U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

JUN 1 1 2008

08-TOD-056

Mr. John C. Fulton, President
and Chief Executive Officer
CH2M HILL Hanford Group, Inc.
2440 Stevens Center Place
Richland, Washington 99354

Dear Mr. Fulton:

CONTRACT NO. DE-AC27-99RL14047 – U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION (ORP) MANAGEMENT ASSESSMENT FINAL REPORT FOR C-109 RETRIEVAL RESUMPTION AND DEPLOYMENT OF FOLDTRACK MOBILE RETRIEVAL TOOL (MRT)

An ORP assessment team performed a formal, focused evaluation of the independent contractor readiness assessment (RA) for C-109 retrieval resumption and deployment of the Foldtrack MRT. The attached report documents the results of the ORP evaluation, which identified two strengths, five findings, and four observations.

Two of the findings have already been closed in an effort to obtain authorization to restart retrieval of C-109. These findings are CRR-F-01 and CRR-F-02. No further action is required for these findings. One finding, T-F-01, was addressed with a compensatory action that was adequate for purposes of start-up of C-109, but does not close the finding.

Within 30 days of receipt of this letter, CH2M HILL Hanford Group, Inc. should respond to the assessment findings that remain open and to Observations ECC-O-01 and SD&P-O-02. The response should include:

- The causes of the findings;
- The corrective actions that have been taken to control or remove any adverse impact from noncompliant conditions (remedial actions) and the results achieved;
- The corrective actions that will be taken to identify the extent of condition, correct the cause(s), and prevent further findings; and
- The date when all corrective actions will be completed, verified, and compliance to applicable requirements achieved.

Additionally, please discuss corrective actions taken to address the contractor RA, Finding FO&P-3, *Procedural vulnerabilities associated with allowing steps to be performed in logical order could result in work being authorized before required checklists have been completed.* Weaknesses observed during the startup of the water skid to test the MRT tool (i.e. inadequate valve lineup resulting in lifted relief valves) indicate that this finding was closed without an adequate extent of condition review.

If you have any questions, please contact me, or your staff may contact Stacy L. Charboneau, Assistant Manager for Tank Farms Project, (509) 373-3841.

Sincerely,

Shirley J. Olinger, Manager
Office of River Protection

TOD:BIW

Attachment

cc w/attach:
E. J. Adams, CH2M HILL
C. E. Anderson, CH2M HILL
J. J. Badden, CH2M HILL
H. S. Berman, CH2M HILL
T. E. Bratvold, CH2M HILL
K. W. Daniels, CH2M HILL
R. A. Dodd, CH2M HILL
G. N. Hanson, CH2M HILL
D. B. Hardy, CH2M HILL
M. D. Hasty, CH2M HILL
R. L. Higgins, CH2M HILL
T. L. Hissong, CH2M HILL
F. M. Ito, CH2M HILL
M. R. Kembel, CH2M HILL
J. W. Long, CH2M HILL
J. A. McDonald, Jr., CH2M HILL
W. E. Ross, CH2M HILL
K. T. Juroff, EM-22
J. A. Hutton, EM-62
W. M. Linzau, DNFSB
R. G. Quirk, DNFSB
CH2M HILL Correspondence

U.S. Department of Energy, Office of River Protection

Office of River Protection

Management Assessment
Final Report

C-109 Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool (MRT) Contractor Level 2 Readiness Assessment

A-08-AMTF-TANKFARM-014

May 2008

Report Approval

David Faulkner, Team Member
Department of Energy — Date 5/22/08

Ron Frink, Team Member
Office of River Protection — Date 5/22/08

FOR M. MORENO PER TELCON
Mario Moreno, Team Member
Office of River Protection — Date 5/22/08

For Schierman per email
Kerry Schierman, Team Member
Department of Energy — Date 5/22/08

Approved:
Brandon Williamson, Team Leader
Office of River Protection — Date 5/22/08

TABLE OF CONTENTS

Acronym List

AA	Authorization Authority
CAM	Continuous Air Monitor
CAP	Corrective Action Plan
CEHA	Chemical Exposure Hazard Analysis
CH2M HILL	CH2M HILL Group, Inc.
CRR	Contractor Readiness Review
DID	Defense-in-Depth
DOE	Department of Energy
DSA	Documented Safety Analysis
DST	Double-Shell Tank
ECN	Engineering Change Notice
EM	Environmental Management
ESL	Evaluated Supplier List
FRP	Facility Readiness Plan
FR	Facility Representative
FW	Facility Worker
HEPA	High-Efficiency Particulate Air
HIHTL	Hose-in-Hose Transfer Line
IHT	Industrial Hygiene Technician
IP	Implementation Plan
IQRPE	Independent Qualified Registered Profession Engineer
JHA	Job Hazard Analysis
LOTO	Lockout/Tagout
MRT	Mobile Retrieval Tool
NCO	Nuclear Chemical Operators
OE	Operating Engineers
ORP	Office of River Protection
PER	Problem Evaluation Request
POA	Plan of Action
QAP	Quality Assurance Plan
RA	Readiness Assessment
RCT	Radiological Control Technician
SMP	Safety Management Program
SSC	System Structure or Component
SSW	Senior Supervisory Watch
SST	Single-Shell Tank
TF	Tank Farm
TFC	Tank Farm Contractor
TOD	Tank Operations Division
TSR	Technical Safety Requirements
TVIS	Tank Vapor Information Sheet
WCN	Work Change Notices
VCZ	Vapor Control Zone

EXECUTIVE SUMMARY

The activity for which readiness is being assessed is the resumption of waste mobilization and retrieval from single-shell tank (SST) 241-C-109 and subsequent waste transfer to double-shell tank (DST) 241-AN-106. Waste retrieval using the sluicing process was temporarily suspended at SST 241-C-109 on August 23, 2007, due to approaching the limit of retrieval efficiency with the existing sluicing equipment and the decision to employ the Foldtrack to assist with retrieval activities. Readiness to restart the Foldtrack assisted retrieval operation was verified by a Level 2 contractor independent readiness assessment (RA) and oversight of the RA by the U.S. Department of Energy (DOE), Office of River Protection (ORP). The ORP manager is designated as the restart authorization authority (AA).

The purpose of this assessment was to provide the ORP manager with an evaluation of the Tank Farm Contractor's (TFC) startup preparations. The ORP oversight for the C-109 RA was a formal, focused evaluation of the contractor's RA. The ORP assessment team evaluated the actions and conclusions of the contractor team, including observation of operations, interviews, record reviews, a drill and daily team meetings. In addition, this review included: 1) an effectiveness evaluation of a number of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation Corrective Action Plan (CAP), and 2) an assessment of the contractor's implementation of Technical Safety Requirement (TSR) controls. Evaluations of the effectiveness of S-102 corrective actions are documented in the appraisal forms in Attachment 2 to the report.

The contractor's independent RA team verified operational readiness to conduct retrieval operations through an in-depth evaluation of performance demonstrations, drills, interviews, and document reviews. The contractor team identified six pre-start findings and eight observations.

The ORP team identified two strengths, five findings and four observations during oversight of the contractor RA. Two of the findings would need to be closed prior to authorizing restart of retrieval activities and one would need to be addressed by compensatory actions. The contractor RA team's final report was inconsistent with the Implementation Plan (IP) in that a review criterion was not covered (CRR-F-01) and two instances were identified where readiness affidavit commitments were not included in the open items list of the Startup Plan (CRR-F-02). One observation from the contractor RA report (*O-T-1, TFC-ENG-DESIGN-C-06, Engineering Change Control, and the Engineering Change Form do not require evaluation for training impacts*) was considered to be a finding (T-F-01) by the ORP team that would need to be addressed with compensatory measures prior to allowing restart of retrieval activities. Strengths noted during the assessment include the organization and maturity of the contractor's process for verifying readiness and the quality of the contractor RA team.

The ORP team determined that adequate preparations were completed to achieve readiness and that the contractor's independent RA team verified operational readiness to conduct retrieval operations. The ORP team recommended on May 9, 2008, in memorandum 08-TOD-051, that the AA (ORP manager) authorize the contractor to proceed with restart activities associated with 241-C-109 retrieval upon DOE's verification of closure of the pre-start findings identified by the contractor RA team and the ORP team. These findings have since been closed.

1.0 INTRODUCTION

1.1 Project Description

SST 241-C-109 waste sludges and solids will be mobilized and transported to the transfer pump using sluicing nozzles and the Foldtrack Mobile Retrieval Tool. Supernatant from DST 241-AN-106 will be used to supply the sluicing medium to the sluicing nozzles. The waste mixture generated by sluicing and utilization of the Foldtrack will be retrieved using a submersible slurry pump, with the slurry then transferred through a hose-in-hose transfer line (HIHTL) back to DST 241-AN-106. These activities are a continuation of existing program work of retrieval and transfer of waste with equipment modifications as described here. The sluicing technology has proven effective as a waste retrieval option during previous SST 241-C-109 waste retrieval campaigns. Utilization of the Foldtrack will provide an additional means to mobilize waste.

1.2 System and Equipment Overview

SST 241-C-109 is located in the 241-C Tank Farm (TF) and DST 241-AN-106 is in the 241-AN TF, both in the 200 East area of the Hanford Site.

The facility is comprised of the SST 241-C-109 and the installed sluicing retrieval systems including the Foldtrack. Also included is the following equipment: POR-008 portable exhauster and the associated ventilation ducting and condensate drain lines, which maintain the SST 241-C-109 tank headspace at a negative pressure during retrieval operations, the 241-C TF waste transfer systems, POR-104 portable valve box, HIHTLs, and DST 241-AN-106 slurry distributor, which distributes the waste to the DST system, and the DST 241-AN-106 supernate pump which returns raw water or DST supernate to SST 241-C-109. The facility is also comprised of the remote control trailers outside the 241-C TF fence from where the retrieval systems are operated and monitored. Also included are the 241-C and 241-AN TFs infrastructure such as electric power, lighting systems, and raw water systems.

A Foldtrack MRT was deployed into SST 241-C-109 via a 12" riser to facilitate waste retrieval operations. The Foldtrack is a vehicle equipped with nitrile rubber tracks and is

hydraulically controlled and operated. It can be used to move waste around the bottom of the tank via a blade mounted on the front of the Foldtrack to an area where it can be mobilized by the submersible pump located centrally in the tank. The hydraulically controlled blade includes a squeegee mounted on the bottom and side capture fins attached to each side of the blade to aid in moving waste. The blade typically can be lowered in front of the crawler to push waste or it can be maneuvered in the up position when the blade is not required. A fan pattern four-jet nozzle manifold is located on the front of the blade that provides filtered water at high pressure for use in breaking up high shear strength waste. An additional ¼" jetting nozzle also operating at high pressure is mounted through the blade and can articulate up to ~40° with the up/down movement of the blade.

1.3 Project Startup Readiness Review Method

The startup of this retrieval project was governed by DOE O 425.1C, *Startup and Restart of Nuclear Facilities*, and the guidance of DOE-STD-3006-2000, *Planning and Conduct of Operational Readiness Reviews.* DOE approved the Startup Notification Report (08-TOD-018, Approval of Amended Quarterly Startup Notification Report for the Second Quarter Fiscal Year 2008, dated February 19, 2008) that established the level of review for this activity as a contractor performed RA with ORP oversight. The Startup Notification Report also defined the restart AA for startup of this activity as the ORP manager.

1.4 ORP Readiness Review Assessment Method

The ORP team conducted an assessment of the TFC's startup preparations for 241-C-109 waste retrieval resumption and deployment of Foldtrack MTR from February through May 2008. The purpose of this assessment was to provide the AA with an evaluation of the TF contractor's TFC startup preparations.

The assessment was divided into two evaluations. The first evaluation was performed to verify that the TFC adequately completed preparations to achieve readiness. The evaluation was conducted by assessing the function areas of training, equipment configuration, and safety documents and procedures before the TFC declared readiness. The second evaluation was performed to verify the contractor RA team conducted an adequate review. In addition, this review included: 1) an effectiveness evaluation of a number of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP, and 2) an assessment of the contractor's implementation of TSR controls. The assessment was conducted in accordance with the assessment plan provided in Appendix 1.

During the two evaluations, the ORP team reviewed project documents, interviewed personnel, and observed performance demonstrations. Appraisal forms were prepared to

document the criteria, review approach, and actions taken by the team members in the evaluation process. The completed appraisal forms are provided in Appendix 2.

1.5 ORP Assessment Team

The ORP assessment team was comprised of the following members:

Assessment Team Lead – Brandon Williamson
Qualified Tank Farms Facility Representative, Tank Farm Operations Division (TOD)

Assessment Team Member – David Faulkner
Environmental Management (EM) EM-64, DOE Headquarters

Assessment Team Member – Ron Frink
Qualified Tank Farms Facility Representative, TOD

Assessment Team Member – Mario Moreno
Nuclear Safety Division, NSD

Assessment Team Member – Kerry Schierman
Qualified Richland Facility Representative, Operations Oversight Division

2.0 ORP ASSESSMENT RESULTS

2.1 Summary of Functional Areas

The results of the assessment in the areas of contractor readiness review, training, equipment configuration, and safety documents and procedures are summarized below. The details of the review can be found in the appraisal forms provided in Appendix 2.

2.1.1 Contractor Readiness Review (CRR)

The breadth, depth, and results of the contractor independent RA were adequate to verify the readiness of hardware, personnel, and management programs for operations of the 241-C-109 retrieval system. This was based on a review of the assessment planning, performance, and final report. The RA was conducted in accordance with the IP and was of sufficient depth as documented in the final report.

The ORP team identified two strengths during this phase of the review.

> "The contractor independent RA team was well organized, experienced, and conducted a rigorous review. The RA team's performance was considered by the ORP team as a strong point with this readiness review process."

"The contractor's self assessment process for verifying readiness was noted as being a well-organized and mature process. The Facility Readiness Plan (FRP), through documentation in affidavits that core requirements are met, provides a solid documentation basis for declaring readiness."

The ORP team identified two findings during this review.

- CRR-F-01: The contractor's final report was inconsistent with the IP in that the "A1" review criterion for core requirement 14 is not covered in the report.

- CRR-F-02: Two instances were identified where readiness affidavit commitments were not included in the open items list of the startup plan.

2.1.2 Training

Training records, field demonstrations, and interviews were evaluated to confirm that the level of knowledge of operations and operations support personnel is adequate and that lessons learned from the S-102 waste spill were evident. Two findings were identified during this review.

- T-F-01: Engineering Change Notices (ECN) do not require a screening for impacts to training. This issue was identified as an observation in the contractor RA final report.

- T-F-02: The contractor RA final report did not address, nor was complete corrective action taken for, an entry that was made into a vapor control zone (VCZ) contrary to the vapor control zone (VCZ) posting and Tank Vapor Information Sheet (TVIS) during the performance demonstration.

2.1.3 Equipment Configuration

Test documents, work packages, walkdowns, and interviews were evaluated to determine effectiveness of programs that confirm the condition and operability of safety systems, structures and components, and to determine whether the material condition of safety, process, and utility systems will support the safe conduct of work. One finding and two observations were identified during this review.

- ECC-F-01: RPP-12711 requires Independent Qualified Registered Profession (IQRPE) involvement to approve life cycle extension for HIHTL, and the IQRPE provider is not on the evaluated supplier list (ESL).

- ECC-O-01: Engineering evaluations are weak in that they address symptoms rather than more studiously evaluating the issue for underlying causes and effects.

- ECC-O-02: Affidavits do not always contain sufficient information to support the determination of readiness.

2.1.4 Safety Documents and Procedures

Operating procedures, an emergency drill, performance demonstrations, and safety basis documents were evaluated to ensure that there are adequate and correct operations procedures that implement the safety basis requirements and that there are adequate and correct procedures for operating process and utility systems. Evaluations for evidence of the application of lessons learned from the S-102 spill event were also performed. This review found two observations.

- SD&P-O-01: The contractor RA team did not document consideration of Administrative Control AC 5.15, Tank Farm Instrumentation.

- SD&P-O-02: The ORP team noted that an additional weakness exists (refer to contractor RA Observation O-E-1) in the project personnel knowledge in that operability of the C-109 exhauster did not consider the TSR defense in depth role of the exhauster system.

2.2 Assessment Conclusion

The ORP team determined that adequate preparations were completed to achieve readiness and that the contractor's independent RA team verified operational readiness to conduct retrieval operations. The TFC ensured that personnel, equipment, procedures, and management were ready for operations.

Strengths noted during the assessment include the organization and maturity of the contractor's process for verifying readiness and the quality of the Contractor RA team.

The weaknesses noted by the ORP team that affect restart were closed and closure documentation is in Appendix 3. DOE has verified closure of the pre-start findings identified by the contractor RA team and those identified during the contractor's Management Self-Assessment. This documentation is also in Appendix 3.

The ORP team recommended via memorandum 08-TOD-051, *Summary of the U.S. Department of Energy (DOE), Office of River Protection (ORP), Assessment of the Contractor's Assessment of the 241-C-109 Tank Waste Retrieval Resumption and Deployment of the Foldtrack Mobile Retrieval Tool (MRT)*, dated May 9, 2008, that the AA, authorize the contractor to proceed with restart activities associated with the 241-C-109 retrieval project upon DOE's verification of closure of all pre-start findings identified by the ORP team and the contractor RA team.

APPENDIX 1

ASSESSMENT PLAN

Office of River Protection

Tank Farms Operations Division (TOD)
Management Assessment Plan
for the
C-109 Retrieval Resumption and Deployment
of Foldtrack Mobile Retrieval Tool
Contractor Level 2 Readiness Assessment

Report Approval

Team Leader:
Brandon Williamson

Team Members:
Ron Frink
Mario Moreno
Kerry Schierman
Ed Westbrook (replaced with David Faulkner)

Approved:

Assessment Team Leader _____ on file _____

Concurred:

The Assistant Manager for Tank Farms _____ on file _____

The Office of River Protection Manager: _____ on file _____

INTRODUCTION

This assessment plan provides a description of the approach ORP will use in evaluating the adequacy of the contractor's C-109 retrieval resumption and deployment of Foldtrack MRT operation project RA. The ORP oversight for the C-109 RA will be formal, focused oversight, and evaluation of the contractor's RA.

DOE approved Startup Notification Report (08-TOD-018, Approval of Amended Quarterly Startup Notification Report for the Second Quarter Fiscal Year 2008, dated February 19, 2008) established the level of review for this activity as a contractor performed RA with ORP oversight. The Startup Notification Report also defined the restart AA for startup of this activity as the ORP manager.

At the conclusion of this assessment, the ORP team will provide the AA with a memorandum providing an overall summary of the results of the assessment, a finalized list of findings and observations for the review, and a recommendation for, or against, startup. This memorandum may be used by the AA as a basis for granting startup approval. The memorandum will be followed by a final assessment report (which is not a prerequisite for startup authorization).

In addition, this review will also include: 1) an effectiveness evaluation of a number of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP, and 2) an assessment of the contractor's implementation of TSR controls.

FACILITY DESCRIPTION

SST 241-C-109 is located in the 241-C TF and DST 241-AN-106 is in the 241-AN TF, both in the 200 East area of the Hanford Site.

The facility is comprised of the SST 241-C-109 and the installed sluicing retrieval systems including the Foldtrack. Also included is the following equipment: POR-008 portable exhauster and the associated ventilation ducting and condensate drain lines, which maintain the SST 241-C-109 tank headspace at a negative pressure during retrieval operations, the 241-C TF waste transfer systems, POR-104 portable valve box, HIHTLs, and DST 241-AN-106 slurry distributor, which distributes the waste to the DST system, and the DST 241-AN-106 supernate pump which returns raw water or DST supernate to SST 241-C-109. The facility is also comprised of the remote control trailers outside the 241-C TF fence from where the retrieval systems are operated and monitored. Also included are the 241-C and 241-AN TFs infrastructure such as electric power, lighting systems, and raw water systems. SST 241-C-109 waste sludges and solids will be mobilized and transported to the transfer pump using sluicing nozzles and the Foldtrack MRT. Supernatant from DST 241-AN-106, or raw water, will be used to supply the

sluicing medium to the sluicing nozzles. The waste mixture generated by sluicing and utilization of the Foldtrack will be retrieved using a submersible slurry pump, with the slurry then transferred through a HIHTL back to DST 241-AN-106. These activities are a continuation of existing program work of retrieval and transfer of waste with equipment modifications as described here. The sluicing technology has proven effective as a waste retrieval option during previous SST 241-C-109 waste retrieval campaigns. Utilization of the Foldtrack will provide an additional means to mobilize waste.

A Foldtrack MRT, will be deployed into SST 241-C-109 via a 12" riser to facilitate waste retrieval operations. The Foldtrack is a vehicle equipped with nitrile rubber tracks and is hydraulically controlled and operated. It can be used to move waste around the bottom of the tank via a blade mounted on the front of the Foldtrack to an area where it can be mobilized by the submersible pump located centrally in the tank. The hydraulically controlled blade includes a squeegee mounted on the bottom and side capture fins attached to each side of the blade to aid in moving waste. The blade typically can be lowered in front of the crawler to push waste or it can be maneuvered in the up position when the blade is not required. A fan pattern four-jet nozzle manifold is located on the front of the blade that provides filtered water at high pressure for use in breaking up high shear strength waste. An additional ¼" jetting nozzle also operating at high pressure is mounted through the blade and can articulate up to ~40° with the up/down movement of the blade.

OBJECTIVES AND SCOPE

The ORP oversight for the C-109 RA will be a formal, focused evaluation of the contractor's RA. As such, the ORP assessment team will evaluate the actions and conclusions of the contractor team, including observation of evolutions and operations, interviews, record reviews, and daily team meetings. ORP will use their own observations as a baseline to evaluate the observations and conclusions from the contractor RA team.

To evaluate the contractor's RA, ORP will evaluate contractor RA team planning, performance, and product. To meet this objective, the ORP review team will use sampling techniques to:

1) Verify that the contractor RA team is adequately staffed and has developed an approved IP in accordance with approved procedures, and consistent with the Plan of Action (POA) approved by the AA on March 24, 2008 (ORP letter from S. J. Olinger to J. C. Fulton, "Approval of Plan of Action POA-C-109-01, 'Single Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool, Revision 1,'" 08-TOD-025, dated March 24, 2008). This includes a review of the prerequisites from the POA to ensure that they are complete before commencement of the contractor RA.

2) Verify that the contractor RA team has performed readiness review activities in accordance with the contractor IP. Real-time oversight of RA team activities will include the following:
   - Field inspections accompanying RA personnel
   - Observation of interviews
   - Attendance at RA team meetings

3) Verify that the contractor's RA is complete and acceptable, and that the results of the contractor RA are adequate to verify the readiness of hardware, personnel, and management programs for operations. This verification will include a review of the contractor's RA final report.

4) Evaluate effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP.

5) Assess the contractor's implementation of TSR controls as they relate to C-109 tank waste retrieval.

   ORP will also conduct independent inspections in subject areas. This will include:
   - Review of facility procedures and documentation
   - Walk-down of equipment and procedures
   - Interviews

DELIVERABLES

At the conclusion of this assessment, the ORP team will provide the AA with a memorandum containing an overall summary of the results of the assessment, a finalized list of findings and observations for the review, a recommendation for or against startup, and an estimated date of completion of the final report. This memorandum may be used as a basis for granting startup approval by the AA. The memorandum will be followed by a final assessment report (which is not a prerequisite for startup authorization). The final report will be prepared to document performance of the assessment. It will include details of RA team observation, field inspections, interviews, review of facility procedures and documentation, and will include a review of the contractor RA report.

CORE REQUIREMENT ASSIGNMENTS

The assessment team is assigned to perform independent inspections and evaluate the contractor's RA for the following functional area's and core requirements consistent with the POA-C109-01, Revision 1.

Kerry Schierman - Training

CR-2: Functions, assignments, and responsibilities are clearly understood.
CR-3: The selection, training, and qualification programs have been implemented.
CR-4: Level of knowledge of managers, operations, and support staff is adequate.
CR-5: Modifications have been reviewed for impact on training.
CR-6: Sufficient numbers of qualified personnel are available.

David Faulkner (previously Ed Westbrook) – Equipment Configuration Control

CR-6: Adequate facilities and equipment are available for operational support services.
CR-8: A program is in place to confirm operability of safety system structure or components (SSC's).
CR-12: An adequate startup program has been developed.
CR-15: A feedback and improvement process has been established.

Mario Moreno - Safety Documentation and Procedures

CR-7: Facility safety documentation is in place and has been implemented.
CR-8: A program is in place to confirm operability of safety SSC's.
CR-9: The facility systems and procedures are consistent with the safety basis.
CR-10: Adequate and correct procedures and safety limits are in place for operations.

Ron Frink – Safety Documentation and Procedures

CR-1: Line management established programs to ensure safe accomplishment of work.
CR-11: A routine and emergency drill program has been established and implemented.
CR-13: The formality and discipline of operations is adequate to conduct work safely.
CR-14: Formal agreements between the operating contractor and DOE have been established to govern safe operations.

APPENDIX 2

APPRAISAL FORMS

Appraisal Form

CONTRACTOR READINESS REVIEW	Criteria Met:

Criteria:

The breadth, depth, and results of the contractor RA are adequate to verify the readiness of hardware, personnel, and management programs for 241-C-109 retrieval resumption and Foldtrack deployment.

Approach:

1. Review the contractor's readiness assessment IP to verify that the team is adequately staffed and the IP is consistent with the plan of action scope and breadth.

2. Observe the contractor's RA team conduct field inspections, performance demonstrations, interviews, and daily meetings to verify that the depth of review is adequate to ensure readiness of hardware, personnel, and management programs for operations.

3. Review the contractor's final report to verify the RA is complete and conducted per the IP.

4. Observe the contractor's RA team conduct field inspections, performance demonstrations, interviews, and daily meetings to evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as they pertain to C-109 retrieval.

DISCUSSION OF RESULTS

Records Reviewed:

Personnel Interviews:

Evolutions/Operations/Shift Performance Observer:

ANALYSIS

Review Conclusion:
Issue(s):

Inspected by:	Approved by: _____ Date:

Appraisal Form

TRAINING	Criteria Met:

Criteria:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Approach:

1. Review the operations personnel training records to evaluate if operations personnel have successfully completed required training.

2. Observe performance demonstrations to evaluate operations personnel ability to operate equipment and respond to system upsets (e.g., off normal conditions and alarm responses).

3. Observe interviews with operations staff to evaluate operations personnel level of knowledge of the C-109 Retrieval and Foldtrack system.

4. Review training records, observe interviews and performance demonstrations to evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as they pertain to personnel training for C-109 retrieval operations.

DISCUSSION OF RESULTS

Records Reviewed:
Personnel Interviews:
Evolutions/Operations/Shift Performance Observer:

ANALYSIS

Review Conclusion:
Issue(s):

Inspected by:	Approved by: _____ Date:

APPRAISAL FORM

Equipment Configuration Control	Criteria Met:

Criteria:

A program is in place that confirmed the condition and operability of safety systems, structures and components. This includes examinations of records of tests and calibration of these systems. The material condition of safety, process, and utility systems will support the safe conduct of work.

Approach:

1. Review the operations acceptance test documents to ensure component shutdown features were tested.

2. Review completed work packages for HIHTL installation and testing.

3. Review completed leak detector and backflow preventer functional testing documents to verify equipment was tested per the TSR.

4. Walkdown the retrieval equipment to determine the system configuration compares to system drawings and the operating procedures.

5. Review the lockout/tagout (LOTO) log book and temporary modification log book to determine if any open items affect the retrieval operation.

6. Review calibration and test records for selected support system components (e.g., hydraulic pumps system, utility manifold, pump skid) to verify equipment operability.

7. Verify exceptions listed on the construction completion document by the project have been completed to the extent necessary for performance demonstrations.

8. Evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as pertains to C-109 retrieval equipment configuration control.

DISCUSSION OF RESULTS

Records Reviewed:

Personnel Interviews:

Evolutions/Operations/Shift Performance Observer:

ANALYSIS

Review Conclusion:

Issue(s):

Inspected by:	Approved by: _____ Date:

Appraisal Form

Safety Documentation and Procedures	Criteria Met:

Criteria:

Safety basis documents have been approved and implemented to support 241-C-109 retrieval resumption and Foldtrack deployment. There are adequate and correct operations procedures that implement the safety basis requirements. There are adequate and correct procedures for operating process and utility systems.

Approach:

1. Review implementation of the safety basis amendment for the 241-C-109 retrieval resumption and Foldtrack deployment project. Verify the implementation checklist is adequately completed.

2. Review the operations procedures and determine if the procedures implement selected TSR (e.g., leak detection, backflow prevention, material balance).

3. Review the operations procedures and determine if the procedures implement selected process control plan requirements.

4. Review the operations procedures and determine if the procedures implement selected environmental requirements (e.g., air permit, function and requirements document).

5. Observe the performance demonstration and evaluate the adequacy of the procedures.

6. Evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as pertains to C-109 retrieval safety documentation and procedures.

DISCUSSION OF RESULTS

Records Reviewed:

Personnel Interviews:

Evolutions/Operations/Shift Performance Observer:

ANALYSIS

Review Conclusion:

Issue(s):

Inspected by:	Approved by: _____ Date:

Appraisal Form

CONTRACTOR READINESS REVIEW	Criteria Met: Yes

Criteria:

The breadth, depth, and results of the contractor RA are adequate to verify the readiness of hardware, personnel, and management programs for 241-C-109 retrieval resumption and Foldtrack deployment.

Approach:

1. Review the contractor's RA IP to verify that the team is adequately staffed and the IP is consistent with the plan of action scope and breadth.

2. Observe the contractor's RA team conduct field inspections, performance demonstrations, interviews, and daily meetings to verify that the depth of review is adequate to ensure readiness of hardware, personnel, and management programs for operations.

3. Review the contractor's final report to verify the RA is complete and conducted per the IP.

4. Observe the contractor's RA team conduct field inspections, performance demonstrations, interviews, and daily meetings to evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as they pertain to C-109 retrieval.

DISCUSSION OF RESULTS

Records Reviewed:

- Activity Description *Single Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool* AD-C109-02;
- Plan Of Action *Single Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool* POA-C109-01;
- Facility Readiness Plan FRP-C109-01;
- Affidavit evidence files, all;
- Implementation Plan *Single Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool* IP-2008-01;

- Memorandum from D. Y. Chung to S. J. Olinger, *Transmittal of Report by Office of Safety Management and Operations Staff on Review of Tank S-102 Spill Event*, dated September 27, 2007;
- Startup Plan, SP-C109-01, Revision A, *Resumption of Waste Retrieval at 241-C-109 Utilizing Foldtrack Mobile Retrieval Tool;*
- *Type A Accident Investigation Report, The July 27, 2007 Tank 241-S-102 Waste Spill at the Hanford Tank Farms*, Volume 1 and Volume 2, dated September 2007;
- RPP-RPT-34831, *Root Cause Analysis Report, CH2M-PER-2007-1327, Radioactive Waste Spill at Tank 241-S-102 on July 27, 2007;*
- Standing Order, OPS-07-008, *Chain of Command During Retrieval Operations;*
- Standing Order, OPS-08-004, *C-109 Re-Start of Retrieval Operations;*
- TFC-OPS-OPER-C-01, *Technical Safety Requirement Compliance;*
- TFC-OPS-OPER-C-13, *Technical Procedure and Use;*
- *Retrieval and Closure Operation Organizational Chart;*
- TFC-ENG-DESIGN-C-06, *Engineering Change Control;*
- CH2M HILL Hanford Group, Inc, (CH2M HILL) interoffice memorandum 73000-RAD-08-008, from R. A. Dodd to S. K. Crowe, *Declaration of Readiness to Operate and Request to Start the Independent Contractor Readiness Assessment of the 241-C-109 Waste Retrieval Resumption and Deployment of Fold track Mobile Retrieval Tool*, dated April 24, 2008; and
- *Contractor Readiness Assessment Report for the SINGLE-SHELL TANK 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool*, dated May 6, 2008, and Revision 1 of the same report, dated May 8, 2008.

Personnel Interviews:

2 Industrial Hygienists
Maintenance Electrician
Maintenance Millwright
Maintenance Pipefitter
2 Nuclear Chemical Operators
C-109 Retrieval Operations Engineer
C-109 Process Engineer
C-109 Field and Radiological Controls Support Supervisor
2 Health Physics Technicians
2 Base Operations Shift Manager

Evolutions/Operations/Shift Performance Observer:

Affidavit of Readiness Approval Meetings
Contractor RA team inbriefing
Contractor RA team daily team meetings
Contractor RA team daily debrief to the project
Contractor RA team outbrief of the final report

Field Demonstration Activities:

- Emergency preparedness drill – FDH-08-17, *C-109 Startup/C-Farm Personnel Contamination Drill (#35E043);*
- TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109;*
- TO-320-050, *Operate Mobile Retrieval Tool System;* and
- Tour of C Farm conducted by Derek Wright for the ORP RA Team.

Cross-Table Exercise Scenarios:

- Industrial hygiene (unusual odors);
- Equipment (loss of hydraulic fluid);
- Radiation protection (potential breach of the transfer line);
- Watchstanding (abnormal data values); and
- Response to abnormal conditions outside of C-109.

ANALYSIS

Review Conclusion:

1. The contractor's RA IP was reviewed and found to be consistent with the approved plan of action both in scope and breadth. Based on oversight of the contractor RA team through interviews, field performance demonstrations, the ORP RA team concludes the contractor RA team was adequately staffed.

2. The ORP RA oversight team observed all phases of the contractor RA to include document reviews, field equipment walkdowns, project personnel interviews, a performance demonstration in the field, an emergency drill, and cross table process upset evaluations. The ORP RA oversight team lead attended all of the contractor's daily team meetings and outbriefs to the project. Based on those activities the ORP RA oversight team concludes that the depth of the contractor RA review was adequate to ensure readiness of hardware, personnel, and management programs for operations.

3. The ORP RA oversight team reviewed the contractor's final report *Contractor Readiness Assessment Report for the Single-Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool*, dated May 6, 2008. This review found an oversight of one review criterion. Specifically, the contractor's final report was inconsistent with the IP in that the "A1" review criterion for core requirement 14 was not covered in the report (CRR-F-01).

   The POA and IP calls out additional evaluations to be performed in areas of programmatic weaknesses that were identified following the SST 241-S-102 spill. The weaknesses were identified to be in Conduct of Operations, Conduct of Radiological Controls, Conduct of Engineering, and Emergency Preparedness. Throughout the interviews, performance demonstrations and drills the contractor RA team followed their lines of inquiry and provided scenarios that probed into the identified weak areas. During the interview phases, project personnel were able to demonstrate what they had learned from the S-102 spill, and it became clear that personnel at all levels could talk about how the S-102 event has had an impact on the way work was performed in general and discussed how those changes affect them.

Strengths:

Strength: The contractor independent RA Team was well organized, experienced, and conducted a rigorous review. The RA Team's performance was considered by the ORP Team as a strong point with this readiness review process.

Strength: The contractor's self assessment process for verifying readiness was noted as being a well organized and mature process. The FRP, through documentation in affidavits that core requirements are met, provides a solid documentation basis for declaring readiness to being the independent Contractor RA.

Issue(s):

CRR-F-01: The contractor's final report was inconsistent with the IP in that the "A1" review criterion for core requirement 14 is not covered in the report.

CRR-F-02: Two instances were identified where affidavit commitments were not included in the open items list or the Startup Plan.

Discussion:

1. Affidavit 12.2, section 1.a, page 2, states:

   "To ensure a deliberate approach is executed by the Manager, C Farm Operations will utilize the most experienced operators for the initial startup activities."

   This approach is not documented in the Startup Plan.

2. An independent review finding was documented in Affidavit 3.1 stating that the hazards of high energy beta had not been adequately addressed in personnel training. The response to the finding stated the hazard of high energy beta would be addressed in the Job Hazard Analysis (JHA) and covered in pre-job briefings. The open item list provided in CH2M HILL Group, Inc. (CH2M HILL) memorandum 73000-RAD-08-008, dated April 24, 2008, did not contain an open item for the commitment made in the affidavit. The ORP RA team assessor reviewed the activity-specific JHA and could not identify any discussion of high energy beta, nor was it discussed during the pre-job briefing conducted prior to demonstration activities during the RA. The Facility Representative (FR) contacted the CH2M HILL startup manager who acknowledged the commitment had been missed, but that they would now add it to their tracking list.

Inspected by: Brandon I Williamson	Approved by:
	Date: 5/22/08

Appraisal Form

TRAINING	Criteria Met: Yes

Criteria:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Approach:

1. Review the operations personnel training records to evaluate if operations personnel have successfully completed required training.

2. Observe performance demonstrations to evaluate operations personnel ability to operate equipment and respond to system upsets (e.g., off normal conditions and alarm responses).

3. Observe interviews with operations staff to evaluate operations personnel level of knowledge of the C-109 Retrieval and Foldtrack system.

4. Review training records, observe interviews and performance demonstrations to evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as they pertain to personnel training for C-109 retrieval operations.

DISCUSSION OF RESULTS

Records Reviewed:

- Affidavit evidence files 2.1, 2.3, 3.1, 3.2, 4.1.a, 4.1.b, 4.2, 5.1, 5.2.a, 5.2.b, and 6.1;
- Memorandum for S. J. Olinger from D. Y. Chung, *Transmittal of Report by Office of Safety Management and Operations Staff on Review of Tank S-102 Spill Event*, dated September 27, 2007;
- Startup Plan, SP-C109-01 Revision A, *Resumption of Waste Retrieval at 241-C-109 Utilizing Foldtrack Mobile Retrieval Tool;*
- Type A Accident Investigation Report, *The July 27, 2007 Tank 241-S-102 Waste Spill at the Hanford Tank Farms*, Volume 1 and Volume 2, dated September 2007;
- RPP-RPT-34831, *Root Cause Analysis Report, CH2M-PER-2007-1327, Radioactive Waste Spill at Tank 241-S-102 on July 27, 2007;*

- Job Task Analysis Report, *241-C-109 Retrieval Project;*
- Training Plan, #7V-100-07-002, *C-109 Retrieval Operations,* Course #350578/350579;
- *Foldtrack Mobile Retrieval Tool Checklist*, Course #350579, Revision 0801.1;
- Course #351602, *Modify Sluicing Retrieval System Certification* – Course description, content, and ITEM course completion report;
- Course #351601, *Sluicing Retrieval Basics* - Course description, content, and ITEM course completion report;
- Course #350578, *C-109 Specific Retrieval Operations Classroom and Checklist* - Course description, content, and ITEM course completion report;
- Course #350579, *C-109 Retrieval System and Mobile Retrieval Tool (MRT) Overview* -Course description, content, and ITEM course completion report;
- HNF-SD-WM-TSR-006, Revision 5, AC 5.6, Organization, Table 5.6-1, *Tank Farm Facilities Minimum Operations Shift Complement;*
- TFC-BSM-TQ_ADD-C-01, *Training Analysis, Design, and Developmen*t;
- TFC-PLN-61, *Tank Farm Contractor Training and Qualification Plan;*
- Meeting Minutes, *Decision Meeting Regarding the Need for MRT Delta Training*, dated April 16, 2008;
- Course #351039, *C-109 Waste Transfer Radiological Monitoring Plan*, Course description, content, and ITEM course completion report;
- Activity #T07046, *Overview of C-109 Retrieval Operations for Support Personnel* - Course description, content, and ITEM course completion report;
- Activity #T07047, *Overview of C-109 Retrieval Operations for Shift Managers and Senior Supervisory Watch (SSW) Personnel* - Course description, content, and ITEM course completion report;
- Activity #T08025, *Delta Training on C-109 Retrieval Operations including the Mobile Retrieval Tool (MRT);*
- CH2M HILL Training Webpage Qualification Lists for C-109 Retrieval and C-106/MR;
- Standing Order OPS-07-008, *Chain of Command During Retrieval Operations;*
- Standing Order OPS-08-004, *C-109 Re-Start of Retrieval Operations;*
- TFC-BSM-TQ_ADD-C-01, *Training Analysis, Design, And Development;*
- TFC-OPS-OPER-C-01, *Technical Safety Requirement Compliance;*
- TFC-OPS-OPER-C-13, *Technical Procedure and Use;*
- *Retrieval and Closure Operation Organizational Chart;*
- TFC-ENG-DESIGN-C-06, *Engineering Change Control;*
- CH2M HILL Hanford Group, Inc, Interoffice Memorandum 73000-RAD-08-008, from R. A. Dodd to S. K. Crowe, *Declaration of Readiness to Operate and Request to Start the Independent Contractor Readiness Assessment of the 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool*, dated April 24, 2008; and

- *Contractor Readiness Assessment Report for the SINGLE-SHELL TANK 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool,* dated May 6, 2008.

Personnel Interviews:

Base Operations Shift Office Manager
Environmental, Safety, Health, and Quality Director
2 Industrial Hygienists
Maintenance Electrician
Maintenance Millwright
Maintenance Pipefitter
2 Nuclear Chemical Operators
C-109 Retrieval Operations Engineer
C-109 Field and Radiological Controls Support Supervisor
2 Health Physics Technicians
Base Operations Shift Manager
Senior Training Specialist
Training Manager
Training and Procedures Director

Evolutions/Operations/Shift Performance Observed:

Field Demonstration Activities:

- Emergency preparedness drill – FDH-08-17, *C-109 Startup/C-Farm Personnel Contamination Drill (#35E043);*
- TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109;*
- TO-320-050, *Operate Mobile Retrieval Tool System;* and
- Tour of C Farm conducted by D. J. Saueressig for the contractor RA team.

Cross-Table Exercise Scenarios:

- Industrial hygiene (unusual odors);
- Equipment (loss of hydraulic fluid);
- Radiation protection (potential breach of the transfer line);
- Watchstanding (abnormal data values); and
- Response to abnormal conditions outside of C-109.

ANALYSIS

Review Conclusion:

Training records were reviewed for personnel projected to be part of the C-109 retrieval activity. Per those records, four Operations Engineers (OE), nine Nuclear Chemical Operators (NCO), six Radiological Control Technicians (RCT), and five Industrial Hygiene Technologists (IHT) had completed requisite training activities to be considered qualified to participate in retrieval operations. No issues were identified with the training records reviewed. However, the contractor could not adequately demonstrate a process was in place to ensure all facility modifications were being reviewed for impact on personnel training and qualification. The issue was identified as an observation by the contractor RA team (O-T-2), but the ORP RA team considered it warranted mitigation prior to activity startup (see below, Finding T-F-01). An ORP RA assessor also identified that a contractor commitment in an affidavit (3.1) to document high energy beta controls and conduct hazard briefings was not being tracked nor addressed (see CRR-F-02).

1. The ORP RA assessors observed field demonstration activities for retrieval operations and emergency preparedness. Although equipment configuration would not allow a demonstration of MRT operation for the RA, ORP RA assessors were able to observe adequate demonstration activities at the Cold Test Facility in March 2008. In each instance, personnel performed adequately to demonstrate readiness for operations. One personnel behavior issue that was recognized but not documented by the contractor RA team, was personnel entry into a VCZ without first meeting the posted requirements at the entry point. The ORP RA team considered the condition warranted addressing (see below, Finding T-F-02).

   Minor discrepancies were identified with radiological work practices (also identified and documented in the contractor RA report as Observation O-RP-2). Further, although project team members performed adequately in the field, an opportunity for project supervisory personnel to measure worker knowledge and readiness to perform work activities was lost when the pre-evolution briefing was minimally interactive in nature. The contractor RA team also identified this lost opportunity and documented it in their report as Observation O-O&P-1.

2. ORP RA assessors observed interviews conducted by the contractor RA team. Operations and support personnel demonstrated adequate knowledge to operate the C-109 retrieval and MRT System. However, the level of knowledge of SST Modes and TSR compliance demonstrated by an Operations Shift Manager during an interview did not meet expectations. This issue was also identified and documented by the

contractor RA team in their Finding F-T-1. There were also discrepancies identified in both documentation and personnel knowledge of minimum staffing requirements for retrieval operations. This issue was also identified by the contractor RA team and documented in their report as Observation O-R&R-1.

3. Training records, interviews, and demonstration activities adequately demonstrated to the ORP RA team that S-102 lessons learned had been integrated into C-109 personnel training. This criterion was also adequately evaluated by the contractor RA team.

Issue(s):

T-F-01: The method of ensuring facility modifications had been reviewed for potential impacts on training and qualification was not adequate.

Discussion:

The contractor RA team documented Observation (O-T-2) identifying processes were not in place to ensure facility modifications that did not affect procedures were reviewed for impacts on training and qualification. The report identified the observation as an area for improvement, but did not specify mitigating controls must be in place prior to activity startup. The ORP RA team considered that although Core Requirement 5 which states, "Modifications to the facility have been reviewed for potential impacts on training and qualifications. Training has been performed to incorporate all aspects of these changes," may have been verified at the time of readiness certification, without a process in place to review facility modifications, that do not affect procedures for impacts on training, maintaining that condition cannot be assured following initial certification.

T-F-02: Personnel entered a VCZ without adequately verifying posted controls were met.

Discussion:

During the conduct of demonstration activities on April 28, 2008, an IHT and a Health Physics Technician lowered the sign and chain at an entry point to the C-109 exhauster VCZ to enter the area. The area was posted with a standard VCZ sign stating, "Entry Requirements: 1) Supplied Air – or, 2) In Accordance with Tank Vapor Information Sheet (TVIS)." As the personnel were entering the VCZ, a contractor RA team member questioned them on what allowed them to enter without respiratory protection. The IHT stated temporary downposting was authorized by the Chemical Exposure Hazard Analysis (CEHA). Since the posting did not specifically discuss the CEHA, the FR asked the contractor RA team member, who was also the CH2M HILL Director of Safety and Health, if the CEHA was identified on the TVIS. The director stated it would be verified on the way out of the farm, as the TVIS would be posted in the change trailer. Upon

exit, the contractor RA team member reviewed the TVIS (TVIS-C-001) and reported to the ORP RA team member that the TVIS did not identify temporary downposting in accordance with the CEHA, and that there would be a follow up on the issue.

The following day, April 29, 2008, a revised TVIS that authorized temporary downposting in accordance with the job-specific CEHA was posted in the change trailer. Later communications with the Retrieval Operations Industrial Hygiene Manager indicated the TVIS had been revised as a result of the condition identified during the performance demonstration on April 28, 2008.

When the above issue was not identified during the contractor RA team debriefing the ORP RA team member questioned the cognizant contractor RA team member why it had not been included. It was stated during team deliberations that the issue had been discussed and it would be documented in the report, but they had determined it did not reach the level of a finding or observation. Following this discussion, the ORP RA team member and team lead discussed the issue with the contractor RA team lead and stated that although the event may not have been a problem from a technical perspective, it represented an instance of personnel not verifying access requirements prior to entry into a posted hazardous area. TFC-POL-14, Revision C, Attachment A, states in part, "All employees must comply with the following Master Safety and Occupational Health Rules...11. Observe all warning signs and do not enter barricaded areas without proper authorization."

Inspected by: Kerry Schierman Brandon Williamson for Schierman per email	Approved by: Brandon Williamson Date: 5/22/08 SC 6/8/08

APPRAISAL FORM

Equipment Configuration Control	Criteria Met: Yes

Criteria:

A program is in place that confirmed the condition and operability of safety systems, structures and components. This includes examinations of records of tests and calibration of these systems. The material condition of safety, process, and utility systems will support the safe conduct of work.

Approach:

1. Review the operations acceptance test documents to ensure component shutdown features were tested.

2. Review completed work packages for HIHTL installation and testing.

3. Review completed leak detector and backflow preventer functional testing documents to verify equipment was tested per the TSR.

4. Walkdown the retrieval equipment to determine the system configuration compares to system drawings and the operating procedures.

4. Review the LOTO log book and temporary modification log book to determine if any open items affect the retrieval operation.

5. Review calibration and test records for selected support system components (e.g., hydraulic pumps system, utility manifold, pump skid) to verify equipment operability.

6. Verify exceptions listed on the construction completion document by the project have been completed to the extent necessary for performance demonstrations.

7. Evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Investigation CAP as pertains to C-109 retrieval equipment configuration control.

DISCUSSION OF RESULTS

Records Reviewed:

- *CH2M HILL Management Self Assessment 241-C-109 Waste Retrieval;* Affidavits 6.2, 8.1, 10.2, 10.3, 12.1, 12.2;
- HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (Web Site);
- RPP-13033, Documented Safety Analysis (DSA) (Web Site);
- FRP-C109-01, Revision 0, *Single-Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool;*
- *C-109 Retrieval PMs CHAMPS Query;*
- *C-109 Retrieval Safety Equipment CHAMPS Query;*
- CGI No. 01919, Revisions 0, 1, & 2, C-Farm Portable Waste Retrieval System (WRS) Valve Box – Valves;
- CH2M PER 2007-1530 and Associated E-STARS Reports;
- RPP-12711, Revision 3H, *Temporary Waste Transfer Line Management Program Plan;*
- RPP-6711, *Evaluation of Hose-in-Hose Transfer Line Service Life;*
- OE-07-003, Operability Evaluation for Valves POR104-WT-V-106, POR104-WT-V-107, POR104-WT-V-111, POR138-WT-V-106, POR138-WT-V-107, and POR138-WT-V-111;
- OSD-T-151-00013, *Operating Specifications for Single Shell Waste Storage Tanks;*
- RPP-RPT-25749, *System Health Report for Waste Transfer Containment for Fourth Quarter CY 2007;*
- RPP-RPT-33198, *Acceptance Test Report for Vendor Acceptance of Hose-in-Hose Transfer lines for C-109 Retrieval Project;*
- RPP-RPT-34052, *Integrity Assessments for 241-C-109 Waste Retrieval Project;*
- TFC-ENG-DESIGN-C-06, REV G-2, *Engineering Change Control;*
- TFC-ENG-FACSUP-C-02, REV B-8, *Operability/Technical Evaluations;*
- TFC-ENG-FACSUP-P-01, REV C-10, *Conduct of System Engineering;*
- TFC-ESHQ-Q_C-C-01, REV D-5, *Problem Evaluation Request;*
- TFC-PLN-003, *Engineering Program Management Plan;*
- TO-220-112, *Over-ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109;*
- Work Instruction CLO-WO-07-1346, *241-C-109 Set Diversion Box;*
- Work Instruction CLO-WO-07-1827, *C-Farm Replace Valve Stops in POR104 Valve Box;*
- Work Instruction CLO-WO-08-0581, *241-C-109 XFER SYS Leak Detection Function Test;*
- Fluid Controls Institute Standard FCI-70-2-2003, *Control Valve Seat Leakage;*

- TE-07-032, *Foldtrack Mobile Retrieval Tool System (FT MRT) Justification for Component Changes to the System;* and
- CLO-WO-07-1348, *241-C-109, Construction Acceptance Test (CAT) Record.*

Personnel Interviews:

Retrieval and Closure Engineering Manager
Retrieval and Closure Engineering Process Engineer
Retrieval and Closure Engineering Project/Component Engineer
Retrieval and Closure Engineering System Engineers (3)
Quality Assurance Program Manager

Evolutions/Operations/Shift Performance Observer:

None.

ANALYSIS

Review Conclusion:

1. Review the operations acceptance test documents to ensure component shutdown features were tested.

   Discussion of results:

   Review of the transfer system leak detector functional test data for the retrieval system showed that the test was completed satisfactorily with no issues. This included the master pump shutdown features.

   A review was completed of the Construction Acceptance Tests for the installation of the Foldtrack MRT. No issues were noted.

2. Review completed work packages for HIHTL installation and testing.

   Discussion of results:

   Review of the work package and procurement packages for the hose-in-hose assemblies show no issues. This review also included the vendor acceptance tests and post-installation leak checks.

One potential future issue is the service life of the hoses. The oldest sections of hose will hit the service life limit of three years in November 2008. CH2M HILL has established a process to review the critical characteristics of the hose assemblies in an effort to determine if the service life can be safely extended. The process appears thorough, however, it has been recently updated to address issues raised by Washington State regulators and this will be the first set of hoses to be extended using this revised methodology.

An issue with the process (see RPP-12711, Revision 3H, Appendix A, Section A.2.1, Page A-5) is that it requires an IQRPE certification of the review performed and concurrence with the service life extension in addition to the evaluation by the qualified system engineer. The IQRPE has been historically used to meet specific portions of the Washington State regulations and as such, does not perform a review outside the scope of those specific State regulations. In addition, the IQRPE vendors are not certified for design and engineering work on the ESL. The Quality Assurance manager explained that IQRPE contracts are typically led by the engineering department and the scope is specific to those portions of the State regulations requiring the independent review. The process needs to be corrected to specifically limit the IQRPE function to those items required by Washington State regulations or the IQRPE provider needs to be evaluated in accordance with the Quality Assurance Plan (QAP) and the provider added to the ESL.

3. Review completed leak detector and backflow preventer functional testing documents to verify equipment was tested per TSR.

Discussion of results:

A review was completed of equipment test documents contained in facility proof files. There were no concerns over tests reviewed regarding how acceptance criteria were developed, testing was conducted, or the adequacy of the testing performed. There are some issues regarding the valves in the POR104 portable valve box that were discovered during the review.

The valves in the POR104 portable valve box were procured prior to the TSR requiring compliance with Fluid Controls Institute Standard 70-2 (FCI-70-2). The valves were procured and tested to the requirements of ASME B31.3 and ASME 16.2. The valves and their vendor testing met all the requirements of the applicable codes. After POR104 was constructed and installed the TSRs were changed to invoke FCI-70-2 or an approved equivalent. There is no evidence of an equivalency evaluation for the safety-significant valves in the POR104 valve box. The system engineer stated emphatically that these were not evaluated

valves under the TSR and that there was no awareness of any equivalency evaluation of the testing performed on these valves as part of their procurement versus FCI-70-2.

The valve stops on the valves in POR104 were modified to use a physically larger travel stop for the valve operator. This change was considered necessary since the valve operators were modified to allow for operation with reach rods through the cover for the POR104 enclosure. The modification did receive the appropriate reviews and approvals. However, after modification, the valves were allowed to be visually over-traveled since the physical sizing of the funnel attachment was not the same size as the vendor-provided operator. When the potential over-travel condition was noted in the field, valve position indication showed that the valve was traveling past the position mark on the position indicator. The affect of the operator modification relative to valve stop size was noted and corrected by an additional modification to the valve stops.

Modifying the valve stops corrected the condition of the valve indicator showing over-travel of the valve. However, based on available data and discussion with the system engineer when the valve operators were modified the total play introduced into the operating mechanism was not determined and its effect on valve positioning was not evaluated. The ball valve is expected to seat adequately even if it is positioned several degrees offset from the closed position due to the physical characteristics of the valve itself, however, the point at which the valve may no longer seal adequately has not been established for the valves in the POR 104 portable valve box. This becomes particularly important considering that the greater play introduced into the operating mechanism by the valve operator modification will result in routine under-rotation of the valve when operating to the closed position. This under-rotation brings into question the validity of previously performed leak checks based on positioning that may not be reliably achieved.

Overall Affidavits 10.2 and 10.3 present a lot of information to the certifying and reviewing officials. In the specific instance of the review of valves for the POR104 portable valve box the depth of review performed and the presence of a healthy questioning attitude regarding how the assembled information met the criteria was less than adequate. Many of the documents reviewed with regard to the valve issue were not part of the affidavit although engineering personnel had no trouble locating information when requested. This same lack of questioning is apparent in the documentation of the modification sequence and the lack of identification of operating system introduced play and its effect on valve positioning. The modification of the valve stops is a good example of this in that the symptom, indication of valve position, was corrected vice examining the issue more thoroughly and correcting, if necessary, the underlying cause of potential

under-rotation of the valve due to increased play in the operating mechanism. Looking at the entire picture of increased valve operator play and the indicated over-rotation from an overview perspective, it appears that the modification to the valve stops may not have been necessary at all. In fact, changing the valve stops could have worsened the potential issue of under-rotation.

4. Walkdown the retrieval equipment to determine the system configuration compares to system drawings and the operating procedures.

   The ORP team observed the contractor RA team perform an in-field walkdown of the 241-C-109 retrieval equipment on April 24, 2008. This walkdown included the C TF Control Trailer, C-109 to AN-106 transfer line, and outside C TF areas including the raw water skid. Additionally, the ORP team independently walked down the retrieval system on several occasions prior to and during the review. The ORP team noted no issues relating to system configuration comparison to drawings that were not identified by the contractor RA team.

5. Review the LOTO log book and temporary modification log book to determine if any open items affect the retrieval operations.

   Discussion of results:

   A review of the temporary modification log for the 241-C TF was completed. There are no temporary modifications installed in the 241-C TF at this time. (April 29, 2008)

   A review of the LOTO log for the 241-C TF was completed. There are no active LOTO for the 241-C TF at this time. (April 20, 2008)

6. Review calibration and test records for selected support system components (e.g., hydraulic pumps system, utility manifold, pump skid) to verify equipment operability.

   Discussion of results:

   No issues were noted during the review of the calibration and test data for the Foldtrack MRT.

7. Verify exceptions listed on the construction completion document by the project have been completed to the extent necessary for performance demonstrations.

Discussion of results:

The only exception is the need for a leak check of the hose connections to the Foldtrack MRT. This leak check is required after installing the Foldtrack into the tank and making the required connections. Without authorization to operate the system from DOE this test could not be performed. It is noted in the Startup Plan and will be performed as part of placing the Foldtrack into operation.

Affidavit 12.2, Section 1.a, Page 2, states that "To ensure a deliberate approach is executed the Manager, C Farm Operations will utilize the most experienced operators for the initial startup activities." This approach is not documented in the Startup Plan. This issue is captured in finding CRR-F-02.

8. Evaluation of the effectiveness of corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as pertains to C-109 retrieval equipment configuration control.

Discussion of results:

The following corrective actions have been determined to be relevant to the C-109 retrieval equipment configuration control:

ENG-2.3
Revise design review procedures, using results of independent review as a guide. Clarify roles and responsibilities and provide detailed guidance/criteria for review of in-house and subcontracted engineering design products. Define a graded approach for design review of engineering products, including requirements for intermediate design reviews and formal disposition of review comment resolutions. Action due date: December 10, 2007; action closed December 12, 2007.

ENG-2.4
Establish and implement a process to perform a thorough extent of condition review for systems connected to waste storage tanks to determine potential waste transfer paths and ensure that such systems incorporate applicable TSR controls. This process will be applied to each transfer prior to operation. Action due date: November 30, 2007; action closed November 29, 2007.

Issue(s):

ECC-F-01: RPP-12711 requires IQRPE involvement to approve life cycle extension for HIHTL, and the IQRPE provider is not on the ESL.

ECC-O-01: Engineering evaluations are weak in that they address symptoms rather than more studiously evaluating the issue for underlying causes and effects.

ECC-O-02: Affidavits do not always contain sufficient information to support the determination of readiness.

Conclusion:

Engineering systems are well documented and present a clear set of requirements for performing work. Implementation is not always up to expectations.

The readiness process is rigorous. However, additional attention should be paid to ensuring that the affidavits contain sufficient information to actually support the determination. This was not always the case for two of the affidavits.

Corrective action closures do not adequately rely on the specifics of the action statement. The closure should include verification that the action specified has been completed as stated.

Overall the facility will be ready to perform the intended transfer of Tank C-109 waste once the pre-start findings have been corrected.

Inspected by: David Faulkner D Faulkner 5/22/08	Approved by: [signature] Date: 5/22/08 SC 6/8/08

Appraisal Form

Safety Documentation and Procedures	Criteria Met: YES

Criteria:

Safety basis documents have been approved and implemented to support 241-C-109 retrieval resumption and Foldtrack deployment. There are adequate and correct operations procedures that implement the safety basis requirements. There are adequate and correct procedures for operating process and utility systems.

Approach:

1. Review implementation of the safety basis amendment for the 241-C-109 retrieval resumption and Foldtrack deployment project. Verify the implementation checklist is adequately completed.

2. Review the operations procedures and determine if the procedures implement selected TSR (e.g., leak detection, backflow prevention, material balance).

3. Review the operations procedures and determine if the procedures implement selected process control plan requirements.

4. Review the operations procedures and determine if the procedures implement selected environmental requirements (e.g., air permit, function and requirements document).

5. Observe the performance demonstration and evaluate the adequacy of the procedures.

6. Evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as pertains to C-109 retrieval safety documentation and procedures.

DISCUSSION OF RESULTS

Records Reviewed:

- 241-C-109 Waste Retrieval Affidavit 1.2;
- 241-C-109 Waste Retrieval Affidavit 1.3;
- 241-C-109 Waste Retrieval Affidavit 7.1;
- 241-C-109 Waste Retrieval Affidavit 7.2;
- 241-C-109 Waste Retrieval Affidavit 8.1;

- 241-C-109 Waste Retrieval Affidavit 9.1;
- 241-C-109 Waste Retrieval Affidavit 11.1;
- 241-C-109 Waste Retrieval Affidavit 11.2;
- 241-C-109 Waste Retrieval Affidavit 13.2.a;
- 241-C-109 Waste Retrieval Affidavit 13.2.b;
- 241-C-109 Waste Retrieval Affidavit 13.3;
- ARP-T-331-00009, *Respond to Alarms at Control Trailer POR103-TRLR-001;*
- Base Operations Standing Order, *C-109 Re-Start of Retrieval Operations;*
- *Contractor Readiness Assessment Report for the SINGLE-SHELL TANK 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool,* dated May 6, 2008;
- Cross-Table Exercise Scenarios # 1 through #5;
- FRP-C109-01, *CH2M HILL Facility Readiness Plan, Single-Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool;*
- HNF-IP-1266, *Tank Farms Operations Administrative Controls;*
- HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements;*
- Implementation Plan, *Single-Shell Tank 241-C-109 Waste Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool;*
- Interoffice Memorandum, *241-C-109 Retrieval Operations Industrial Hygiene Sampling and Monitoring Strategy*, 7X100-JWJ-08-058R3;
- Memorandum for Shirley Olinger from Dae Y. Chung, *Transmittal of Report by Office of Safety Management and Operations Staff on Review of Tank S-102 Spill Event*, dated September 27, 2007;
- Office of River Protection, *Management Assessment Plan for the C-109 Retrieval Resumption and Deployment of Foldtrack Mobile Retrieval Tool Contractor Level 2 Readiness Assessment;*
- RPP-13033, *Tank Farms Documented Safety Analysis (DSA);*
- RPP-21304, *AN-106 Supernatant Pump Process Flow for C-109 Sluicing;*
- RPP-21360, *C-109 Slurry Pump Process Flow Calculation;*
- RPP-36253, *Evaluation of Postulated Pressurizing and Channeling Waste Leak Accident Scenarios;*
- RPP-PLAN-33095, *Process Control Plan for Tank 241-C-109 Waste Retrieval;*
- RPP-PLAN-36151, *Radiological Monitoring Plan for Tank 241-C-109 to Tank 241-AN-106 Waste Transfer;*
- RPP-RPT-34831, *Root Cause Analysis Report, CH2M-PER-2007-1327, Radioactive Waste Spill at Tank 241-S-102 on July 27, 2007;*
- RPP-RPT-35922, *241-C-109 Waste Retrieval System Process Hazards Analysis;*
- TE-07-009, *Technical Evaluation for the C-109 and AN-106 Transfer Pumps;*
- TE-07-012, *C-109 Retrieval System Technical Evaluation for Pressurizing/Channeling within Waste Tank Solids;*

- TE-07-024, *Foldtrack Mobile Retrieval Tool System Waste Channeling/Waste Leak Path Technical Evaluation;*
- TE-08-019, *Tank 241-C-019 Retrieval System Technical Evaluation of Waste Migration from Jet Streams;*
- TFC-ENG-DESIGN-C-35, *Process Hazard Analysis;*
- TFC-ENG-SB-C-03, *Unreviewed Safety Question Process;*
- TFC-ENG-STD-28, *Process Hazard Analysis Standard;*
- TFC-ESHQ-RP_RWP-C-04, *Radiological Work Permit;*
- TO-060-006, *Operate POR-008 Exhauster;*
- TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109;* and
- TO-320-050, *Operate Mobile Retrieval Tool System.*

Personnel Interviews:

Base Operations Shift Office Manager
C-109 Retrieval Operations Engineer (2)
Electrical System Engineer
Health Physics Technicians (2)
Nuclear Chemical Operators (2)
Nuclear Safety & Licensing Manager
Readiness Assessment Team Member – Management
Readiness Assessment Team Member – Operations
Readiness Assessment Team Member – Team Lead
Readiness Assessment Team Member – Training
Retrieval and Closure Engineering Director
Retrieval and Closure Engineering Manager
Retrieval and Closure Systems Engineer
Retrieval Operations Director
Vice President Retrieval and Closure Operations

Evolutions/Operations/Shift Performance Observations:

- Field demonstration activities;
- C-109 retrieval system start-up pre-job briefing;
- Cross-table exercise scenarios:
  - Equipment (loss of hydraulic fluid)
  - Industrial hygiene (unusual odors)
  - Radiation protection (potential breach of the transfer line)
  - Response to abnormal conditions outside of C-109
  - Watch-standing (abnormal data values)

- Emergency Preparedness Drill – FDH-08-17, *C-109 Startup/C-Farm Personnel Contamination Drill (#35E043);*
- Integrated performance demonstration at C-109 Control Trailer;
- POR008 exhauster startup field activities;
- Pre-job briefing for POR008 exhauster startup;
- TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109* (in-field and in control trailer); and
- TO-320-050, *Operate Mobile Retrieval Tool System* (Section 5.1 *Startup Mobile Retrieval Tool*) (in-field and in control trailer).

ANALYSIS

Review Conclusion:

Review implementation of the safety basis amendment for the 241-C-109 retrieval resumption and Foldtrack deployment project. Verify the implementation checklist is adequately completed.

The 241-C-109 retrieval resumption and Foldtrack deployment did not require a safety basis amendment. The RA Team validated this conclusion through review of the 2007 annual update to the DSA. Consequently, an AB implementation checklist was not required.

Review the operations procedures and determine if the procedures implement selected TSR (e.g., leak detection, backflow prevention, material balance).

The contractor RA team review of operations procedures TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109,* Revision B-1 and TO-320-050, *Operate Mobile Retrieval Tool System* adequately implemented selected TSR (e.g., leak detection, Double Valve Isolation, and Waste Transfer Associated Structures). The Radiological Control and Industrial Hygiene TSR related instruments rely on AC 5.15, *Measuring and Test Equipment Program* when used to verify parameters for TSR compliance. AC 5.11, *Transfer Controls* allows radiation surveys to be performed during waste transfers for sections of the waste transfer route where the material balance monitoring cannot detect waste leaks (AC 5.11.2.b.1). This AC is used between both supernate HIHTL and C-109 slurry HIHTL to the valve box (POR104). The contractor RA team did not check that the radiation instruments to be used (RO-20) to meet AC 5.11.2.b.1 radiation surveys also met the requirements of AC 5.15. An ORP RA assessor identified that the contractor RA team did not evaluate the implementation of AC 5.15 during the assessment (see SD&P–O-01).

The ORP RA team reviewed relevant operations procedures (TO-220-112 and TO-320-050); implementation of the TSRs was found to be adequate. The relevant TSRs for the retrieval system include: LCO 3.1.1, LCO 3.2.1, AC 5.7, AC 5.9, AC 5.10, AC 5.11, AC 5.12, AC 5.15, and AC 5.16. There are no TSR requirements associated with the POR008 exhauster or the MRT. ARP-T-331-0009 appropriately identifies TSR applicability.

Review the operations procedures and determine if the procedures implement selected process control plan requirements.

The contractor RA team reviewed RPP-PLAN-33095, *Process Control Plan for Tank 241-C-109 Waste Retrieval* as part of F&CS2 with no deficiencies noted. The contractor RA team determined that implementation of the process control plan in the operations procedures was adequate.

RPP-PLAN-33095 was reviewed by ORP RA assessors. Some of the controls prescribed within the process control plan pertain to transfer leak detection systems, SST flammable gas concentration, source term, waste group designation, induced gas release waste group designation, steady-state gas release, transfer system, corrosion mitigation, pre-retrieval sampling, sludge level measurement, temperature monitoring, water additions, flushing, vacuum control, camera operation, etc. The ORP RA assessors determined that implementation of the process control plan in the operations procedures was adequate.

Review the operations procedures and determine if the procedures implement selected environmental requirements (e.g., air permit, function and requirements document).

The RA team, as part of the cross-table demonstration (see contractor RA report, CR 11 for further details on the cross-table), revealed a weakness in being able to define the operability of non-TSR equipment relied upon to ensure environmental compliance. This weakness was documented as Observation O-E-1 by the contractor RA team. The Environmental Management Program Safety Management Program is credited in RPP-13033, Table 3.3.2.3.2-3, *Defense-In-Depth (DID) Features for Potential Hazardous Conditions* as DID for releases caused by in-tank spray leaks to mitigate a significant facility worker (FW) hazardous condition. ORP Safety Evaluation Review (08-TED-009) has since deemed this to not be a significant FW hazardous condition using the SARAH criteria. The EM SMP remains as DID and consists of the following program elements: High-Efficiency Particulate Air (HEPA) filters (including testing requirements); ventilation stack Continuous Air Monitor (CAM) systems (including surveillance, tracking, and trending), HEPA filter differential pressure instrumentation systems (including surveillance, tracking, and trending); and HEPA filter protection (including moisture removal systems). TSR AC 5.7 SMP credits the EM

program to mitigate this FW hazardous condition. The contractor RA team found TO-220-112, *Over-Ground Transfer from 241-C-109 to 241-AN-106 and Sluicing of Tank 241-C-109,* Rev B-1 adequately requires POR-008 exhauster to be operable during waste transfers and sluicing; Table 1 of the procedure has related shutdown criteria. During the cross-table exercises, an ORP RA assessor identified project personnel and the RA team failed to recognize the EM program link to the DSA and TSR AC 5.7 SMP as a DID for the C-109 exhauster (see SD&P-O-02).

Additionally, a review by the ORP RA assessors concluded that TO-220-112 contains the appropriate environmental compliance requirements within Section 3.4. ARP-T-331-0009 appropriately does not have environmental compliance requirements. TO-320-050 contains the appropriate environmental compliance requirements for the MRT. TO-060-006 contains the appropriate environmental compliance requirements for the POR008 exhauster. The rigor to establish compliance is adequate. The ORP RA team found no additional discrepancies.

Observe the performance demonstration and evaluate the adequacy of the procedures.

The ORP RA assessor observed field demonstration activities for retrieval operations and emergency preparedness. Although equipment configuration would not allow a demonstration of MRT operation for the RA, ORP RA assessors were able to observe adequate demonstration activities at the Cold Test Facility in March 2008. In each instance, personnel performed adequately to demonstrate readiness for operations. Minor discrepancies were identified with radiological work practices (identified and documented in the contractor RA report as Observation O-RP-2).

Evaluate the effectiveness of the corrective actions completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP as pertains to C-109 retrieval safety documentation and procedures.

Interviews and procedure demonstration activities adequately demonstrated to the ORP RA team that S-102 lessons learned have been integrated into C-109 retrieval safety documentation and procedures. The construction labor personnel excavating a HIHTL were adequately warned of the spray leak. This criterion was also adequately evaluated by the contractor RA team.

As a result of the S-102 corrective actions, *RPP-PLAN-36151, Radiological Monitoring Plan for Tank 241-C-109 to Tank 241-AN-106 Waste Transfer* was developed to document the basis for implementation of AC 5.11, *Waste Transfer* in addition to other safety and regulatory requirements. For example, when radiation surveys are used in lieu

of material balance for SST waste retrieval operations, AC 5.11 requires radiation survey criteria based on the waste transfer flow rates to be documented, including survey intervals. The contractor implementing document, HNF-IP-1266, *Tank Farms Operations Administrative Controls,* requires that the waste transfer flow rate be based on the pump flow out rate. This criterion was also adequately evaluated by the contractor RA team.

Review Conclusion:

Safety basis documents have been approved and are adequately implemented to support 241-C-109 retrieval resumption and Foldtrack deployment. Operations procedures adequately implement the safety basis requirements and are adequate for operating process and utility systems.

The contractor RA team's approach and rigor with respect to review of safety documentation and procedures has been adequate. The operations procedures adequately implement TSRs, process control plan requirements, and environmental requirements. Performance demonstrations using the relevant procedures for the waste transfer retrieval system and the MRT, within the operational limitations of the readiness assessment, were shown to be adequate.

Corrective actions that have been completed as part of the S-102 Tank Waste Spill Type A Accident Investigation CAP, pertaining to C-109 retrieval safety documentation and procedures, have been adequately implemented.

Issue(s):

SD&P–O-01: The contractor RA team did not document consideration of Administrative Control AC 5.15, Tank Farm Instrumentation.

SD&P-O-02: The ORP team noted that an additional weakness exists (ref contractor RA observation O-E-1) in the project personnel knowledge in that operability of the C-109 exhauster did not consider the TSR defense in depth role of the exhauster system.

Inspected by: Ron Frink and Mario Moreno 5/22/08 22 APR 08	Approved by: Date: 5/22/08 SC 6/8/08

APPENDIX 3

CLOSURE OF PRE-START FINDINGS

DOE verification of closure of the various prestart findings associated with the RA are documented in the ORP Operational Awareness Database. The wording below was taken directly from that database.

ORP Team Findings

CRR-F-01: The contractor's final report was inconsistent with the IP in that the "A1" review criterion for core requirement 14 is not covered in the report.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

A review of Revision 1 to the contractor RA report for the SST 241-C-109 Waste Retrieval Resumption and deployment of the Foldtrack MRT was reviewed and A1 review criterion for core requirement 14 was included in the report.

This finding is closed.

CRR-F-02: Two instances were found where affidavit commitments were not included in the open items list or the Startup Plan. 1) High Energy Beta training; 2) Startup with most experienced staff.

The statement for affidavit 12.2 which addresses the use of the most experienced operators was not intended as a requirement but rather as a statement that the C-109 retrieval team is the most qualified group of operators for this retrieval. Specifically, these operators are not only qualified for the specific retrieval process but also they are all qualified for the operation of the MRT.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Initiate a Problem Evaluation Request (PER) to address the post start evaluations of training regarding high energy beta.

PER 2008-0987 was initiated on May 9, 2008. The PERs immediate actions include "Change training material to include hazards/controls for high-energy beta; discuss disposition for this training deficiency with the operations manager responsible for training to discern corrective actions."

2. Revise Worksite Hazard Analysis TO-220-112 to address high energy beta.

The WHA has been revised to include discussions on beta alarming dosimetry and open window surveys. The C-109 to AN-106 retrieval prejob outline also includes a discussion of high energy beta controls. I discussed this with the finding originator and originator concurs with closure.

This finding is closed.

T-F-01: ECN do not require a screening for impacts to training. This issue is captured as an observation in the contractor final RA report.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Issue Management Directive TFC-MD-058, ECN Training Impacts, to require an evaluation of training impacts.

TFC-MD-058, ECN Training Impacts was issued on May 9, 2008, and establishes the required compensatory measures for the screening of ECNs for the impacts to training.

2. Revise TFC-ENG-DESIGN-C-06, Engineering Change Control, to modify the ECN form to require an evaluation of training impacts. Completion date is June 1, 2008.

This finding is not closed, but for purposes of start-up of C-109, Action number 1 (closed) is sufficient to address the identified issue

Contractor RA Pre-Start Findings

F-E-1: Issues related to modification of safety significant valves in the POR 104 vale box and the need for leak testing require resolution.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Contact the manufacturer to assure the restored rotation (as currently installed) of the valve funnel against stops were within the specification to block flow.

This was completed on May 5, 2008. The amount of over travel with the original stops was approximately 7.5 degrees. The vendor allows a margin of + or - 10 degrees in the closed position. Replacing the stops restored the over travel to less than 2 degrees.

2. Issue a lessons learned to the engineering organization on "Stand Alone Completeness" of technical documents such as Operability Evaluations.

This was completed on May 9, 2008. River Protection Project Lessons Learned document, IB-08-028 – *Completeness of Engineering Documents,* was issued.

3. Revise OE-07-003, "Operability Evaluation for Valves POR104 WT V 106, POR104 WT V 107, POR104 WT V 111, POR138 WT V 106, POR138 WT V 107, and POR138 WT V 111," to document restoration of valve geometry.

This was completed on May 12, 2008. OE-07-003, "Operability Evaluation for Valves POR104 WT V 106, POR104 WT V 107, POR104 WT V 111, POR138 WT V 106, POR138 WT V 107, and POR138 WT V 111," was revised and Attachment B also has a computation to verify that the valve closed position for valves in POR-104 are within the manufactures allowable tolerance to maintain valve seat closure after valve stop replacement.

(Note: Valves POR104-WT-V-106, POR104-WT-V-107, and POR104-WT-V-111 are no longer classified as Safety Significant and are "evaluated" waste transfer isolation valves for double valve isolation. The compensatory measure for these evaluated valves include periodic radiological surveys of the raw water hose as it leaves the POR104 portable Valve Pit [Ref TE-05-026 – Technical Evaluation of POR104 "evaluated" Waste Transfer Isolation valves for Double Valve Isolation.])

F-O&P-1: Critical radiological activities requiring Radiological Control Supervision oversight have not been documented by the Retrieval Closure Radiological Control Manager as required in the Startup Plan (corrected during review).

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Issuance of interoffice memorandum on 73D10-EJA-08-020, "Radiological Oversight Expectations During 241-C-109 Transfer Operations," was executed to correct this identified deficiency.

Completed. Memo includes Radiation oversight expectations.

2. Base Operations Standing Order, OPS-08-004 was revised to include Radiological Oversight requirements consistent with the memorandum.

Completed. Standing order incorporated memo referenced in CA1.

F-O&P-2: The operations team failed to adequately address an instance of poor watch standing and attentiveness.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 readiness assessment have been completed.

Corrective Actions:

1. The operations teams performance will be reviewed against the contractor employee discipline procedure (TFC-BSM-HR_EP-C-02).

I have been told that this review has been initiated and is currently within the Human Resource group. Since this is a CH2M HILL internal matter I will not be made aware of the status. The initiation of the review completes this action.

2. Perform briefing on fitness for duty expectations with the C-109 operations team.

This briefing was completed on May 7, 2008. The briefing included the SSW's, OE's and NCO's. The SSW's and OE's were also briefed on addressing fitness for duty issues. I reviewed the attendance roster for the briefing and all C-109 NCO's, OE's and SSW's attended.

F-O&P-3: Procedural vulnerabilities associated with allowing steps to be performed in any logical order could result in work being authorized before required checklists have been completed.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Revise procedure TO-220-112 to specify which specific sections can be performed independently, and which sections can be performed concurrently.

A review was conducted and the procedure was revised to state which sections can be performed independently or concurrently, independently but not concurrently, and concurrently. This was completed on May 12, 2008.

2. Brief the C-109 operations crew on the changes to TO-220-112.

I reviewed the attendance roster (May 12, 2008) for the procedure change brief and 1 OE and 1 NCO were not on the list. I discussed this with C-Farm Retrievals Manager and he informed me that the NCO that was absent had made up the training and showed me his attendance roster. The OE is on vacation and will receive training when he gets back. Until then he has not been included in the C-109 watch bill. The OE has also been removed from the qualification list until he attends this briefing.

F-RP-1: A gap in the transfer line shielding was identified which could have led to a potential unnecessary radiation exposure (corrected during review).

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA have been completed.

Corrective Actions:

1. Temporary shielding was added to the transfer line eliminating the identified gap.

This action was completed on May 29, 2008.

2. Backfilled area identified during extent of condition walkdown.

This action was completed on May 7, 2008.

3. Modified Scheduled Radiation Task Description COO-VAR5, to include inspection of transfer line shielding to identify gaps.

I reviewed COO-VAR5 - Scheduled Radiation Survey Task Description and it does include performing a visual inspection of transfer line shielding which includes identifying gaps in the shielding. Completed on May 8, 2008.

F-T-1: The level of knowledge regarding SST MODES and TSR compliance did not meet expectations.

This review is to verify that the corrective actions called out in the Finding Resolution Form (Form 3) of the contractor and DOE C-109 RA has been completed.

The weaknesses identified during the C-109 RA were immediately evaluated in order to implement interim corrective actions. The Shift Manager interviewed by the RA team on May 27, 2008, failed to demonstrate effective knowledge of MODE change expectations as well as documentation required to demonstrate compliance with SR 3.2.2. The actions of this Shift Manager were determined to fall below overall management expectations.

Operations management initiated Progressive Performance Management steps with the Shift Manager including removal from standing watch as a Shift Manager pending successful completion of improvement plan. This action has been completed.

The MODE requirements in the TSR do not directly yield any operational changes regarding equipment Operability or actions of field personnel. Based on this conclusion, Nuclear Safety and Licensing will perform additional review to update or remove the MODES in TSR-006. The review also determined that the formality of documenting MODE status and MODE changes to meet management expectations is not included in the TSR or implementing procedures. Pending complete evaluation and implementation of updates additional detail on MODE change was added to Standing Order OPS-07-008. The review of standing order updates is highlighted on the shift manager turnover sheets and recent examples demonstrating review by all the shift managers in the Base Operations Shift Operations organization. This was checked by reviewing the Base Operations Senior Shift Manager/Shift Manager Turnover Sheet and checking the signatures of the oncoming and off going shift managers. Management has also set expectations that all MODE changes are to be noted in the logbook and the SST MODEs are also being tracked on the shift office status board.

The same management expectations and clear understanding of Standing Order OPS-07-008 have also been briefed to the C-109 retrieval OEs as documented on the attached course completion roster. There was one individual who was not on the roster. This individual was trained and added to the roster. The above actions will support the immediate needs to address F-T-1.

Self Assessment identified

During the contractors readiness activities prior to the contractor C-109 RA, the contractor identified items to track on a pre-start action item list. This list was reviewed to verify closure. The items included:

- Approve Work Package CLO-WO-08-00614, MRT water line leak check;
- C-109, replace POR-008 gasket and glycol;
- Resolve issue with operator's radios in C Farm. See PER-2008-0177;
- Post waste transfer zone between C-109 and AN-106, and communicate new postings;
- Confirm C-104/AN-101 HIHTL excavations are >5' from C-109 TX line, and backfill is completed within 5';
- Establish a pre-fire plan for C-109 waste retrieval; and
- Repair light for closed-circuit television.

All items were closed.

NOTE:

- The Hanford Fire Department Pre-Incident Plan for the C TF Site Plan contained one drawing that incorrectly identified Tank C-104 as C-107. The fire protection engineer has been notified and the plan will be corrected. This is not considered a pre-start-up action.