



U.S. Department of Energy
Office of River Protection

P.O. Box 450, MSIN H6-60
Richland, Washington 99352

FEB 12 2007

07-TED-005

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 – ASSESSMENT REPORT A-07-AMTF-TANKFARM-001, TANK FARM CONTRACTOR (TFC) TANK 241-C-108 RETRIEVAL OPERATIONS LEAK DETECTION SYSTEM, MASTER PUMP SHUT DOWN SYSTEM (MPSS) AND ELECTRICAL SYSTEM ASSESSMENT

This letter transmits the results of the U.S. Department of Energy, Office of River Protection (ORP) assessment of the TFC Tank 241-C-108 Retrieval Operations Leak Detection System, MPSS and Electrical System. The assessment was completed on December 18, 2006.

The objectives of the assessment were to assure that the 241-C-108 retrieval leak detection system, MPSS and the electrical system have been designed, installed, tested and maintained to ensure its operability in accordance with appropriate system functional requirements and design criteria. All criteria for the assessment objectives have been met with some areas of improvement (three Observations). The safety significant (SS) leak detection system and the MPSS meet the requirements of the Documented Safety Analysis and the Technical Safety Requirements. The Cognizant System Engineer (CSE) maintains overall system configuration management to include test procedures and drawings. The retrieval system meets the current National Electrical Code requirements for installed electrical components and the Occupational Safety and Health Administration Standards for General Industry Subpart S (electrical).

The assessment team identified three Observations:

- The omission of the C-108 safety significant leak detection system and the MPSS components from the Safety Equipment List (SEL). Updating the SEL is an administrative action and is a post start action.
- The design feature of the safety significant leak detector relay has a reset function that could allow TFC personnel to reset the MPSS pump motor contacts while a leak is detected. Resetting the relay while a leak is detected would establish a condition that could cause the system not to meet the requirements of the Limited Condition of Operations 3.1.1 if the pump start sequence was initiated. ORP recommends using engineered controls instead of the established administrative controls to prevent access to the reset switch.


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- The portable valve pit (POR104) has openings used for valve alignments where rainwater can enter and trip the leak detection system. The leak detector in the portable valve pit went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC indicated the portable valve pit would be covered if rain is expected during the C-108 waste retrieval operations; however, ORP recommends having controls in place prior to the waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the SS leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. The Integrated Safety Management System process was adequate as the lessons learned from a previous transfer were incorporated into system changes.

If you have any questions, please contact me or your staff may contact Russell Harwood, Assessment Team Lead, (509) 376-2348.

Sincerely,



T. Zack Smith, Assistant Manager
for Tank Farms Project

TED:RGH

Attachment

cc: w/attach:

R. Cantwell, CH2M HILL
C. DeFigh-Price, CH2M HILL
R. S. Popielarczyk, CH2M HILL
C. R. Ungerecht, PAC
CH2M HILL Correspondence

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

**Tank Farm Contractor
Tank 241-C-108 Retrieval Operations Leak
Detection System, Master Pump Shut Down
System and Electrical System Assessment**

Final Report

A-07-AMTF-TANKFARM-001

07-TED-005

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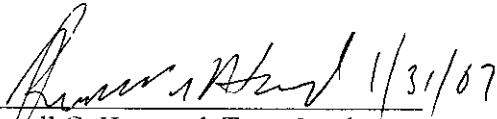


Office of River Protection

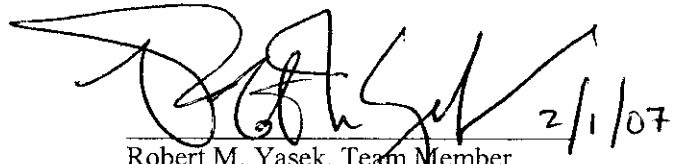
Russell G. Harwood
Team Leader

January 2007

Report Approval

 1/31/07

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE), Office of River Protection (ORP) performed an assessment of the Tank Farm Contractor (TFC) Tank 241-C-108 Retrieval Operations Leak Detection System, Master Pump Shut Down System (MPSS) and Electrical System from December 12, 2006, through December 18, 2006. The objectives of the assessment were to assure that the 241-C-108 retrieval leak detection system, MPSS and the electrical system have been designed, installed, tested and maintained to ensure its operability in accordance with appropriate system functional requirements and design criteria.

A closeout meeting was conducted with the TFC on December 18, 2006. Following the meeting, the TFC was provided the opportunity to review the assessment report for factual accuracy.

Conclusion

All criteria for the assessment objectives have been met with some areas of improvement (three Observations). The safety significant (SS) leak detection system and the MPSS meet the requirements of the Documented Safety Analysis (DSA) and the Technical Safety Requirements (TSR). The Cognizant System Engineer (CSE) maintains overall system configuration management to include test procedures and drawings. The retrieval system meets the current National Electrical Code (NEC) requirements for installed electrical components and the Occupational Safety and Health Administration (OSHA) Standards for General Industry Subpart S (electrical).

The assessment team identified three Observations. Observation 1-O-1 addresses the omission of the C-108 safety significant leak detection system and the MPSS components from the Safety Equipment List (SEL). TFC procedures require safety significant components be listed in the SEL, but the TFC did not transfer the information from a separate C-100 Retrieval Project SEL Implementation Database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2 addresses the design feature of the leak detector relay, which has a reset function that could allow TFC personnel to reset the MPSS pump motor contacts while a leak is detected. The transfer pump could inadvertently start if the motor start sequence was initiated with the MPSS pump motor contacts reset. LCO 3.1.1, as defined in the Technical Safety Requirements, would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak detector relay is located in the Operations Trailer cabinet where access to the reset switch is administratively controlled by the TFC waste transfer procedure and prevents personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak

detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3 addresses the portable valve pit (POR104) that has openings used for valve alignments where rainwater can enter and trip the leak detection system. The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time, showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the safety significant leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. Conduct of Operations was performed well during the leak detector function test including the halting of the test due to water intrusion in the portable valve box. The Integrated Safety Management System (ISMS) process was adequate as the lessons learned from a previous transfer (C-103) were incorporated into system changes.

Issues:

Findings:

None

Observations:

Observation 1-O-1

The SS components of the leak detection and MPSS systems were not listed in the SEL, but were found in a separate C-100 Retrieval Project SEL Implementation Database.

TFC Equipment Identification and Data Management Procedure, TFC-ENG-FAC SUP-C-23, Section 4.3, "Revise and Update the SEL," requires updating of the SEL to reflect changes or additions to the safety equipment. No SS components for the C-108 retrieval system were shown in the SEL, however; all of the information needed for the SEL, including the quality assurance level information, was located in the implementation database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2

The safety significant Tracetek TTC-1 sensing module (leak detection relay) has a design feature where the reset switch could perform the function of a system bypass. The reset switch on the module will reset the relay contacts, but not clear the leak detector circuitry. The module can be reset for motor start while the module indicates a leak with no indication on the annunciator panel that the system is in the reset (bypass) mode. The vendor information also states, “Any equipment that has been automatically shut down by the leak detection relay may be reactivated when RESET is pushed.”

Institute of Electrical and Electronics Engineers (IEEE) Standard Criteria for Safety Systems for Nuclear Power Generating Stations, IEEE Std 603-1998, Section 7.4, “Operating Bypass,” states that when applicable permissive conditions are not met, a safety system shall automatically prevent the activation of an operating bypass. LCO 3.1.1, as defined in the Technical Safety Requirements, would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak detector relay is located in the Operations Trailer cabinet where access to the reset switch is controlled by the TFC waste transfer procedure and prevents personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3

The POR104 has openings used for valve alignments where rainwater can enter and trip the leak detection system. Tank Farm Facility Intrusion Prevention, TFC-ENG-FAC SUP-P-03, Rev. D, Section 4, requires the responsible engineers to identify equipment or structures that may require liquid intrusion protection and to determine the intrusion protection method.

The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

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1.0 INTRODUCTION

The U.S. Department of Energy (DOE), Office of River Protection (ORP) performed an assessment of the Tank Farm Contractor (TFC) Tank 241-C-108 Retrieval Operations Leak Detection System, Master Pump Shut Down System (MPSS) and Electrical System from December 12, 2006, through December 18, 2006.

2.0 PURPOSE AND SCOPE

The objectives of the assessment were to provide ORP assurance that the 241-C-108 retrieval leak detection system, MPSS and the electrical system have been designed, installed, tested and maintained to ensure its operability in accordance with appropriate system functional requirements and design criteria.

In addition, the electrical system was assessed to the current National Electrical Code (NEC) and Occupational Safety and Health Administration (OSHA) Standards for General Industry Electrical (29 CFR Part 1910, Subpart S).

The objectives of the assessment were to:

- Verify that the C-108 retrieval system meets the requirements of the Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR).
- Verify that the Cognizant System Engineer (CSE) maintains overall system configuration management to include test procedures and drawings.
- Verify that the C-108 retrieval electrical system meets the current NEC and OSHA Standards for General Industry Electrical (29 CFR Part 1910, Subpart S).

3.0 APPROACH AND DELIVERABLES

Major elements of the review consisted of:

- Preparation of the Criteria Review and Approach Documents (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 CRADs are included as part of the assessment forms in Appendix A.

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The review team consisted of the Leak Detection Safety System Oversight (SSO) engineer and the Facility Representative responsible for oversight of the C-108 retrieval operations. Biographical summaries for each of the team members are included as Appendix B.

The entrance briefing was conducted on December 12, 2006, with field work being completed on December 14, 2006. Fieldwork consisted of TFC staff interviews, a walk down of the leak detection and electrical system with the CSE, and observation of the leak detection functional test. Team meetings were held periodically to discuss strengths and issues of the C-108 retrieval systems. Issues were communicated to the TFC in the close out meetings. The exit briefing was held on December 18, 2006, with TFC management, the ORP assessment team and a Defense Nuclear Facilities Safety Board (DNFSB) representative.

4.0 ASSESSMENT RESULTS

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

4.1. Performance Objective 1

The performance objective for evaluating this objective is:

The safety significant leak detection system and the MPSS satisfy the functional requirements and design criteria.

The review team determined that leak detection and MPSS system and testing do meet the requirements of the DSA and the TSR with three Observations.

The functional classification of the system components was correct and this information was obtained through the SEL Implementation Database rather than the SEL. TFC procedures require safety significant components be listed in the SEL, but the TFC did not transfer the information from a separate C-100 Retrieval Project SEL Implementation Database.

Industry and the TFC operating experience had been factored into the design specification, however, the safety significant Tracetek TTC-1 sensing module (leak detection relay) was found to have a design feature where the reset switch could perform the function of a system bypass.

The portable valve box (POR104) is not a watertight enclosure that allows rainwater to enter and trip the leak detector. As a result, the functional test was halted when rainwater leaked into POR104 and the leak detection system went into alarm.

The TFC did use lessons learned where the system had been used for the retrieval of 241-C-103 and a review of the Problem Evaluation requests (PER) showed one issue with a power loss test switch that was corrected and verified for the C-108 retrieval.

The walk down of the leak detection and MPSS system components showed that the physical system matched the drawings and corresponding Engineering Change Notices (ECNs). The CSE was involved in the project design and installation and the operability, reliability and material conditions are maintained in the CSE's system notebook and reported in the quarterly system health reports. The CSE is the approval authority for any changes made to the safety significant system.

No Findings and three Observations:

Observation 1-O-1

The SS components of the leak detection and MPSS systems were not listed in the SEL, but were found in a separate C-100 Retrieval Project SEL Implementation Database.

TFC Equipment Identification and Data Management Procedure, TFC-ENG-FAC SUP-C-23, Section 4.3, "Revise and Update the SEL," requires updating of the SEL to reflect changes or additions to the safety equipment. No SS components for the C-108 retrieval system were shown in the SEL, however; all of the information needed for the SEL, including the quality assurance level information, was located in the implementation database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2

The safety significant Tracetek TTC-1 sensing module (leak detection relay) has a design feature where the reset switch could perform the function of a system bypass. The reset switch on the module resets the relay contacts, but does not clear the leak detector circuitry. The module can be reset for motor start while the module indicates a leak with no indication on the annunciator panel that the system is in the reset (bypass) mode. The vendor information also states, "any equipment that has been automatically shut down by the leak detection relay may be reactivated when RESET is pushed."

The Institute of Electrical and Electronics Engineers (IEEE) Standard Criteria for Safety Systems for Nuclear Power Generating Stations, IEEE Std 603-1998, Section 7.4, "Operating Bypass," states that when applicable permissive conditions are not met, a safety system shall automatically prevent the activation of an operating bypass. LCO 3.1.1, as defined in the Technical Safety Requirements, would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak

detector relay is located in the Operations Trailer cabinet where access to the reset switch is controlled by the TFC waste transfer procedure and prevents

personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3

The POR104 has openings used for valve alignments where rainwater can enter and trip the leak detection system. Tank Farm Facility Intrusion Prevention, TFC-ENG-FAC SUP-P-03, Rev. D, Section 4, requires the responsible engineers to identify equipment or structures that may require liquid intrusion protection and to determine the intrusion protection method. During the observation of the leak detector functional test, the review team found no provisions to prevent intrusion of rainwater into the valve pit.

The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

4.2. Performance Objective 2

The performance objective for evaluating this objective is:

The electrical system meets the National Fire Protection Association (NFPA) and OSHA electrical requirements.

The criteria for this objective have been met for the C-108 retrieval system.

The electrical systems and components are in good physical condition and meet the NEC and OSHA requirements.

5.0 CONCLUSIONS

Conclusion

All criteria for the assessment objectives have been met with some areas of improvement (three Observations). The safety significant leak detection system and the MPSS meet the requirements of the DSA and the TSRs. The CSE maintains overall system configuration management to include test procedures and drawings. The retrieval system meets the current NEC requirements for installed electrical components and the OSHA Standards for General Industry Subpart S (electrical).

The assessment team identified three Observations. Observation 1-O-1 addresses the omission of the C-108 safety significant leak detection system and the MPSS components from the SEL. TFC procedures require safety significant components be listed in the SEL, but the TFC did not transfer the information from a separate C-100 Retrieval Project SEL Implementation Database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2 addresses the design feature of the leak detector relay, which has a reset function that could allow TFC personnel to reset the MPSS pump motor contacts while a leak is detected. The transfer pump could inadvertently start if the motor start sequence was initiated with the MPSS pump motor contacts reset. LCO 3.1.1 would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak detector relay is located in the Operations Trailer cabinet where access to the reset switch is administratively controlled by the TFC waste transfer procedure and prevents personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3 addresses the POR104 that has openings used for valve alignments where rainwater can enter and trip the leak detection system. The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the safety significant leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. Conduct of Operations was performed well during the leak detector function test

including the halting of the test due to water intrusion in the portable valve box. The ISMS process was adequate as the lessons learned from a previous transfer (C-103) were incorporated into system changes.

Issues:

Findings:

None

Observations:

Observation 1-O-1

The SS components of the leak detection and MPSS systems were not listed in the SEL, but were found in a separate C-100 Retrieval Project SEL Implementation Database.

TFC Equipment Identification and Data Management Procedure, TFC-ENG-FACSup-C-23, Section 4.3, "Revise and Update the SEL," requires updating of the SEL to reflect changes or additions to the safety equipment. No SS components for the C-108 retrieval system were shown in the SEL, however; all of the information needed for the SEL, including the quality assurance level information, was located in the implementation database. Updating the SEL is an administrative action and is a post start action.

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robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3

The POR104 has openings used for valve alignments where rainwater can enter and trip the leak detection system. Tank Farm Facility Intrusion Prevention, TFC-ENG-FAC SUP-P-03, Rev. D, Section 4, requires the responsible engineers to identify equipment or structures that may require liquid intrusion protection and to determine the intrusion protection method.

The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the safety significant leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. Conduct of Operations was performed well during the leak detector function test including the halting of the test due to water intrusion in the portable valve box. The ISMS process was adequate as the lessons learned from a previous transfer (C-103) were incorporated into system changes.

6.0 REFERENCES

References and personnel contacted for each assessment performance objective are listed in Appendix A.

APPENDIX A

CRITERIA REVIEW AND APPROACH DOCUMENTS

PERFORMANCE OBJECTIVE 1 – SAFETY SYSTEM

The safety significant leak detection system and the MPSS satisfy the functional requirements and design criteria.

Criteria:

- System meets the requirements of the DSA and TSRs.
- 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 CH2M HILL Hanford Group, Inc., (CH2M HILL) operating experience have been adequately factored into the design specification.
- Design and performance requirements are adequate to satisfy the principal function of the systems.
- The system's physical configuration matches the system documentation (drawings and ECNs).
- Adequate review has been completed and documented by CH2M HILL to verify that the design is consistent with the specified functional requirements and design criteria, e.g.,
 - Internal and independent design reviews; and
 - Verification reviews of specific design products.
- The Cognizant System Engineer (CSE) maintains overall cognizance of the system and is responsible for system engineer support to operations.
- The CSE has assessed the safety significant system that includes a review of system operability, reliability, and material conditions. The review would assess (a) the ability of the system to perform design and safety functions, (b) physical configuration as compared to system documentation, and (c) system component performance in comparison to established performance criteria.
- The CSE remains apprised of any modification activities that affects the safety significant leak detection and MPSS systems.

Approach:

Record Review:

TFC Authorization Basis (DSA and TSR)
Safety Equipment List (SEL)
Piping & Instrumentation Drawings (P&ID) and one-line drawings
Test procedures
Component specifications

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Interviews:

Management (project and operations)
Engineering: Cognizant System Engineer (CSE)
Craft: electricians

Observations:

Verify the safety significant leak detection system was designed, built and tested to meet the criteria of the DSA and the TSR.

PROCESS:

Records Reviewed:

System Design Description for the Single-Shell Tank Waste Transfer System, RPP_15140, Rev. 3
Tank Farm Plant Operating Procedure, Perform Functional Test for C-108 Transfer Leak Detectors, TF-FT-359-027, Rev. A-1, December 12, 2006
System Health Report for Retrieval/Closure Electrical Systems, First Quarter 2006, RPP-RPT-25714, Rev. 4
System Health Report for Retrieval/Closure Electrical Systems, Second Quarter 2006, RPP-RPT-25714, Rev. 5
System Health Report for Retrieval/Closure Electrical Systems, Third Quarter 2006, RPP-RPT-25714, Rev. 6
Problem Evaluation Requests: PER-2005-4221, PER-2006-1251, PER-2006-0659, CH2M-PER-2006-1696, PER-2006-0818
Tank Farm Alarm Response Procedure, Respond to Alarms at Control trailer POR103-TRLR-001, ARP-T-331-00009, Rev. A-2 dated 4/25/2006
MTL 7700 Series Shunt-diode safety barriers data sheets
Raychem TraceTek TTC-1 Sensing Module data sheets
Tank Farms SEL, RPP-8792, Rev. 10
241-Sluice Retrieval Civil/Electrical Equipment Layout Plan, H-14-106526, Rev. 2
241-Sluice Retrieval Civil/Electrical Equipment Layout Plan ECN 722719 Rev. 2
C-108 to AN-106 Site Plan, H-14-107049, Rev. 2
241-C Sluice Retrieval Electrical Pit TBX Wiring Diagrams, H-14-106929, Rev. 1
241-C Sluice Retrieval Electrical Pit TBX Wiring Diagrams, EN 723647, Rev. 0
241-C Sluice Retrieval POR103-WT-TBX-001 Interconnection Diagram, H-14-106929, Rev. 2
241-C Sluice Retrieval POR103-WT-TBX-001 Interconnection Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Interconnection Diagram, H-14-106929, Rev. 2
241-C Sluice Retrieval POR103-WT-IE-001 Interconnection Diagram, ECN 724164, Rev. 0
241-C Sluice Retrieval POR103-WT-MSTR-001 Interconnection Diagram, H-14-106929, Rev. 1

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241-C Sluice Retrieval POR103-WT-MSTR-001 Interconnection Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR104 Valve Pit TBX-101 and TBX-103 Wiring Diagram,
H-14-106929, Rev. 0
241-C Sluice Retrieval POR104 Valve Pit TBX-102 Wiring Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR106-WT-HPU-001 Elementary Wiring Diagram, H-14-106929,
Rev. 0
241-C Sluice Retrieval POR106-WT-HPU-001 Elementary Wiring Diagram, ECN 723639,
Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 724116, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723879, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723481, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723743, Rev. 2
Electrical (EDS) One Line Diagram, H-14-030013, Rev. 11
EDS Panelboard Schedule, H-14-030013, Rev. 10
EDS Panelboard Schedule, ECN 724058, Rev. 0
241-C Retrieval Electrical POR103-WT-DP-001 Panelboard Schedule, H-14-030025, Rev. 1
241-C Sluice Retrieval Electrical POR103-WT-TRLR-001 Control Trailer, H-14-030025, Rev. 1
241-C Sluice Retrieval Electrical POR103-WT-TRLR-001 Control Trailer, ECN 723644, Rev. 1
EDS One Line Diagram, H-14-030001, Rev. 13
EDS Panelboard Schedule, H-14-030001, Rev. 7
241-C Waste Transfer WRS P&ID C-108 Sluicing Retrieval, H-14-020813, Rev. 1
241-C Waste Transfer WRS P&ID C-108 Sluicing Retrieval, ECN 723040, Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/106, H-14-024325, Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/140/204/205, H-14-024325,
Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/140/204/205, ECN 723879,
Rev. 0
Waste Transfer System (WT) O&M System P&ID, H-14-020801, Rev. 11
Waste Transfer System (WT) O&M System P&ID, ECN 722719, Rev. 2
Raw Water Portable EQPT O&M P&ID Water Flush EQPT, H-14-021824, Rev. 2

Personnel/Positions Interviewed:

CSE
Electricians (2)
C-100 Retrieval Project Manager
Closure Maintenance Manager

Evolutions/Operations/Shift Performance Observed:

Leak detector functional test

RESULTS:

DISCUSSION OF RESULTS:

The review team determined that leak detection and MPSS system and testing do meet the requirements of the DSA and the TSR. The functional classification of the system components was correct and this information was obtained through the SEL Implementation Database rather than the SEL.

Industry and the TFC operating experience had been factored into the design specification. The SS Tracetek TTC-1 sensing module (leak detection relay) has a design feature where the reset switch could perform the function of a system bypass. The CSE was aware of the issue and administrative controls for access to the reset button will be implemented.

The system has been used for the retrieval of 241-C-103 and a review of the PERs show one issue with a power loss test switch location that was corrected and verified for the C-108 retrieval.

The portable valve box (POR104) is not a watertight enclosure that allowed rainwater to enter and trip the leak detector. The functional test was halted when rainwater leaked into POR104 and the leak detection system went into alarm.

The walk down of the leak detection and MPSS system components showed that the physical system matched the drawings and corresponding ECNs. The CSE was involved in the project design and installation and the operability, reliability and material conditions are maintained in the CSE's system notebook and reported in the quarterly system health reports. The CSE is the approval authority for any changes made to the SS system.

Conclusion:

All criteria for the assessment objectives have been met with some areas of improvement (three Observations). The safety significant leak detection system and the MPSS meet the requirements of the DSA and the TSRs. The CSE maintains overall system configuration management to include test procedures and drawings. The retrieval system meets the current NEC requirements for installed electrical components and the OSHA Standards for General Industry Subpart S (electrical).

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The assessment team identified three Observations. Observation 1-O-1 addresses the omission of the C-108 safety significant leak detection system and the MPSS components from the SEL. TFC procedures require safety significant components be listed in the SEL but the TFC did not transfer the information from a separate C-100 Retrieval Project SEL Implementation Database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2 addresses the design feature of the leak detector relay, which has a reset function that could allow TFC personnel to reset the MPSS pump motor contacts while a leak is detected. The transfer pump could inadvertently start if the motor start sequence was initiated with the MPSS pump motor contacts reset. LCO 3.1.1 would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak detector relay is located in the Operations Trailer cabinet where access to the reset switch is administratively controlled by the TFC waste transfer procedure and prevents personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3 addresses the portable valve pit (POR104) that has openings used for valve alignments where rainwater can enter and trip the leak detection system. The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the safety significant leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. Conduct of Operations was performed well during the leak detector function test including the halting of the test due to water intrusion in the portable valve box. The ISMS process was adequate as the lessons learned from a previous transfer (C-103) were incorporated into system changes.

Issues:

Findings:

None

Observations:

Observation 1-O-1

The SS components of the leak detection and MPSS systems were not listed in the SEL, but were found in a separate C-100 Retrieval Project SEL Implementation Database.

TFC Equipment Identification and Data Management Procedure, TFC-ENG-FACSup-C-23, Section 4.3, "Revise and Update the SEL," requires updating of the SEL to reflect changes or additions to the safety equipment. No SS components for the C-108 retrieval system were shown in the SEL, however; all of the information needed for the SEL, including the quality assurance level information, was located in the implementation database. Updating the SEL is an administrative action and is a post start action.

Observation 1-O-2

The safety significant Tracetek TTC-1 sensing module (leak detection relay) has a design feature where the reset switch could perform the function of a system bypass. The reset switch on the module will reset the relay contacts, but not clear the leak detector circuitry. The module can be reset for motor start while the module indicates a leak with no indication on the annunciator panel that the system is in the reset (bypass) mode. The vendor information also states, "Any equipment that has been automatically shut down by the leak detection relay may be reactivated when RESET is pushed."

Institute of Electrical and Electronics Engineers (IEEE) Standard Criteria for Safety Systems for Nuclear Power Generating Stations, IEEE Std 603-1998, Section 7.4, "Operating Bypass," states that when applicable permissive conditions are not met, a safety system shall automatically prevent the activation of an operating bypass. LCO 3.1.1 would not be met if the transfer pump operated while the transfer system is inoperable (leak detected) beyond 30 minutes from the time the leak was first detected. The leak detector relay is located in the Operations Trailer cabinet where access to the reset switch is controlled by the TFC waste transfer procedure and prevents personnel access to the relay cabinet during operations to prevent resetting the relay. The TFC should consider using more robust engineered controls such as a lock on the leak detection relay cabinet for future waste transfers instead of relying upon the administrative controls in the waste transfer procedure to prevent access to the TTC-1 reset switch.

Observation 1-O-3

The portable valve pit (POR104) has openings used for valve alignments where rainwater can enter and trip the leak detection system. Tank Farm Facility Intrusion Prevention, TFC-ENG-FACSup-P-03, Rev. D, Section 4, requires the responsible engineers to identify equipment or structures that may require liquid intrusion protection and to determine the intrusion protection method.

The leak detector in POR104 went into alarm during the leak detector functional test due to heavy rain at the time showing the system vulnerability to rainwater intrusion. The TFC has indicated they will cover the pit with temporary covers if rain is expected during the C-108 waste retrieval operations. The TFC should have controls in place to ensure the valve pit will be covered before a waste transfer so that inclement weather does not affect the probability of a transfer system shutdown due to water intrusion.

The TFC personnel were knowledgeable of the safety significant leak detection system and communicated well. The CSE has been working with the Project Group and was knowledgeable of the system. Conduct of Operations was performed well during the leak detector function test including the halting of the test due to water intrusion in the portable valve box. The ISMS process was adequate as the lessons learned from a previous transfer (C-103) were incorporated into system changes.

PERFORMANCE OBJECTIVE 2 – ELECTRICAL SYSTEM

The electrical system meets the NFPA and OSHA electrical requirements.

Criteria:

- The retrieval system meets the current NEC requirements for installed electrical components.
- The retrieval system meets the requirements of OSHA Standards for General Industry Subpart S.

Approach:

Record Review:

P&ID and one-line drawings

Panelboard schedules

Interviews:

Management (project and operations)

Engineering: CSE

Craft: electricians

Observations:

Verify the installed leak detection safety system met the requirements of the NEC and OSHA.

January 2007

PROCESS:

Records Reviewed:

System Design Description for the Single-Shell Tank Waste Transfer System, RPP_15140, Rev. 3
System Health Report for Retrieval/Closure Electrical Systems, First Quarter 2006, RPP-RPT-25714, Rev. 4
System Health Report for Retrieval/Closure Electrical Systems, Second Quarter 2006, RPP-RPT-25714, Rev. 5
System Health Report for Retrieval/Closure Electrical Systems, Third Quarter 2006, RPP-RPT-25714, Rev. 6
Problem Evaluation Requests: PER-2005-4221, PER-2006-1251, PER-2006-0659, CH2M-PER-2006-1696, PER-2006-0818
241–Sluice Retrieval Civil/Electrical Equipment Layout Plan, H-14-106526, Rev. 2
241–Sluice Retrieval Civil/Electrical Equipment Layout Plan Engineering Change Notice (ECN) 722719 Rev. 2
C-108 to AN-106 Site Plan, H-14-107049, Rev. 2
241-C Sluice Retrieval Electrical Pit TBX Wiring Diagrams, H-14-106929, Rev. 1
241-C Sluice Retrieval Electrical Pit TBX Wiring Diagrams, EN 723647, Rev. 0
241-C Sluice Retrieval POR103-WT-TBX-001 Interconnection Diagram, H-14-106929, Rev. 2
241-C Sluice Retrieval POR103-WT-TBX-001 Interconnection Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Interconnection Diagram, H-14-106929, Rev. 2
241-C Sluice Retrieval POR103-WT-IE-001 Interconnection Diagram, ECN 724164, Rev. 0
241-C Sluice Retrieval POR103-WT-MSTR-001 Interconnection Diagram, H-14-106929, Rev. 1
241-C Sluice Retrieval POR103-WT-MSTR-001 Interconnection Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR104 Valve Pit TBX-101 and TBX-103 Wiring Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR104 Valve Pit TBX-102 Wiring Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR106-WT-HPU-001 Elementary Wiring Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR106-WT-HPU-001 Elementary Wiring Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, H-14-106929, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723639, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 724116, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723879, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723481, Rev. 0
241-C Sluice Retrieval POR103-WT-IE-001 Block Diagram, ECN 723743, Rev. 2
Electrical (EDS) One Line Diagram, H-14-030013, Rev. 11
EDS Panelboard Schedule, H-14-030013, Rev. 10
EDS Panelboard Schedule, ECN 724058, Rev. 0

241-C Retrieval Electrical POR103-WT-DP-001 Panelboard Schedule, H-14-030025, Rev. 1
241-C Sluice Retrieval Electrical POR103-WT-TRLR-001 Control Trailer, H-14-030025, Rev. 1
241-C Sluice Retrieval Electrical POR103-WT-TRLR-001 Control Trailer, ECN 723644, Rev. 1
EDS One Line Diagram, H-14-030001, Rev. 13
EDS Panelboard Schedule, H-14-030001, Rev. 7
241-C Waste Transfer WRS P&ID C-108 Sluicing Retrieval, H-14-020813, Rev. 1
241-C Waste Transfer WRS P&ID C-108 Sluicing Retrieval, ECN 723040, Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/106, H-14-024325, Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/140/204/205, H-14-024325,
Rev. 1
Sluicing Retrieval Portable Equipment P&ID POR103/104/105/140/204/205, ECN 723879,
Rev. 0
Waste Transfer (WT) System O&M System P&ID, H-14-020801, Rev. 11
WT System O&M System P&ID, ECN 722719, Rev. 2
Raw Water Portable EQPT O&M P&ID Water Flush EQPT, H-14-021824, Rev. 2

Personnel/Positions Interviewed:

CSE
Electricians (2)
C-100 Retrieval Project Manager
Closure Maintenance Manager

Evolutions/Operations/Shift Performance Observed:

Walk down of the leak detection system and the MPSS.

RESULTS:

DISCUSSION OF RESULTS:

The criteria for this objective have been met for the C-108 retrieval system.

The electrical systems and components are in good physical condition and meet the NEC and OSHA requirements.

Conclusion:

The criteria for this objective have been met.

Issues:

None

APPENDIX B

TEAM MEMBER

BIOGRAPHIES

Team Member Qualification Summary

Team Member Name: Russell G. Harwood, Team Member

Title and Organization: Electrical Engineer
Tank Farm Engineering Division
Office of Assistant Manager for Tank Farms Project
Office of River Protection (ORP)

Areas Assigned: Tank Farms Engineering Division. Instrumentation and Control Safety System Oversight. Tank Farms Electrical Safety Officer.

Summary of Education and Technical Qualifications and Experience:

- Sixteen years experience in the nuclear and environmental restoration fields
- Safety System Oversight (SSO) Qualified, September 2005
- BS in Electrical Engineering, University of Idaho

Summary of Experience:

- Lead or a member of numerous electrical SSO assessments.
- Program manager of the tank farm system upgrades.
- Program Manager of the DNFSB 2000-2 Recommendation closure (operability of vital safety systems).
- NEC and OSHA 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.
- 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
Office of River Protection

Areas Assigned: Closure Operations

Summary of Education, 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 USAF weapons control officer, including experience as an instructor, evaluator, supervisor and flight test controller.
- BS in Geophysics, New Mexico Institute of Mining and Technology
- Team leader, DOE Radiological Assistance Program, Region 8