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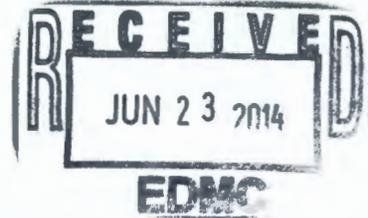
OFFICE OF RIVER PROTECTION

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14-TF-0071

JUN 19 2014

Ms. Jane A. Hedges, Program Manager
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Ms. Hedges:

THE U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION –
ADMINISTRATIVE ORDER DOCKET NUMBER 10156 (CORRECTED DOCKET
NUMBER 10618), TRANSMITTAL OF *TANK 241-AY-102 MONITORING AND
CONTINGENCY PLAN* RESPONSE TO ADMINISTRATIVE ORDER ITEMS #7A AND #7B

Reference: Administrative Order Docket #10156 for the Hanford Site, EPA/State ID
Washington 7890008967, dated March 21, 2014.

On March 21, 2014, Administrative Order for the Hanford Site, EPA/State ID # 7890008967
Docket #10156, (Reference) was issued to the U.S. Department of Energy, Office of River
Protection and Washington River Protection Solutions LLC. The Order requested a number of
documents and activities regarding Tank 241-AY-102, including the following Items #7a and 7b:

7. Within 60 days of the effective date of this Order, submit to Ecology for approval:
 - A. Monitoring plans for annulus inspection, waste temperature monitoring and annulus ventilation monitoring including a schedule for calibration of the continuous air monitor (CAM) and Enraf-Nonius Series 854 (ENRAF). The monitoring plans must provide clear, immediate actions for maintaining annulus ventilation.
 - B. A contingency plan for safely managing any worsening conditions indicated by inspections and monitoring. Such indications include suspected increased leak rate or blockage on the ventilation channels causing increases in waste temperatures.

Any other new issues not identified in the contingency plan such as those that arise as a result of construction or waste transfer activities, must be identified and evaluated, with a recovery plan and schedule provided to Ecology within 30 days.

JUN 19 2014

Jane A. Hedges
14-TF-0071

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The purpose of this letter is to transmit the draft *Tank 241-AY-102 Monitoring and Contingency Plan* document to the Washington State Department of Ecology for review and approval. The document is attached to address both Requirements 7a and 7b.

If you have any questions, please contact either Tom Fletcher Assistant Manager Tank Farms, ORP, at (509) 372-8828, Steve Killooy, Production Operations Technical Support, WRPS, at (509) 373-5075.



L. David Olson, President and Project Manager
Washington River Protection Solutions LLC



Kevin W. Smith, Manager
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Attachment

cc w/attach:

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Administrative Record

Environmental Portal, LMSI

WRPS Correspondence

Attachment

14-TF-0071

Tank 241-AY-102 Monitoring and Contingency Plan

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ABBREVIATIONS AND ACRONYMS

CAM	continuous air monitor
ENRAF	Enraf-Nonius Series 854
Ecology	Washington State Department of Ecology
Settlement Agreement	<i>Settlement Agreement and Stipulated Order of Dismissal</i>
TOC	Tank Operations Contractor

1.0 INTRODUCTION

1.1 PURPOSE

This document contains the monitoring and contingency plans for Tank 241-AY-102 (AY-102) as required by action item numbers 7a and 7b of the Administrative Order Docket 10156, (Corrected Docket Number 10618) issued by the Washington State Department of Ecology (Ecology) on March 21, 2014. Numbers 7a and 7b state:

7. Within 60 days of the effective date of this Order, submit to Ecology for approval:

- a. Monitoring plans for annulus inspection, waste temperature monitoring and annulus ventilation monitoring including a schedule for calibration of the continuous air monitor (CAM) and Enraf-Nonius Series 854 (ENRAF). The monitoring plans must provide clear, immediate actions for maintaining annulus ventilation.
- b. A contingency plan for safely managing any worsening conditions indicated by inspections and monitoring. Such indications include suspected increased leak rate or blockage on the ventilation channels causing increases in waste temperatures.

Any other new issues not identified in the contingency plan such as those that arise as a result of construction or waste transfer activities, must be identified and evaluated, with a recovery plan and schedule provided to Ecology within 30 days.

The monitoring and contingency plans contained herein, apply only to AY-102.

1.2 OBJECTIVE

This document provides the plans for monitoring of AY-102 annulus inspection, waste temperature monitoring, and annulus ventilation monitoring, including a schedule for calibration of the continuous air monitor (CAM) and Enraf-Nonius Series 854 (ENRAF). This document also describes immediate actions for maintaining annulus ventilation in AY-102. Additionally, this document provides the contingency plan for safely managing any worsening conditions indicated by prescribed inspections and monitoring of AY-102.

2.0 TANK 241-AY-102 MONITORING PLAN

2.1 ANNULUS INSPECTION

2.1.1 Video Inspection

In compliance with the Order, the following video inspections are being performed for Tank 241-AY-102:

- Annulus video inspections at Risers 77, 83, and 87; Frequency: Weekly
- Inspections of greater than 95 percent of the annulus floor area; Frequency: Monthly.

2.1.2 Enraf-Nonius Series 854 Monitoring

ENRAF gauge operation is based on displacement (buoyancy). A liquid leak from the primary waste storage tank into the annulus tank will cause a change in buoyancy of the displacer to occur. At 0.25 inches (directly below the gauge) of liquid in the annulus tank, the displacer will rise sufficiently to activate a high-level alarm at the Tank Operations Contractor instrument building and Tank Monitoring and Control System, as applicable.

ENRAF monitoring is performed in accordance with PCHB No. 98-249 and PCHB No. 98-250, *Settlement Agreement and Stipulated Order of Dismissal* (Settlement Agreement). ENRAF data is obtained on a daily basis (once per calendar day). Data obtained during the performance of monitoring is evaluated on the day the reading is taken to determine if the reading is within 0.25 inch. Annulus ENRAFs are maintained and operated continuously. Annulus ENRAF maintenance and calibration requirements are described in Section 3.0 of this plan.

2.1.3 Continuous Air Monitoring

The CAM for the AY-102 annulus is operated in compliance with the Settlement Agreement. The annulus CAM is located upstream of the HEPA filters and thus monitors the exhaust stream before filtration. The annulus CAM has the potential to detect moveable contamination that may enter the annulus air space when disturbed.

The Settlement Agreement states that the Leak Detection System on each double-shell tank may not be replaced by, but may be supplemented by, the operation of an annulus ventilation system CAM. The following requirements are applicable for the AY-102 annulus CAM while being used as supplemental leak detection:

- Filter papers removed from the AY-102 annulus CAM following a verified¹ alarm will be counted for long-life radionuclides (non-Radon).
- When the annulus vent system is operating, the AY-102 annulus CAM will be monitored daily for airborne releases into the annulus that could give an indication of a leak from the primary tank structure into the annulus.

¹ "Verified" refers to an alarm that has been investigated and found to be legitimate, as opposed to an anomalous alarm due to equipment malfunction.

- The AY-102 annulus CAM will be set to alarm at set points no greater than 3,000 counts per minute.
- The AY-102 annulus CAM alarms will initiate an investigation and if necessary implementation of contingency planning described in Section 4.0 of this plan.

2.2 WASTE TEMPERATURE MONITORING

AY-102 waste temperature monitoring is accomplished via the installation of thermocouples inside and outside of the tank. The minimum number of operable thermocouples required, maximum temperatures and maximum rates of temperature change are established in Section 1.4 of OSD-T-151-00007, *Operating Specifications for the Double-Shell Storage Tanks*.

2.2.1 Monitoring Requirements

For AY-102, thermocouple trees are located in the primary tank. Thermocouples are also located as pairs in the concrete dome and walls, and spaced in series in the concrete foundation and the insulating concrete. Temperatures are continuously recorded on the Master Pump Shutdown System and displayed on the Surveillance Data Display System. AY-102 temperatures can be taken manually, if the automated systems are not available. In accordance with approved Tank Operations Contractor (TOC) operations procedures, temperature data are collected on a weekly and quarterly basis. Any out-of-tolerance readings are reported to the TOC engineering organization for further evaluation.

A thermal analysis of AY-102 was performed to evaluate the waste temperature response to ventilation outages and/or annulus slot blockage following removal of a portion of the supernatant (RPP-56864, *Tank 241-AY-102 Thermal Evaluation of Supernatant Reduction*). RPP-56864 indicates the importance of maintaining a significant supernatant heel to ensure that evaporative cooling continues without solids precipitation or formation of a nonconvective layer. Additional thermal analyses addressing temperature responses due to anticipated waste configurations during future solids retrieval are underway (i.e., removal of supernatant resulting in uncovering solids).

In accordance with approved TOC operations procedures, if the TOC determines that a temperature specification limit is exceeded, the following actions are initiated:

- All additions to and transfers from AY-102 will be stopped (currently, due to the status of AY-102, transfers into and out of the tank are prohibited and administrative controls are in place to prevent transfers into the tank) (RPP-RPT-53901).
- AY-102 surveillance requirements (alarms and/or rounds) may be increased to detect additional change.
- Appropriate notifications and evaluations for reporting will be performed in accordance with recovery actions specified in OSD-T-151-00007.

2.3 ANNULUS VENTILATION MONITORING

The annulus ventilation system is not credited for providing any safety functions, but it does provide two primary process functions. First, the system removes moisture from the tank annulus space to minimize the potential for condensation to form on the tank, thus reducing the potential for corrosion on the outer primary tank wall and the secondary steel tank liner. Second, the system removes heat to assist in maintaining the tank within applicable temperature limits.

Thermal modeling and analysis evaluated waste temperature response to loss of annulus ventilation or annulus slot blockage (RPP-56864). Analyses show the annulus ventilation system provides some cooling capability, but indicates that waste temperatures approaching the structural limits of AY-102 are not immediately anticipated under scenarios involving loss of annulus ventilation only.

Operation requirements for the AY-102 annulus ventilation system are outlined in the TOC safety basis documents and air operating permits. OSD-T-151-00007 requires annulus ventilation to operate on a continuous basis, except for outages not to exceed 30 days. In the event that the annulus ventilation is down for greater than 30 days, a Recovery Action (RAP) Plan must be submitted to ORP.

In addition to submittal of the RAP, the Tank Operations Contractor will implement additional controls for AY-102 to provide clear, immediate actions for maintaining annulus ventilation. This will include prioritization of AY-102 annulus ventilation maintenance and activities to restart the system if it were not running.

Tank farm ventilation systems and exhaust monitoring systems are operated to and regulated under WAC 173-400, 173-460, and 246-247 and applicable Notices of Construction issued to ensure compliance with these regulations. To ensure reporting requirements are met, all planned and unplanned outages of the AY-102 ventilation systems, abatement control equipment, and exhaust-monitoring systems (including portable exhausters) are reported to the TOC environmental protection organization.

Air Operating Permit P-296A019-001, requires that the 296-A-19 stack for annulus exhauster on AY-102 is continuously sampled via record sampler. The annulus record sampler is inspected daily in conjunction with approved TOC operations procedures.

3.0 CALIBRATION AND MAINTENANCE PLAN

Calibration is defined as the adjustment of an instrument loop using a multipoint check of indicated range, required alarm set points, and/or required interlocks adjusted to actuate/reset at a specified set point. Calibration of AY-102 ENRAF leak detector probes and the annulus ventilation CAM are performed using approved TOC maintenance procedures. The schedule/frequency of calibration is described in this chapter.

In conjunction with DOE G 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*, the TOC implements a rigorous program that ensures systems associated with monitoring and ventilation of the double-shell tanks are maintained and

calibrated. TOC administrative procedures/processes provide direction for the development of technical procedures and work orders that incorporate management policies and assign responsibility for implementation.

3.1 ENRAF-NONIUS SERIES 854

Annual calibration, functional testing, and maintenance of ENRAF annulus leak detection gauges are performed per approved TOC maintenance procedures. The next scheduled calibration of the ENRAF measuring waste levels in the AY-102 primary tank is on or before January 30, 2015. The scheduled dates for the next AY-102 annulus ENRAF calibrations are on or before July 9, 2014, and August 30, 2014, for ENRAFs located in risers 88, 89 and 90 respectively. In accordance with the Settlement Agreement, the primary leak detection for AY-102 consists of three operable annulus leak detector probes and one operable in-tank level instrument. The AY-102 annulus CAM can supplement primary leak detection, but cannot replace a leak detector probe. Downtime for preventative maintenance and periodic functional testing of leak detection system devices shall not exceed 24 hours. Downtime for repair of a leak detection system device discovered to be inoperable or requiring repair shall not normally exceed 90 days. The TOC environmental protection organization must be notified of any leak detection device out-of-service for more than 90 days. Ecology must be notified of any leak detection device out-of-service for more than 90 days. This notification must include a schedule for repair and return to service of the device as soon as possible.

Calibration records for leak detection devices are an environmental record and are maintained for 5 years. All maintenance, repair, and functional testing activities of the leak detection system are documented in Hanford's operating record.

3.2 ANNULUS CONTINUOUS AIR MONITOR

Comprehensive inspection of a record air sampler(s) and the AY-102 annulus CAM are performed in accordance with approved TOC operations procedures on a daily basis. AY-102 annulus CAM sample filter exchanges are performed every 2 to 3 weeks per approved TOC maintenance procedures.

AY-102 annulus CAM calibration procedures and the facility-specific functional test procedures are performed annually. The functional test procedures are worked in conjunction with the calibration procedures. CAM calibration procedures are performed in the instrumentation shop using a known radiological standard. In accordance with the Settlement Agreement, the AY-102 annulus CAM is required to alarm at 3,000 counts per minute; the TOC implements a 2,000 counts per minute alarm set point. Procedures use a single calibration point. Single-point calibration is recommended by the CAM manufacturer. The CAM manufacturer also utilizes a single-point calibration methodology prior to shipment to customers. Single-point calibration is justified by the fact that the efficiency is relatively constant due to the inherent characteristics of the CAM.

The AY-102 annulus CAM is calibrated when first installed and recalibrated at predetermined intervals depending on accuracy requirements and operating conditions. However, recalibration is completed at least annually and whenever maintenance or modifications might affect

equipment calibrations. The next scheduled calibration of the AY-102 annulus CAM is on or before October 25, 2014.

4.0 TANK 241-AY-102 CONTINGENCY PLAN

This Contingency Plan describes the actions that would be pursued in the event of worsening conditions. The worsening conditions which would influence initiating this Contingency Plan include: discovering pumpable (greater than 6") liquid in AY-102 annulus, evidence of a waste leak in the AY-102 leak detection pit or other evidence of compromised integrity of the annulus, increased waste temperatures, or a prolonged loss of annulus ventilation. A change in conditions below this level (such as increased non-pumpable waste in the annulus) would be evaluated on a graded approach but may not trigger additional actions.

The *Double Shell Tank Emergency Pumping Guide*, HNF-3484 (EPG), identifies several strategies for emergency pumping once a failure of the primary tank in a DST has been identified such that a pumpable volume in the annulus is present. The first step would be to pump waste in the annulus back to the primary tank. Annulus pumping equipment is currently staged for rapid deployment into AY-102, should pumpable liquid be discovered.

Given a worsening condition concerning safe storage of the waste in AY-102, the pumping of supernatant from AY-102 may be initiated as expeditiously as possible. A pump is currently installed in AY-102 that could remove a portion of the supernatant from the primary tank. RPP-56864, *Tank 241-AY-102 Thermal Evaluation of Supernatant Reduction* provides thermal analysis and modeling addressing temperature responses for various levels of supernatant removal. RPP-56864 concludes the remaining supernatant should only be pumped once preparations have been made to initiate solids removal. Should worsening conditions necessitate any portion of supernatant be pumped, continuous water additions would be required until solids retrieval is initiated.

A schedule included in RPP-PLAN-55220 details the planning, procurement and installation of out-of-tank equipment activities proposed to undertake in order to be able to initiate solids removal. At the point that the Tank Operations Contractor undertakes removal of this material, modified sluicing technology will be utilized. Design of the retrieval system for solids removal from AY-102 is underway and being performed per RPP-PLAN-56413, *AY-102 Recovery Project Execution Plan*. A worsening condition is not likely to affect the aggressive schedule for solids removal contained in RPP-PLAN-55220.

In the event waste temperature specifications discussed in Section 2.2 of this document are exceeded due to blockage/loss of annulus ventilation or ongoing supernatant evaporation, the identified actions in Section 2.2 will be initiated.

For other new issues not identified or anticipated by this contingency plan, such as those that may arise as a result of construction or waste transfer activities, will be identified and evaluated, Ecology will be notified. Within 30 days of notification, Ecology will be provided a recovery plan and schedule.

5.0 REFERENCES

- Administrative Order Docket 10156 for the Hanford Site, EPA/State ID #WA7890008967, dated March 21, 2014.
- DOE G 433.1-1A, 2011, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*, U.S. Department of Energy, Washington D.C., September 12.
- HNF-3484, 2009, *Double-Shell Tank Emergency Pumping Guide*, Rev. 10, Washington River Protection Solutions, LLC, Richland, Washington, August 31.
- OSD-T-151-00007, 2009, *Operating Specifications for the Double-Shell Storage Tanks*, Washington River Protection Solutions, LLC, Richland, Washington, October.
- PCHB No. 98-249 and PCHB No. 98-250, 1998, *Settlement Agreement and Stipulated Order of Dismissal*, Pollution Control Hearings Board, Attorney General of Washington, U.S. Department of Energy, et al. v. Ecology, Olympia, Washington.
- RPP-56864, 2013, *Tank 241-AY-102 Thermal Evaluation of Supernatant Reduction*, Washington River Protection Solutions, LLC, Richland, Washington, June 13.
- RPP-PLAN-55220, 2013, *241-AY-102 Pumping Plan*, Washington River Protection Solutions, LLC, Richland, Washington, June.
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.
- WAC 173-303-400, "Interim Status Facility Standards," *Washington Administrative Code*, as amended.
- WAC 246-247, "Radiation Protection – Air Emissions," *Washington Administrative Code*, as amended.