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

06-TED-050

JUL 25 2006

Mr. M. S. Spears, President
and Chief Executive Officer
CH2M HILL Hanford Group, Inc.
2440 Stevens Center Place
Richland, Washington 99354

Dear Mr. Spears:

CONTRACT NO. DE-AC27-99RL14047 – TRANSMITTAL OF ASSESSMENT REPORT A-06-AMTF-TANKFARM-003

This letter transmits the results of the U.S. Department of Energy (DOE), Office of River Protection's (ORP) assessment of the Replacement Cross-Site Transfer System (RCSTS) leak-detection; the RCSTS Service Water Pressure Detection System; the new installation of the RCSTS 244-A Lift Station by-pass line; and the RCSTS leak detection System Engineer (SE). Most of the assessment field work was completed on February 13, 2006, through March 3, 2006, with follow-up activities on May 30, 2006, and July 19, 2006.

The assessment team evaluated compliance with the Documented Safety Analysis and the Technical Safety Requirements, Washington Administrative Codes and DOE O 420.1A, *Facility Safety*.

Based on this review, the ORP assessment team concluded that the RCSTS systems and components evaluated and the SE oversight of those systems meet the above requirements with some exceptions. The team identified one Finding and seven Observations. The corrective action to close the Finding was completed and verified on July 19, 2006.

The direction herein is considered to be within the limitations of the Technical Direction (TD) clause in the Contract and does not meet any of the conditions described in paragraph (b) (1) through (4) of the TD clause. If, in the opinion of the Contractor, any instruction or direction by the Contracting Officer Representative (COR) in this letter falls within one of the categories defined in TD clause (b)(1) through (b)(4), the Contractor shall not proceed, but shall notify the Contracting Officer immediately orally, and in writing within five (5) working days, after receipt of any such instruction or direction and shall request the COR to modify the contract accordingly. The COR will respond as required by the TD clause.

If you have any questions, you may contact me, or your staff may contact Russell Harwood, Tank Farms Engineering Division, (509) 376-2348.

Sincerely,

Chris Bosted
Contracting Officer Representative

TED:RGH

Attachment

cc w/attach:
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U.S. Department of Energy
Office of River Protection

Tank Farm Contractor
Replacement Cross-Site Transfer System Leak Detection Assessment Report

Final Report
A-06-AMTF-TankFarm-003

July 2006

Russell G. Harwood
Team Leader

Report Approval

7/20/06

Russell G. Harwood, Team Leader
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Dana C. Bryson, Director
Tank Farms Engineering Division
Office of River Protection

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE), Office of River Protection (ORP) performed an assessment of the CH2M HILL Hanford Group, Inc. (CH2M HILL) Tank Farm Contractor (TFC) Replacement Cross-Site Transfer System (RCSTS) supernate line leak-detection system and the Service Water Pressure Detection System (SWPDS) during the period of February 13, 2006, through February 23, 2006.

The assessment was performed to provide ORP reasonable assurance that the TFC has met the following criteria:

- The Safety Significant (SS) RCSTS supernate line leak-detection system and SWPDS have been designed, tested, and maintained to meet the requirements of the Documented Safety Analysis (DSA), and the Technical Safety Requirements (TSR);

- The Defense in Depth (DID) RCSTS supernate line encasement leak detection has been designed, tested, and maintained to meet the requirements of the Washington Administrative Codes (WAC) 173-303 *Dangerous Waste Regulations*;

- The RCSTS new installation of the 244-A Lift Station bypass line meets operability requirements; and

- The RCSTS leak detection System Engineer (SE) ensures continued operational readiness as required by DOE Order (O) 420.1A, *Facility Safety*.

A closeout meeting was convened with the TFC on March 3, 2006. The TFC provided additional information and the assessment Finding and Observations were discussed. The feedback was evaluated and incorporated into the Final Report as deemed appropriate.

Follow-up meetings with the SE on closure of the Finding were performed on May 30, 2006, and on July 19, 2006.

Conclusion:

The assessment team found reasonable assurance that the TFC is maintaining the RCSTS supernate line and the newly installed 244-A Lift Station bypass line in a condition that ensures its operability in accordance with appropriate system functional requirements, design criteria, WAC requirements, and meets the requirements of the DSA, and the TSR.

The SE for this system was very knowledgeable of the system, had ownership of the system and was helpful in providing documentation and guidance to effectively evaluate the cross-site system. The SE met the requirements of DOE O 420.1A, *Facility Safety*.

The SS Master Pump Shutdown System (MPSS) has many non-safety related components that are not separated from the nine SS components of the system. This is not consistent with the guidance of DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety*

Criteria Guide for Use with DOE O 420.1, Facility Safety. As suggested by the guide, commingling of safety-related and non-safety related components can have an adverse impact on system reliability and availability. Additionally, the SS relays used in the MPSS are no longer being manufactured and the TFC has only enough spares to last for approximately five years. A program needs to be developed to provide replacements of the SS relays in a timely manner to maintain reliability and performance of the RCSTS.

The follow-up meetings on the Finding showed the SE tracked closure using the Problem Evaluation Request (PER-2006-1159), completed the corrective action on June 29, 2006, and closed the PER on July 18, 2006. ORP verified the Finding closure to be complete on July 19, 2006, and the Observations are in varying degrees of completion.

The assessment resulted in 1 Finding and 7 Observations:

Finding

The TFC did not follow procedures requiring incorporation of LCO 3.1.2 *Backflow Prevention Device,* Surveillance Requirement (SR) 3.1.2.5 into the RCSTS, SWPDS Functional Test Procedure (Finding 1).

Observations

- The SS SWPDS used when flushing the cross-site transfer system was not listed in the System Design Description (SDD) for the RCSTS as a SS system. (Observation 1A).

- The training manual and the leak alarm response procedure for the RCSTS does not provide information on the SS alarm. Instead, the training manual and alarm response procedure refers to the Monitoring and Control System (MCS) which is a DID (non-SS), system for notifying the operator of a leak (Observation 4).

- There is not separation of SS and non-safety related components in shutdown circuits of the MPSS (Observation 5A).

- The process for meeting the State of Washington requirements in case of possible entrapment of waste in the secondary encasement from a leak of the primary line of the RCSTS is not described or specified in TFC plans or procedures (Observation 2).

- Replacement options for the SS relays used for the MPSS and the Leak Detection System (LDS) that are no longer being manufactured have not been evaluated (Observation 5B).

- The MPSS shut down circuit has components that are not being used and have not been removed or isolated from the system or circuit (Observation 3).
- The SWPDS functional test procedure does not clearly document how the safety function, loss of signal, is being met (Observation 1B).

Table of Contents

1.0 INTRODUCTION

The U.S. Department of Energy (DOE), Office of River Protection (ORP) performed an assessment on the CH2M HILL Hanford Group, Inc. (CH2M HILL) Tank Farm Contractor (TFC) Safety Significant (SS) Replacement Cross-Site Transfer System (RCSTS) supernate line leak-detection system and the SS Service Water Pressure Detection System (SWPDS) during the period of February 13, 2006, through February 23, 2006.

2.0 PURPOSE AND SCOPE

The assessment was performed to provide ORP reasonable assurance that the TFC have met the following criteria:

- The SS RCSTS supernate line leak-detection system and SS SWPDS have been designed, tested, and maintained to meet the requirements of the Documented Safety Analysis (DSA), and the Technical Safety Requirements (TSR);

- The Defense in Depth (DID) RCSTS supernate line encasement leak detection has been designed, tested, and maintained to meet the requirements of the Washington Administrative Codes (WAC) 173-303 *Dangerous Waste Regulations*;

- The RCSTS new installation of the 244-A Lift Station bypass line meets operability requirements; and

- The RCSTS leak detection System Engineer (SE) ensures system continued operational readiness as required by DOE Order (O) 420.1A, *Facility Safety*.

The assessment focused on the RCSTS supernate line that extends from the 241-SY-A valve pit in 200 West to the AN-01A pump pit in 200 East. This system was chosen due to the functional need to transfer waste from the West Tank Farms (TF) to the East TF on a regular basis and to evaluate the recent modifications to the transfer line to bypass the 244-A Lift Station. The assessment focused on the SS RCSTS supernate line leak-detection system, SWPDS, and Master Pump Shutdown System (MPSS). The DID RCSTS encasement leak detection and the System Engineer (SE) oversight of the RCSTS instrumentation and control were also evaluated.

The scope of the assessment was established through a set of Criteria and Review Approach Documents (CRAD). The CRAD focused on the following areas: 1) Specification of the system functional requirements and design criteria; 2) Verification that the design is consistent with specified functional requirements, and design criteria including safety classifications; 3) Validation that the system hardware is configured, tested, and maintained adequately to ensure system operability. In this context, operability comprises functionality, reliability, maintainability, testability, operation and operator interface; and 4) The SE oversight of the system is performed in accordance with the requirements in DOE O 420.1A, *Facility Safety*.

3.0 BACKGROUND

The RCSTS normally transfers waste from West TF to East TF for processing and storage. There are two encased lines, one for the transfer of supernate (WT-SNL-3150), and the other line for slurry (WT-SLL-3160). The slurry line has not been approved for use and was not evaluated during this assessment. The WT-SNL-3150 transfer line starts at the 241-SY-A valve pit and passes through the diversion box (6241-A), and a vent station (6241-V) and terminates in the AN-01A pump pit all of which have SS leak detectors connected to a SS MPSS. The RCSTS uses the safety significant SWPDS located in the SY Tank Farm for flushing of the cross-site transfer line. The SS RCSTS supernate line leak-detection system, DID encasement leak detectors, and the SS SWPDS are all connected to the MPSS and to the DID Monitoring and Control System (MCS) located in the 242-S Evaporator. The MCS was not evaluated in this assessment.

Project W-314 installed a RCSTS bypass around the 244-A Lift Station to the 241-AN-01A pit to comply with Resource Conservation and Recovery Act of 1976 (RCRA) requirements. The assessment evaluated the line slope and leak detection within the new bypass section to meet WAC 173-303 *Dangerous Waste Regulations*.

The TFC SE duty is to ensure continued operational readiness of the RCSTS and is responsible and accountable for the SS components and equipment in the system. The SE was evaluated on the configuration management controls applied to the SS equipment and implementation of Integrated Safety Management System (ISMS) in accordance with DOE O 420.1A, *Facility Safety*.

4.0 APPROACH AND DELIVERABLES

The review was performed consistent with ORP M 220.1, *Integrated Assessment Program*. Major elements of the review were developed from DOE O 420.1A, *Facility Safety*, previous Safety System Oversight (SSO) assessments, and guidance developed in support of DOE SSO Program.

Major elements of the review consisted of:

- Preparation of the CRAD;
- Selection of the review team;
- Pre-review activities;
- Entrance Meeting with the TFC;
- Fieldwork activities;
- Development of the assessment results;
- Exit Meeting with the TFC; and
- Development of a final report, including a factual accuracy review by the TFC.

The CRAD are included as part of the assessment forms in Appendix A.

The review team was selected from ORP staff based on technical expertise and experience. The team was comprised of a qualified SSO (MPSS and Leakage Detection Systems) and 2 TF IN-Training Facility Representatives. Biographical summaries for each of the team members are included as Appendix B.

Pre-review activities consisted of reviewing current System Design Descriptions (SDD), reviewing previous TFC system walk downs, SE interview to discuss assessment details, DSA (including TSR), current TFC requirements for SE, and DOE O 420.1A, *Facility Safety*.

The entrance briefing was conducted on February 13, 2006, and fieldwork was conducted from February 13, 2006 to February 17, 2006. Fieldwork consisted of TFC staff interviews, walkdowns, document reviews, and participation in TFC training. Team meetings were held daily to discuss strengths and weaknesses which were communicated to the TFC via daily debriefing meetings. The exit briefing was held on March 3, 2006, with senior TFC management and ORP line management.

5.0 ASSESSMENT RESULTS

A summary of the results of the assessment by assessment criterion is provided below. Detailed discussions, references, personnel interviewed, and additional considerations for the TFC are provided in Appendix A.

5.1. Criterion 1 – System Design

The performance objective and criteria for evaluating this objective are;

System design is consistent with specified functional requirements and design criteria. This may include confirming that:

- System meets the requirements of the DSA and TSR;
- Functional and design criteria for the system are clearly specified with documented bases and justification;
- Functional classification of the system components is appropriate;
- Verify the operability requirements for the system as described in the TSR are appropriate;
- Industry and TFC operating experience have been adequately factored into the design specification;
- Design and performance requirements are adequate to satisfy the principal function of the leak detection system and the SWPDS. The leak detection requirement would be to shut down the waste transfer pump in the event of waste transfer leak, loss of signal, or loss of

power. The SWPDS requirement would be to shut down the waste transfer pump in the event of backflow of waste in the raw water system, loss of signal, or loss of power. The MPSS interlock that is controlled by the leak detection system or SWPDS would be evaluated;

- The systems physical configuration matches the system documentation (drawings and Engineer Change Notices); and

- Adequate review has been completed and documented by the TFC to verify that the design is consistent with the specified functional requirements and design criteria (e.g., internal and independent design reviews, verification reviews of specific design products).

The SS systems meet the requirements described in Criterion 1 with the following exceptions:

- The SS SWPDS used when flushing the cross-site transfer system was not listed in the SDD for the RCSTS as a SS subsystem. The flushing of the RCSTS line is accomplished after completing waste transfers. The description of the SWPDS was described in the SDD for the 200 West Area Double-Shell Tank (DST) waste transfer system where the system is physically located. The TFC has acknowledged this deficiency and issued Problem Evaluation Request (PER) 2005-4219 to resolve the issue on the next SDD update.

- The functional test for SWPDS meets the requirements of the TSR, but the functional test procedure should clearly spell out that removing the power to the SWPDS also tests the system to simulate a loss of signal as well as loss of power. The DSA specifically states that each condition must be tested.

- TFC did not follow procedures required to incorporate Limiting Condition for Operation (LCO) 3.1.2 *Backflow Prevention Device*, Surveillance Requirement (SR) 3.1.2.5 into the RCSTS SWPDS Functional Test Procedure. The *Functional Test of the Replacement Cross-Site Transfer System Service Water Pressure Detection System in Valve Pit 241-SY-A*, TF-FT-059-003, Rev D-3, dated April 21, 2005, did not list SR 3.1.2.5. The SR requires the verification that the remote alarm indicator lamp illuminates when energized every 182 days when the SWPDS is used for backflow prevention.

- SR 3.1.2.5 was added to the TSRs in the ORP letter 04-TED-103 to the TFC on November 9, 2004[1]. The DSA Requirements Matrix[2] for Limited Conditions for Operations (LCO) 3.1.2

1 ORP letter from R. J. Schepens to E. S. Aromi, CH2M HILL, *"Approval of the Tank Farms Safety Basis (SB) Amendment-011 to Amend RPP-13033, Tank Farms Documented Safety Analysis (DSA), Revision 1-A and HNF-SD-WM-TSR-006, Tank farms Technical Safety Requirements (TSR), Revision 4-A,"* 04-TED-103, dated November 9, 2004.

2 CH2M HILL Operations Manual, *"Safety Basis Requirements Implementation Matrix,"*TFC-OPS-OPER-D-20, Rev. A-6, dated March 30, 2006.

Backflow Prevention Systems shows the functional test to be applicable but a review of the River Protection Project (RPP) Document Acceptance Review Forms showed no procedure change authorization.

- The TFC did not follow the requirements in *Technical Procedure Control and Use*, TFC-OPS-OPER-C-13, and *Safety Basis Implementation Checklist Preparation, Review, and Approval.* TFC-OPS-OPER-C-02 that require an evaluation of the procedure changes, changes to the DSA Requirements Matrix and incorporation of changes based on the field validation.

- The functional test procedure was found to include the steps to meet the requirements of SR 3.1.2.5 and those actions were performed as part of the functional test prior to the implementation of the SR. The reference to SR 3.1.2.5 to identify this procedure step as a TSR requirement was missing along with other notations to indicate an "Acceptance Criteria." This finding is an administrative oversight error rather than an operational omission. The SWPDS functional test for the AN, AW and AP Tank Farms also omitted the SR 3.1.2.5 requirements. The TFC issued PER-2006-1159 to correct the Function Test Procedure. The same deficiency was found in the AN, AW and AP Tank Farms SWPDS Functional Test Procedures and were corrected and verified. The follow-up meetings on the Finding showed the SE tracked the closure of the Finding using the PER process, completed the corrective action on June 29, 2006 and closed the PER on July 18, 2006. ORP verified the Finding closure to be complete on July 19, 2006.
- The MPSS shut down circuit has components that are not being used and have not been removed or isolated from the system or circuit. These inactive components are the four encasement pressure switches (PS-241-SY-SN-275, PS-241-SY-SN-276, PS-241-SY-SN-281, and PS-241-SY-SN-282) in the MPSS shut down circuit. The SE indicated the switches would be isolated.

- The process for meeting the WAC requirements in case of possible entrapment of waste in the secondary encasement from a leak of the primary line of the RCSTS is not described or specified in TFC plans or procedures. The recently completed 244-A bypass piping section had an Independent Qualified Responsible Professional Engineer's (IQRPE) report as well as a TFC Nonconformance Report (NCR) that did not address how to deal with the potentially trapped waste in the secondary encasement line and how to meet the requirement or obtain a waiver from the WAC-173-303 requirement to remove leaked waste from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

A Non-Conformance Report (NCR), PER, and an Engineering Change Notice (ECN) were submitted by the TFC to document and address a section of piping with a low point in the line that could trap 5 to 7 gallons of waste in the secondary piping in the event of a leak in the primary line. The ECN concludes that flushing of the stainless steel primary pipe with raw water is acceptable, but stipulates the use of flush water inhibited with 0.01M hydroxide nitrate if time

intervals between transfers exceed one year. The IQRPE reviewed the ECN and agreed with the TFC flushing solution, and certified his report. The TFC has stated that in the event of a leak the line would require more than 24 hours to remove the waste. No discussions on this issue have been addressed with the WAC.

Finding 1:

The TFC did not follow procedures required to incorporate LCO 3.1.2 *Backflow Prevention System,* SR 3.1.2.5 into the RCSTS SWPDS functional test.

Observation 1-A:

The SWPDS used when flushing the cross-site transfer system was not listed in the SDD for the RCSTS as SS system.

TFC ACTION: Closure of PER-2005-4219.

Observation 1-B:

The SWPDS functional test procedure does not clearly document how the safety function, loss of signal, is being met.

Observation 2:

The process for meeting the WAC requirements in case of possible entrapment of waste in the secondary encasement from a leak of the primary line of the RCSTS is not described or specified in TFC plans or procedures.

Observation 3:

The MPSS shut down circuit has components that are not being used and have not been removed or isolated from the system or circuit.

5.2. Criterion 2 – System/Component Procurement

The performance objective and criteria for evaluating this objective are; System hardware is procured to applicable design and performance requirements including designation of quality level and safety classification. The review may include:

- Hardware specifications and supporting calculations and analyses;
- Vendor analysis and quality records;
- Failure modes and effects analyses (e.g., system response to the pressure sensor failure);

- Acceptance test procedures; and
- Operational test procedures.

The criteria for this CRAD have been met. The leak detector and relay vendor information was reviewed and found to meet the requirements for safety significant systems. The acceptance tests for the 244-A by-pass section were reviewed and the design was found to meet the functional requirements.

5.3. Criterion 3 – System Installation, Testing, and Operation

The performance objective and criteria for evaluating this objective are; The system was installed and tested and is maintained adequately and operated to meet operability requirements, including confirmation that requirements and acceptance criteria for installation, post-modification and surveillance testing are consistent with the design bases of the system. This criterion may include review of:

- TSR are being met;
- Installation quality records;
- In-situ component and system functionality test reports;
- Commissioning reports;
- Vendor technical requirements that may include operating parameters;
- Maintenance manuals;
- System maintenance records;
- Surveillance test procedures and test reports;
- Operating history to-date, this may include discussion with the System Engineer;
- System functional testing;
- Contractor personnel have been adequately trained and qualified to ensure the system will perform its design function;
- Operations Procedures; and
- Maintenance Procedures.

The SS systems meet the requirements described in Criterion 3 with the following exceptions:

- Replacement options for the SS relays used for the MPSS and LDS that are no longer being manufactured have not been evaluated. The TFC has enough replacement relays to last for about 5 years. A program needs to be developed to provide replacements in a timely manner so no interruption in service occurs since the replacement components will require time for development, procurement, installation, testing, and certification.

- The training manual and the alarm response procedure for the RCSTS leaks does not provide information on the SS leak alarm. The training manual and alarm response procedure refer to the MCS that is a non-safety significant, DID system for notifying the operator of a leak. The training manual, *Respond to Alarms for the Cross-site Transfer Line System*, ARP-T-059-00001, Rev C-1, dated August 1, 2005, and the class instruction indicated the cross-site system would shut down automatically if the 200 East MPSS tripped. While this information is technically correct, the MCS system is not the SS alarm function credited in the DSA. The training manual and alarm response procedure should describe the relay based SS system that requires communications with the operator in the 241-SY-271, Instrument Building for the RCSTS MPSS shut down or the operator in the 242-A Evaporator for a 200 East Tank Farms MPSS shut down. The 242-S MCS Operator response to an alarm is to verify the SS system is an alarm and to notify the cross-site Operator Engineer to shutdown the transfer pump. The student training handout, Replacement *Cross-site Transfer Line System (RCSTS) Student Handout, Course Number 350033*, Rev 01a, dated February 1, 2006, needs to be updated. The student handout fails to show the Tank pit AN-01A termination point on the transfer line.

- There is not separation of SS and non-safety related components in shutdown circuits of the MPSS. The reliability of the shutdown circuit can be adversely affected by having non-safety related components in the circuit. The SS RCSTS has nine SS elements but the non-safety related DID encasement leak detection and the 200 East Area leak detection system increases the number of elements to over 170. DOE guidance in the *Nonreactor Nuclear Safety Design Criteria And Explosives Safety Criteria Guide For Use With DOE O 420.1A, Facility Safety*, DOE G 420.1-1, recommends minimizing interfaces between safety class, safety significant and non-safety SSCs. DOE O 420.1, *Facility Safety*, addresses only the reliability of the systems when called upon; historically, the RCSTS meets the reliability requirement mainly because the system is only used upon demand and for short durations. The reliability of the RCSTS could become a factor with a higher frequency of use and long run times.

Observation 4:

The training manual and the leak alarm response procedure for RCSTS does not provide information on the SS alarm. The training manual and alarm response procedure refers to the MCS that is a non-SS, DID system for notifying the operator of a leak.

Observation 5-A:

There is not separation of SS and non-safety related components in shutdown circuits of the MPSS.

Observation 5-B:

Replacement options for the SS relays used for the MPSS and LDS that are no longer being manufactured have not been evaluated.

5.4. Criterion 4 – System Engineer Performance

The performance objective and criteria for evaluating this objective are:

- The contractor System Engineer is ensuring continued operational readiness of the system;
- The System Engineer can identify the system elements and their functions;
- The System Engineer understands the DSA and TSR requirements for their system;
- How configuration management is being used for the safety system;
- How Integrated Safety Management System is being implemented;
- How the System Engineer is responsible and accountable for the adequacy of the safety system;
- The adequacy and quality of the System Engineer walk downs, surveillances and assessments of the system;
- The System Engineer adequately demonstrates knowledge of the existing material/operational conditions of the system;
- Oversight of system modifications, maintenance and repair being performed to ensure system performance is not compromised;
- Material condition of the system is evaluated and documented;
- Corrective actions plans are prioritized, tracked and completed;
- Action to complete overdue work packages; and
- The System Engineer notebook is maintained, organized and accessible.

The criteria for this CRAD have been met. The SE gave a briefing on the elements of the RCSTS, provided narration during a walk down of the system and answered questions relating to the system to demonstrate appropriate knowledge of system elements and functions. The SE demonstrated excellent understanding of DSA and TSR requirements for the RCSTS, which was demonstrated in discussion and review of system and procedural documents. This information was also posted on the SE notebook website. Configuration management of safety significant components for the RCSTS is implemented through the control of drawings. Documents undergo a review process and are updated by ECN.

Development of the DSA and TSRs are through an ISMS process. Changes to current procedures or configuration use inputs from engineers and field personnel. These are incorporated, reviewed and implemented. Input from field operators is returned and is incorporated in future changes for continuous improvement. This is documented online in the SE notebook website. Post-Maintenance Testing of the safety significance is performed to determine the extent of modifications, maintenance and repair actions. Existing functional test procedures are used to ensure requirements of the DSA are met. The results of these tests are documented on the SE logbook website.

6.0 CONCLUSIONS

The assessment team found reasonable assurance that the TFC is maintaining the RCSTS supernate line and the newly installed 244-A Lift Station bypass line in a condition that ensures its operability in accordance with appropriate system functional requirements, design criteria, WAC requirements, and meets the requirements of the DSA, and the TSR.

The SE for this system was very knowledgeable of the system, had ownership of the system and was helpful in providing documentation and guidance to effectively evaluate the cross-site system. The SE met the requirements of DOE O 420.1A, *Facility Safety*.

The SS Master Pump Shutdown System (MPSS) has many non-safety related components that are not separated from the nine SS components of the system. This is not consistent with the guidance of DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide for Use with DOE O 420.1, Facility Safety*. As suggested by the guide, commingling of safety-related and non-safety related components can have an adverse impact on system reliability and availability. Additionally, the SS relays used in the MPSS are no longer being manufactured and the TFC has only enough spares to last for approximately 5 years. A program needs to be developed to provide replacements of the SS relays in a timely manner to maintain reliability and performance of the RCSTS.

The follow-up meetings on the Finding showed the SE tracked closure using the Problem Evaluation Request (PER-2006-1159), completed the corrective action on June 29, 2006 and closed the PER on July 18, 2006. ORP verified the Finding closure to be complete on July 19, 2006 and the Observations are in varying degrees of completion.

This review resulted in 1 Finding and 7 Observations:

Finding

The TFC did not follow procedures requiring incorporation of LCO 3.1.2 *Backflow Prevention Systems*, SR 3.1.2.5 into the RCSTS SWPDS functional test procedure.

Observations

- The SS SWPDS used when flushing the cross-site transfer system was not listed in the SDD for the RCSTS as a sub-system (Observation 1-A).

- The training manual and the alarm leak response procedure for the RCSTS does not provide information on the SS alarm. The training manual and alarm response procedure refers to the MCS, which is a non-SS, DID system for notifying the operator of a leak (Observation 4).

- There is not separation of safety related and non-safety related components in shutdown circuits of the MPSS (Observation 5-A).

- The process for meeting the State of Washington requirements in case of possible entrapment of waste in the secondary encasement from a leak of the primary line of the RCSTS is not described or specified in TFC plans or procedures (Observation 2).

- Replacement options for the SS relays used for the MPSS and LDS that are no longer being manufactured have not been evaluated (Observation 5-B).

- The MPSS shut down circuit has components that are not being used and have not been removed or isolated from the system or circuit (Observation 3).
- The SWPDS functional test procedure does not clearly document how the safety function, loss of signal, is being met. (Observation 1-B).

7.0 REFERENCES

References and personnel contacted for each CRAD are listed in Appendix A.
Team Member Qualification Summaries are listed in Appendix B.

APPENDIX A

CRITERIA REVIEW AND APPROACH DOCUMENTS

U.S Department of Energy (DOE), Office of River Protection (ORP) Replacement Cross-site Transfer System Leak Detection Technical Evaluation Results

Criterion 1 – System Design

- System hardware is procured to applicable design and performance requirements including designation of quality level and safety classification.
- Pump shut down circuit review.
- System design is consistent with specified functional requirements and design criteria.

Records Reviewed/Personnel Contacted

1. H-2-822402, Process & Instrumentation Diagram SY Valve Pits, Sheet 1, Rev. 12.
2. H-2-37735, Electrical Elementary Diagrams, Sheet 2, Rev. 20.
3. H-2-822442, Electrical Elementary Diagram Pump P-102-SY-02A, Sheet 1, Rev. 6.
4. H-2-822440, Instrumentation Relay Cabinet Elementary Diagram, Sheet 2, Rev. 0.
5. H-6-14018, Electrical Elementary Diagrams vent Station 6241-V, Sheet 3, Rev. 3.
6. H-2-822513, Electrical Elementary Diagrams Diversion Box 6241-A, Sheet 4, Rev. 3.
7. RPP-15136, System Design Description for Cross-site Transfer System between 200 West and 200 East Tank Farms, Rev. 2.
8. The System Engineer discussed system electrical drawings and traced out the circuits.
9. Tank Farm Functional Test of the RCSTS SWPDS, TF-FT-059-003, Rev D-3, dated April 21, 2005.
10. ORP letter from R. J. Schepens to E. S. Aromi, CH2M HILL, “Approval of the Tank Farms Safety Basis (SB) Ammendment-011 to Amend RPP-13033, Tank Farms Documented Safety Analysis (DSA), Revision 1-A and HNF-SD-WM-TSR-006, Tank Farms Technical Safety Requirements (TSR), Revision 4-A,” 04-TED-103, dated November 9, 2004.
11. Technical Procedure Control and Use, TFC-OPS-OPER-C-13.
12. Safety Basis Implementation Checklist Preparation, Review, and Approval, TFC-OPS-OPER-C-02.
13. *Washington Administrative Code (WAC) 173-303 and DOE O 6430.1A, Section 1300-7*
14. *System Design Description for the RCSTS between 200 West and 200 East Tank Farms,* RPP-15136, Rev 2.

15. *Functional Design Criteria For Project W-058 Replacement Of The Cross Site Transfer System*, SD-W058-FDC-001

16. *W-314 Functional And Design Requirements*, HNF-SD-W314-DRD-004 Rev. 4

17. *Design Technical Requirements And Basis*, HNF-SD-W314-PDS-001, Rev 4

18. Safety Equipment List (SEL), Document RP-8792, Rev. 9, *Subsystem and Component Level Safety Equipment List for Tank Farms Safety Systems.*

19. *W-58 Acceptance for Beneficial Use* (ABU), HNF-SD-W058-ABU-001, Rev. 1.

20. ABU document RPP-7584 Rev. 1, *Project W-314 Tank Farm Restoration and Safe Operation, Waste Transfer System Acceptance for Beneficial Use.*

21. Nonconformance Report, CH-05-NCR-010.

22. Problem Evaluation Request, PER-2005-2422.

23. Engineering Change Notice, ECN 723344.

24. Construction Specification W314-C7A Section 15493.

25. HNF-4161, Rev. 2-C, *Project W-314 Requirements Deviations.*

26. Project W-314 200 East Waste Transfer System Cross Site Tie-in Interim Independent Integrity Assessment Report.

27. System Design Description (SDD) for Cross-site Transfer, RPP-15136.

28. SDD for 200 West Area Transfer, RPP-15138.

29. Tank Farms TSR, HNF-SD-WM-TSR-006 Rev 4-M.

30. Tank Farms DSA, RPP-13033 Rev. 1.

31. Tank Farms Functional Test of the RCSTS SWPDS, TF-FT-059-003.

32. 241-SY Pressure Switch Functional Test (09/13/03), 2W-03-01006/P.

33. Safety Equipment List (SEL), RPP-8792.

34. Drawings: H-2-822409 Rev 11, H-2-822291 Rev 2, H-14-030031 Rev 6, H-2-822442 Rev 6, H-2-37735 Rev 20, H-2-822402 Rev 12.

35. Occurrence report: RP-TFC-TANKFARM-2004-0017.

36. AMETEK Pressure Transmitter Operation Manual.

Discussion of Results

Drawings were reviewed to ensure the system can operate as required in the DSA and TSR. All safety significant leak detectors are on the pump shut down circuit. The SWPDS circuits are on the shut down circuit including two valve alignment switches. The Defense-In-Depth (DID) encasement leak detectors are on the shut down circuit.

The shut down circuit has encasement pressure switches PS-241-SY-SN-275, PS-241-SY-SN-276, PS-241-SY-SN-281, and PS-241-SY-SN-282. These pressure switches are no longer used and the System Engineer indicated they could be removed.

DOE G 420.1-1, Section 5.1.2.2 states:

> *"A nuclear safety design goal is to minimize interfaces between safety-class, SS and nonsafety SSC's. These interfaces must be evaluated to identify SSC failures that would prevent the safety SSCs from performing their intended safety function."*

Tank Farm Functional Test of the RCSTS SWPDS in Valve Pit 241-SY-A, TF-FT-059-003, Rev D-3, dated April 21, 2005, did not list TSR Surveillance Requirement (SR) 3.1.2.5 as a surveillance requirement. SR 3.1.2.5 requires the verification that the remote alarm indicator lamp illuminates when energized every 182 days when the SWPDS is used for backflow prevention.

SR 3.1.2.5 was added to the TSR in letter 04-TED-103, from ORP to CH2M HILL, dated November 9, 2004. The DSA Requirements Matrix for LCO 3.1.2 *Backflow Prevention Systems* shows the functional test to be applicable but a review of River Protection Project Document Acceptance Review Forms showed no procedure change authorization.

TFC did not follow *Technical Procedure Control and Use,* TFC-OPS-OPER-C-13, and *Safety Basis Implementation Checklist Preparation, Review, and Approval,* TFC-OPS-OPER-C-02, which requires an evaluation of the procedure change, to change the matrix and incorporate the changes based on the field validation. This would also include adequate training prior to implementation.

The functional test procedure had the steps to meet the requirements of SR 3.1.2.5 as those actions were performed as part of the functional test prior to the implementation of the surveillance requirement but was missing the reference to SR 3.1.2.5 and other notations to indicate an "Acceptance Criteria." The Finding is an administrative oversight error rather than an operational omission. The other SWPDS listed on the matrix requiring updates were either inactive or required the changes. The TFC will be required to evaluate those systems.

The SWPDS meets the requirements of the TSR to physically disconnect outside raw water from the RCSTS. The functional and design criteria for the system are clearly specified with documented bases and justification. The functional test for the SWPDS meets the requirements of the TSR, but the functional test procedure should clearly spell out that removing the power to the SWPDS also tests the system to simulate a loss of signal as well as loss of power. The DSA specifically states that each condition must be tested, so the basis for this needs to be stated or referenced as well.

The SDD for the RCSTS (RPP-15136) did not include relevant information about SWPDS, although it was described in the SDD for 200 West Area Transfer (RPP-15138). It is appropriate to include it in the SDD for the RCSTS as it used in operation of this system.

The functional classification of the system components is appropriate. Designation of SWPDS as a Safety Significant Structures, Systems and Component (SSC) is appropriate, given its role in reducing the frequency or the consequence of a Waste Transfer Leak. Verification of the operability requirements for the system as described in the TSR is appropriate.

Operability requirements from the TSR for the SWPDS are:

> *For a service water pressure detection system to be considered (continued) OPERABLE, it must have reasonable integrity and be configured (e.g., valve alignments) such that the backflow of WASTE causes a rise in pressure in the associated piping that can be detected. This pressure set point must be < 20 lb/in2 gauge, and must actuate an alarm in a location that is monitored. It may also initiate an automatic WASTE transfer pump shutdown if it is connected to a MPSS. The < 20 lb/in2 gauge set point is based on operational experience to prevent spurious detection system actuation. The set point is also below the minimum pressure used for testing system integrity (see SR 3.1.2.3).*
>
> *The plant electrical distribution system is identified as a support system for the service water pressure detection system and for the MPSS (when the MPSS is used to provide an interlock function with the WASTE transfer pump). Although continuous electrical power is not required because alarms and interlocks will fail to the alarm state, loss of electrical power to the service water pressure detection system constitutes an inoperable condition for that system. The LCO Note allows the service water pressure detection system to be inoperable for < 30 minutes during local WASTE transfer pump priming or flushing for operational flexibility. Service water pressures greater than 20 lb/in2 gauge are needed to prime jet pumps and for flushing activities. Therefore, the set point could be exceeded and the Note is required to continue the activities. Other PHYSICALLY CONNECTED WASTE transfer pumps can continue to operate for < 30 minutes while the service water pressure detection system is inoperable.*
>
> *LCO The 30-minute time allowance in the Note does not significantly increase the likelihood of a pressurized leak. The activities are manned, for short durations (i.e., less than 30 minutes), and include several indications that the activity is successful, with no WASTE being misrouted. These indications may include: Hoses and connections visible by the operator; an in-line water meter, which is functionally tested at each use, displaying the flow direction in the flush line; pump pressure instrumentation showing the flush water reaching its destination; and the service water pressure detection switch is VERIFIED as operational when it goes from a clear to an activated state at the start of the activities.*
>
> *Once the pump priming or flushing activities are complete, the service water pressure detection system is cleared to < 20 lb/in2 gauge and becomes OPERABLE. The local transfer pump cannot be started until the service water pressure detection system is OPERABLE.*

The operability requirements for the SWPDS in the RCSTS were appropriate to reduction of the frequency or consequence of a waste transfer leak in the system. Industry and TFC operating experience have been adequately factored into the design specification. Previous transfers using the RCSTS have been documented and are available in the System Engineer's (SE) notebook to review past operations.

Design and performance requirements are adequate to satisfy the principal function of the Leak Detection System (LDS) and the SWPDS. The LDS requirement would be to shut down the waste transfer pump in the event of waste transfer leak, loss of signal, or loss of power. The

SWPDS requirement would be to shut down the waste transfer pump in the event of backflow of waste in the raw water system, loss of signal, or loss of power. The Master Pump Shutdown System (MPSS) interlock that is controlled by the LDS or SWPDS would be evaluated.

The SWPDS design and performance requirements were met with the components that are used. The functional testing of these components, as spelled out in the Functional Test Procedures will ensure that the TSR are met and the components make up an operable SWPDS.

Conclusion

Having non-safety, safety system controls (encasement pressure switches) combined with safety system controls contributes to the degradation of the safety significance due to higher occurrences of system shutdowns.

TFC did not follow the documents *Technical Procedure Control and Use*, TFC-OPS-OPER-C-13, and *Safety Basis Implementation Checklist Preparation, Review, and Approval*, TFC-OPS-OPER-C-02, which requires an evaluation of the procedure change, change the matrix and incorporate the changes based on the field validation. This would also include adequate training prior to implementation.

The functional test procedure was found to include the steps to meet the requirements of SR 3.1.2.5 and those actions were performed as part of the functional test prior to the implementation of the SR. The reference to SR 3.1.2.5 to identify this procedure step as a TSR requirement was missing along with other notations to indicate an "Acceptance Criteria." This finding is an administrative oversight error rather than an operational omission. The SWPDS functional test for the AN, AW and AP Tank Farms also omitted the SR 3.1.2.5 requirements. The TFC issued PER-2006-1159 to correct the Function Test Procedure. The same deficiency was found in the AN, AW and AP Tank Farms SWPDS Functional Test Procedures and were corrected and verified. The follow-up meetings on the Finding showed the SE tracked the closure of the Finding using the PER process, completed the corrective action on June 29, 2006 and closed the PER on July 18, 2006. ORP verified the Finding closure to be complete on July 19, 2006.

Area(s) for the TFC to follow-up

Remove or isolate elements not being used in the MPSS.

Criterion – 2 System/Component Procurement

System hardware is procured to applicable design and performance requirements including designation of quality level and safety classification.

Records Reviewed/Personnel Contacted

1. HNF-SD-ABU-001, Rev 1.
2. RPP-7564 Rev. 1.

Discussion of Results

W-058 section was accepted for beneficial use via HNF-SD-ABU-001, Rev 1, released in June 1998. It documents completion of Acceptance Test Procedures and Reports, and Pre-Operational and Operational Test Procedures and Reports.

Approved W-314 sections were accepted for beneficial use via RPP-7564 Rev. 1. These documents were approved following reviews during the definitive design phase (prior to construction).

Conclusion

No issues.

Area(s) for the TFC to follow-up

None

Criterion – 3 System Installation, Testing, and Operation

The system was installed and tested and is maintained adequately and operated to meet operability requirements, including confirmation that requirements and acceptance criteria for installation, post-modification and surveillance testing are consistent with the design bases of the system.

Records Reviewed/Personnel Contacted

1. Functional Test of the RCSTS LDS, TF-FT-059-002, Rev D-0, November 2, 2005.
2. Calibrate the Diversion Box and Vent Station Sump Pump Leak Detection Elements, 6-LDD-275, Rev. C-1, September 1, 2004.
3. Vendor Information: Model 8-66 Liquid Level/Interface Controller, Maintenance manual.
4. 8-66B Data Sheet.
5. Functional Test of the RCSTS SWPDS in Valve Pit 241-SY-A, TF-FT-059-003, Rev D-3, April 21, 2005.
6. Respond to Alarms for the Cross-site Transfer Line System, ARP-T-059-00001, Rev C-1, August 1, 2005.
7. RCSTS Student Handout, Course Number 350033, Rev 01a, February 1, 2006.
8. Instructor TFC.
9. H-2-37735, Electrical Elementary Diagrams, Sheet 2, Rev. 20.
10. HNF-SD-ABU-001, Rev 1, release June 1998.
11. Acceptance Test Procedures and Reports, and Pre-Operational and Operational Test Procedures and Reports. HNF-SD-W058-ATR-001.
12. Functional Test of the RCSTS LDS, TF-FT-059-002.
13. Sub-test Plan for Waste Transfer System W-314-STP-1.2 Rev. 0.

Discussion of Results

Record 3 shows the thermo-conductivity probes as intrinsically safe and for corrosive environments

Discussions on the Master Tracking List (MTL) and B/W relays indicate they are no longer being manufactured. TFC has enough replacement relays for about five years. A replacement needs to be found and TFC indicated that they were working on the issue.

Team participated in the RCSTS operator training for alarm responses. The training was thorough, presentation was complete, handouts were beneficial, and the test was comprehensive.

Reference 1, Pg. 6, 200 East MPSS.

The document and instruction indicated the cross-site system would shut down automatically if the 200 East MPSS tripped. The routing was through PCU-4 which is connected by Programmable Logic Controllers (PLC) to PCU-1 and then to the Operator Control Station (OCS). The PLC is not a credited system for the cross-site shutdown but as DID. The credited system is the relay-based system that is independent of the PLC and the automated system being monitored at the OCS. The proper notification of a 200 East area leak detector alarm would be from the operator at the 242-T Evaporator to the cross-site pump operator.

The last revision to Reference 1 was in August 2005 and the changes to the cross-site system were not in this document.

The student handout also needs to be updated. The student handout needs to show the AN-01 termination point) page 17, and replace the views of the 244-A Lift Station with AN-01 screen views.

W-058 section – the components were accepted for beneficial use via HNF-SD-ABU-001, Rev 1, release June 1998. It documents completion of Acceptance Test Procedures and Reports, and Pre-Operational and Operational Test Procedures and Reports. HNF-SD-W058-ATR-001, Acceptance Test Report, documents the Acceptance Tests Procedures test results for the LDS; all were completed satisfactorily. Procedures for maintaining and performing functional test of the LDS were found in 3-MISC-295, Functional Check of the Cross-site Transfer Line Leak Detection Computer Generated interlocks and TF-FT-059-002, Functional Test of the RCSTS LDS.

W-314 section – testing of the new continuous leak detection cable in accordance with the Sub-Test Plan for Waste Transfer System W-314-STP-1.2 Rev. 0, was completed and accepted. The component vendor was involved in the testing. The test involved the entire system since there were connectors on the old section that required replacement and re-testing. These test results, as well as the process and results of the recently completed encasement drying operations of the old section will be documented on a Test Results Report (TRR) in the near future.

Conclusion

The system is installed tested and operated to meet the DSA and TSR requirements but as the components become obsolete, the contractor must have a replacement plan in place for a smooth transition, as there are more stringent requirements when replacing Safety Significant components.

The instructor discussed the changes from the 244-A Lift Station to the AN-01A pit but the training materials did not accurately reflect the changes. The alarm response needs to address the Safety Significant leak detection and SWPDS systems and the training manual need updating to show the Safety Significant system.

Area(s) for the TFC to follow-up

Provide DOE information on the number of MTL and B/W relays in stock, replacement rate of the relays, replacement relay design concept and the schedule to switch to the new replacements.

Reference 1 needs to be revised to show the correct steps to shut down the cross-site transfer pump if the 200E MPSS goes into alarm. Operators that require the cross-site alarm procedure training would be required to take additional training on the changes. The alarm response needs to address the Safety Significant leak detection and SWPDS systems and the training manual need updating to show the Safety Significant system.

Discussion of Results

244-A Bypass - Functional and design criteria for the system are clearly specified with documented bases and justification.

The following document clearly specifies the functional criteria, RPP-15136 Rev. 2, titled, *System Design Description for the Replacement Cross-Site Transfer System Between 200 West and 200 East Tank Farms,* functional criteria for encasement leak detection is provided on section 3.1.1.3 "Environmental Protection Function," as follows;
Requirement: The RCSTS shall be designed to mitigate the consequences of any accidental releases/leakage.

Basis: WAC 173-303 and DOE O 6430.1A, Section 1300-7.

How Requirement is Met: Continuous leak-detection cables are provided in the annular region between the primary piping and the encasement piping. Detection of a leak in the system provides a shutdown signal to the transfer pumps to terminate the leakage source. Leakage in the pipe annulus is channeled to the diversion box for collection and transfer to the double-shell tanks. The diversion box and vent station are provided with leak detection, sump pumps, a wash-down system, and an emergency pump-out connection to mitigate accidental releases/leakage. The diversion box and vent station are closed structures equipped with Hi-Efficiency Particulate Air breather filters to mitigate airborne release of leakage.

Specific WAC-173-303 requirements are the following:

(iii) Provided with a leak-detection system that is designed and operated so that it will detect the failure of either the primary or secondary containment structure or the presence of any release of dangerous waste or accumulated liquid in the secondary containment system within twenty-four hours, or at the earliest practicable time if the owner or operator can demonstrate to the department that existing detection technologies or site conditions will not allow detection of a release within twenty-four hours; and

(iv) Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within twenty-four hours, or in as timely a manner as is

possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated precipitation cannot be accomplished within twenty-four hours

The design criteria were found on document, SD-W058-FDC-001, Title: FDC FOR PROJECT W-058 REPLACEMENT OF THE CROSS SITE TRANSFER SYSTEM. Section 3.0 Design Criteria. Subsection 3.8 Instrumentation, states, *"Leak detection devices shall be provided to detect leaks from the primary pipe to the secondary pipe, diversion box, and vent station. Monitoring instrumentation shall be capable of detecting the failure of the containment system within 24 hours as required by WAC 173-303-640. (The system shall be capable of testing the integrity of the secondary pipe periodically to ensure that a primary pipe leak will be contained in the secondary pipe). The design shall incorporate a remote alarm system to facilitate quick and safe transfer shutdowns if the primary containment pipe is breached."*

HNF-SD-W314-DRD-004 Rev. 4, documents the project W-314 functional and design requirements, as stated in the Section 1.3 as listed in: Section 3.2.1.3.2.1, "Confine Waste Leakage within the Transfer Associated Structures," section 3.2.1.3.2.2 "Contain Leakage Within Transfer Piping Encasement," and section 3.3.1.2 "Secondary Containment Monitors," provide the leak detection requirements. Section 3.3.1.11 "Underground Piping" includes requirements for secondary containment as specified in WAC 173-303-640. Design technical requirements and basis were found in HNF-SD-W314-PDS-001, Rev 4, Table B-1, "Function Number and Name," paragraphs 3.1.5 Confine Waste Within Transfer Piping, 3.1.6; "Confine Flush within Transfer Piping," 3.2.2.1 "Confine Leakage Within Encasement."

The Cross-site Transfer System encasement leak detection leak system is properly classified in the SEL, Document RP-8792, and Rev. 9, *Subsystem and Component Level Safety Equipment List for Tank Farm Safety Systems*. Since the DSA does not credit this system for the prevention of postulated accidents, it is not included in the SEL.

Not designed to satisfy TSR requirement

Design specifications drew from contractor existing operating experience, as evidenced by design requirements basis references to past technical documents and operating experience.

The environmental protection function of the continuous LDS is identified in the requirements documents for operating the existing RCSTS and new W-314 section of the RCSTS. Specific requirements to shut down the waste transfer pump in the event of a waste transfer leak or loss of signal or power is also provided. RPP-15136, Rev.2, *System Design Description for the Replacement Cross-Site Transfer System 200 West and 200 East Tank Farms,* includes the following requirement under section 3.1.2.2 Environmental Protection Function, "The RCSTS shall be designed to detect leaks from the primary pipe." Under section 3.1.5 Operability, it states,

The MPSS shall be considered Operable if the following requirements are demonstrated:

Requirement: The MPSS shall cause associated waste transfer pump contactor(s) to open when an alarm signal is received from the Transfer LDS.

Basis: RPP-13033, Chapter 4, Section 4.4.9.4.1, Performance Criteria 1, HNF-SD-WM-TSR-006, LCO 3.1.1.

How Requirement is Met: The MPSS is designed to meet this requirement. When the MPSS is required to be Operable, functional testing is performed every 182 days to verify that system alarms actuate causing associated waste transfer pump contactors to open when the leak detector is actuated (TSR SR 3.1.1.4).

Requirement: The MPSS shall cause associated waste transfer pump contactors to open upon loss of signal from the LDS, or loss of power.

Basis: RPP-13033, Chapter 4, Section 4.4.7.4.3, "Performance Criteria 3," and HNF-SD-WM-TSR-006, LCO 3.1.2.

How Requirement is Met: The MPSS is designed to meet this requirement. When the MPSS is required to be operable, functional testing is performed every 182 days to verify that associated waste transfer pump contactor(s) open for the alarm conditions; loss of power (TSR SR 3.1.1.4); loss of signal (TSR SR 3.1.1.4).

Confirmed by review of the project W-58 ABU, HNF-SD-W058-ABU-001, Rev. 1, page 4, indicates for As-built Drawings, "Field Verification and As-Building Complete."

Confirmed for the W-314 portion (except for a small section close to the 244-A lift station) by review of its ABU document RPP-7584 rev. 1, *Project W-314 Tank Farm Restoration and Safe Operation, Waste Transfer System Acceptance for Beneficial Use*. The "Engineering Final Design Checklist" on page C-3, and "Construction Completion Document," section 1a, through IIb, completion of exceptions, provides documentation for this portion.

A Non-Conformance Report, CH-05-NCR-010, a PER-2005-2422, and an ECN 723344, were recently submitted to document and address a section of piping with negative slope, (a section of W-314 piping, connecting to the exiting W-058 portion at the 244A lift station).

Issue): The PER describes the problem as, "Fluor Government Group survey results report a reverse slope of approximately 1-5/8" for SNL-1360 (should de SLL-3160) and 1-1/8" for SNL-3150". See attached survey report. This results in a low point of approximately 5-7 gallons of trapped liquid. See attached "Design Analysis" dated 6-16-2005 from FGG. Construction specification W314-C7A Section 15493, paragraph 3.1.2.2 does not allow any traps. The ECN provides a solution that flushing of the stainless steel primary pipe with raw water is acceptable and use of flush water inhibited with 0.01M hydroxide nitrate if time intervals between transfers exceed 1 year. A W-314 document, HNF-4161, rev. 2-C, Project W-314 Requirements Deviations was prepared to reflect the requirements for this deviation. The Independent Qualified Responsible Professional Engineer's (IQRPE) "Project W-314 200 East Waste

Transfer System Cross Site Tie-in Interim Independent Integrity Assessment Report", addresses the issue in section 2.3 "Non-Conformance Condition". The report agrees the CH2NHill flushing solution, and certified his report.

The IQRPE report, as well as the TFC NCR did not address how to deal with the potentially trapped waste in the secondary piping and how to meet the requirement or obtain waiver for the WAC-173-303 requirement to remove leaked waste from secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated precipitation cannot be accomplished within twenty-four hours.

Adequate review has been completed and documented by the TFC to verify that the design is consistent with the specified functional requirements and design criteria e.g., internal and independent design reviews, verification reviews of specific design products.

W-058 section was accepted for beneficial use via HNF-SD-ABU-001, Rev 1, release June 1998.

Approved W-314 sections were accepted for beneficial use via RPP-7564 Rev. 1.

These documents were approved following reviews that the design meets the functional requirements.

Conclusion

The PER describes the problem as, "Fluor Government Group Inc. survey results report a reverse slope of approximately 1-5/8" for SNL-1360 (should be SLL-3160) and 1-1/8" for SNL-3150." This results in a low point of approximately five to seven gallons of trapped liquid. Construction specification W314-C7A Section 15493, paragraph 3.1.2.2 does not allow any traps. The Engineer Change Notice (ECN) provides a solution that flushing of the stainless steel primary pipe with raw water is acceptable and use of flush water inhibited with 0.01M hydroxide nitrate if time intervals between transfers exceed one year. A W-314 document, HNF-4161, Rev. 2-C, Project W-314 Requirements Deviations were prepared to reflect the requirements for this deviation. The Independent Qualified Responsible Professional Engineer's (IQRPE), *Project W-314 200 East Waste Transfer System Cross Site Tie-in Interim Independent Integrity Assessment Report*, addresses the issue in section 2.3 "Non-Conformance Condition." The report agrees with the TFCs flushing solution, and certified his report.

The IQRPE report, as well as the TFC NCR did not address how to deal with the potentially trapped waste in the secondary piping and how to meet the requirement or obtain a waiver for the WAC-173-303 requirement to remove leaked waste from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated precipitation cannot be accomplished within twenty-four hours.

The functional test procedure should clearly spell out that removing the power to the SWPDS also tests the system to simulate a loss of signal as well as loss of power.

Area(s) for the TFC to follow-up

Discuss with the State of Washington Department of Ecology the WAC 173-303 requirements and the issue of removing waste from the secondary encasement line in the event of a primary line leak.

Change the functional test to indicate loss of signal and loss of power.

Criterion – 4 System Engineer Performance

The contractor System Engineer is ensuring continued operational readiness of the system.

Records Reviewed/Personnel Contacted

1. System Engineer, February 16, 2006.
2. Waste Feed Operations Instrumentation System, System Engineer Notebook (Computer-based, site address: http://idmsweb/idmsprod/livelink.exe/fetch/2000/60627/60851/121199/4504396/3318002/3318339/index.htm?nodeid=3318404&vernum=2)

Discussion of Results

The System Engineer can identify the system elements and their functions.

The System Engineer gave a briefing on the elements of the RCSTS, provided narration during a walk down of the system and answered questions relating to the system to demonstrate appropriate knowledge of system elements and functions.

The System Engineer understands the DSA and TSR requirements for their system.

The System Engineer demonstrated excellent understanding of DSA and TSR requirements for the RCSTS, which was demonstrated in discussion and review of system and procedural documents. This information was also posted on the System Engineer logbook website.

Configuration management of Safety Significance for the RCSTS is implemented through the control of drawings. Documents undergo a review process and are updated by ECN. ECN's are incorporated into drawings within a timeframe that is dependent upon their classification as Essential, Support, or General drawings. The latest revisions of all drawings are maintained on the Hanford Document Control System to which access is limited.

Development of the DSA and TSRs are through an Integrated Safety Management System process. Changes to current procedures or configuration use inputs from engineers and field personnel. These are incorporated, reviewed, and implemented. Input from field operators is returned and is incorporated in future changes for continuous improvement. This is documented online in the System Engineer notebook website.

The System Engineer ensures that the DSA covers the scope of work. He ensures that new equipment meets DSA requirements during ECN reviews. The System Engineer reviews functional test procedures to ensure that DSA requirements are met. As required by the Shift Manager, the System Engineer performs operability evaluations on the RCSTS prior to start of transfer.

Walk downs are completed weekly and cover all aspects of RCSTS components. Quarterly Comprehensive Walk downs (equivalent to surveillances and assessments) are performed every 90 days. Quarterly Comprehensive Walk downs are performed in accordance with Conduct of System Engineering procedures, accessible online in the Engineers Toolbox. All of these walk downs, surveillances and assessments are documented online in the System Engineer notebook website.

The System Engineer demonstrated existing system conditions in briefing the first day of this assessment and further showed this documented online at the System Engineer notebook website.

Post-Maintenance Testing is performed to determine the extent of modifications, maintenance and repair actions. Existing functional test procedures are used to ensure requirements of the DSA are met. The results of these tests are documented on the System Engineer logbook website.

Material condition of the system is evaluated and documented through weekly and quarterly walk downs, which are documented in the System Engineer notebook. The PER process is also used, as needed to identify and track system conditions that may require Corrective Actions.

For items identified in walk downs, the walk down log tracks Corrective Actions taken. Items identified in the Quarterly Comprehensive Walk downs are tracked in the System Health Report, available on the System Engineer logbook website. Other Corrective Actions, and more significant actions identified from walk downs, use the PER process to prioritize, track and complete Corrective Actions.

Coordination and prioritization with Operations planning personnel is done to allocate resources to complete overdue work packages. These actions are updated in the System Health Report, available online at the System Engineer notebook website.

The System Engineer notebook is maintained online at:
http://idmsweb/idmsprod/livelink.exe/fetch/2000/60627/60851/121199/4504396/3318002/3318339/index.htm?nodeid=3318404&vernum=2

The website was accessed, was well organized, and had all information relevant to the RCSTS, including the information previously mentioned.

Conclusion

The System Engineer is well organized and maintains a complete notebook on line.

Area(s) for the TFC to follow-up

None

APPENDIX B

TEAM MEMBER QUALIFICATION SUMMARIES

Team Member Qualification Summary

Team Member Name: Russell G. Harwood, Assessment Team Leader

Title and Organization: Safety System Oversight (Leakage Detection and Master Pump Shutdown System [MPSS])
Tank Farms Engineering Division
Office of the Assistant Manager for Tank Farms Project
U.S. Department of Energy (DOE), Office of River Protection (ORP)

Areas Assigned: Safety System Oversight (SSO) of the safety significant leak detection systems and MPSS.

Summary of Education and Technical Qualifications and Experience:

- Fifteen years experience in the nuclear and environmental restoration fields;
- SSO Qualified (Leakage Detection Systems and MPSS), September 2005; and
- Bachelor of Science degree in Electrical Engineering, University of Idaho.

Summary of Experience:

- SSO Assessment of the AW Farm Service Water Pressure Detection System;
- Program manager of the tank farm system upgrades;
- Program Manager of the Defense Nuclear Facility Safety Board (DNFSB) 2000-2 Recommendation closure (operability of vital safety systems);
- National Electrical Code and Occupational Safety and Health Association inspector for ORP;
- Project manager for the contractor implementation of Basis for Interim Operation compensatory measures, instrumentation upgrades, configuration management, emergency preparedness;
- Puget Sound Naval Shipyard electrical design engineer for communication and alarm systems; and
- Formal Specialized Training, Instrumentation and Process Control, Variable Frequency Drives, Programmable Logic Controllers

Team Member Qualification Summary

Team Member Name: Robert M. Yasek

Title and Organization: Facility Representative
Tank Farms Operations Division
Office of the Assistant Manager for Tank Farms Project
U.S. Department of Energy (DOE), Office of River Protection (ORP)

Areas Assigned: Initial Qualification

Summary of Education and Technical Qualifications and Experience:

- Twenty years experience in the military, nuclear and environmental restoration fields;
  - One year experience as a DOE Facility Representative;
  - Eleven years experience as a DOE project manager for site characterization and environmental restoration at Yucca Mountain Project and the Hanford Site;
  - Eight years as a United States Air Force weapons control officer, including experience as an instructor, evaluator, supervisor, and flight test controller.

- Bachelor of Science degree in Geophysics, New Mexico Institute of Mining and Technology.

- Team leader, DOE Radiological Assistance Program, Region 8.

Team Member Qualification Summary

Team Member Name: Jaime E. Navarro

Title and Organization: Facility Representative
Tank Farms Operations Division
Office of the Assistant Manager for Tank Farms Project
U.S. Department of Energy, Office of River Protection

Areas Assigned: East Tank Farms, In-Training

Summary of Education and Technical Qualifications and Experience:

- Twenty years experience in project management of military and environmental restoration construction projects;
- Three years petroleum production operations;
- Bachelor of Science degree in Civil Engineering, California State Polytechnic University, Pomona, California;
- Master of Science in Engineering Management, Washington State University; and
- Project Management Professional, Project Management Institute

Summary of Experience:

- Project Manager for over 20 military construction projects;
- Project Manager for $300M in construction upgrades at Hanford Tank Farms; and
- Assessment Team leader for Pump Maintenance, Hanford Tank Farms