0.64cm screen in the lid of the wash canisters, consistent with the current procedure for washing spent nuclear fuel. The 0.64cm screen used in the lids of wash canisters will retain material larger than 0.64cm in the wash canister, allowing it to be separated from the KOP sludge and handled as spent nuclear fuel scrap or debris in accordance with existing procedures. The PCM will be operated with nested screens in the PCM wash water outlet in the bottom of the PCM. The KOP material smaller than 0.64cm will be collected in these screens in the PCM or will enter the IWTS where it will accumulate in the KOP, the IWTS strainers, or the settler tanks. By design, particles smaller than 600 microns entering the IWTS are expected to be collected in the settler tanks. The washed material collected in the PCM screens will be repackaged in canisters for management as KOP sludge. Similarly, KOP sludge generated during the washing process and collected in the KOP and IWTS strainers will undergo visual examination, be sorted as needed and repackaged into canisters for management as KOP sludge.

2.2 VISUAL EXAMINATION

The process of managing the KOP sludge remotely and under water limits full inspection per the National Association of Corrosion Engineers (NACE) Visual Standard No. 2 referenced in 40 CFR 761.79(b)(3)(i)(B). Given that there is no chemical or physical bonding of the fine sludge to

the non-porous surface of the KOP sludge, and the ease with which finer sludge particles are brushed away from the KOP sludge give a sufficient indication of the absence of PCB-bearing sludge remaining on the KOP sludge. Therefore, a simple KOP sludge agitation test will be performed whereby washed KOP sludge collected in a canister will be prodded with a rod or similar device. The lack of a "persistent cloud" of light particulate sludge will be used as a positive indicator that the KOP sludge has been appropriately decontaminated of the fine particulate sludge, and hence PCB contamination. The capability of determining the presence of finer sludge material within the KOP sludge has been demonstrated by in-basin inspections for which video records have been kept.

Under water examinations will be performed and documented following washing to confirm the removal of fine particulate from the KOP sludge. Documentation will consist of video records and/or notation in operating logs by the Field Work Supervisor of the observations for each canister of washed KOP sludge.

2.3 PROTECTION FROM REDEPOSITION

The washed KOP sludge will be stored in canisters that are covered to prevent redeposition of material from the basin water. Some fine particulate may accumulate in the covered canisters as a result of the oxidation of metallic uranium in the KOP sludge.

3.0 COMPLIANCE WITH ARARS AND TBC MATERIAL

This remedial design change does not involve any waivers or exceptions to any Applicable or Relevant and Appropriate Requirements (ARARs) and to-be-considered materials (TBCs) described in the *RDR/RAWP* (DOE-RL, 2001). However, this remedial design change adds details to the discussion of the 40 CFR 761 ARAR in Section 3.1.4 concerning the PCB decontamination of KOP sludge.

3.1 WASTE MANAGEMENT STANDARDS

PCB Waste Management and Disposal (40 CFR 761)

Substantive Requirements

- Perform alternative PCB decontamination in accordance with 40 CFR 761.79.

Design Features

- PCB Decontamination of KOP sludge: The *Focused Feasibility Study for K Basins Interim Remedial Action* (DOE-RL, 1999) included an analysis of ARARs and also included information to satisfy substantive provisions of a PCB Risk-Based Disposal Approval to address PCBs in the K Basins sludge. The CERCLA Record of Decision (ROD) for K Basins Interim Remedial Action (EPA, 1999) issued in September 1999 presented the selected interim remedial action remedy for the fuel, sludge, water, debris, and deactivation of the basins. The ROD acknowledged that basin debris that was treated as described in the ROD satisfied the substantive provisions for a risk based disposal approval per 40 CFR 761.61(c). The decision was based on the expectation that minimal quantities and concentrations of PCBs will be left on the debris and that management of this waste in accordance with applicable radioactive waste and dangerous waste requirements will be protective of residual

PCBs that may remain on the debris. This logic can also be applied to the KOP sludge in that PCBs are attracted to organic compounds, not metals. Organic compounds currently commingled with the KOP material can be expected to be found almost exclusively in the fine fraction. Removing the fine sludge fraction is therefore an effective means of removing the PCBs.

The KOP material is a non-porous material covered by a porous surface; and has been or is contacted by non-liquid PCBs. Therefore, cleaning to the visual decontamination standard of 40 CFR 761.79(b)(3)(i)(B), NACE Visual Standard No. 2[1] could be applied for self-implementing decontamination. However, the KOP sludge cannot be decontaminated through methods that would facilitate a standard application of NACE Visual Standard No. 2. All activities must be conducted underwater to provide shielding to protect the workers from the dangerous radiation levels emitted. Consequently, visual inspection of all cleaned areas pursuant to NACE Visual Standard No. 2 would not be practical.

Therefore, the process used to separate and wash finer sludge particles (<600 microns) from the KOP sludge coupled with an agitation test described in the remedial design is sufficient in the removal of these fines (and hence PCB contamination) from the KOP sludge to meet the substantive requirements for alternative decontamination under 40 CFR 761.79(h). Management of washed KOP sludge will not pose an unreasonable risk of injury to health or the environment. A similar strategy was used to wash sludge from the K Basins spent nuclear fuel in a previously approved alternative decontamination request (DOE-RL, 2004).

4.0 REFERENCES

DOE-RL, 1996, Letter E. D. Sellers (DOE-RL) to D. Duncan (EPA), *105 K-East Basin Polychlorinated Biphenyls (PCBs) Spill Cleanup Plan*, 96-SFD-172, July 16, 1996.

DOE-RL, 1999, *Focused Feasibility Study for the K Basins Interim Remedial Action,* DOE/RL-98-66, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2001, *Remedial Design Report and Remedial Action Work Plan for the K Basins Interim Remedial Action*, DOE/RL-99-89, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2004, K. A. Klein (DOE-RL) to N. Ceto (EPA), 04-OES-0138, *Toxic Substances Control Act (TSCA) Demonstration of Alternative Polychlorinated Biphenyl (PCB) Decontamination of Spent Nuclear Fuel*, dated September 28, 2004.

EPA, 1999, *Record of Decision for the K Basins Interim Remedial Action*, EPA/ROD/R10-99/059, U.S. Environmental Protection Agency, Richland, Washington.

[1] 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.

EPA, 2004, EPA Approval Letter, N. Ceto (EPA), to K. A. Klein (DOE-RL), *EPA Approval of Toxic Substance Control Act (TSCA) Demonstration of Alternative Polychlorinated Biphenyl (PCB) Decontamination of Spent Nuclear Fuel*, dated October 14, 2004.