- Test personnel are knowledgeable and able to satisfactorily perform the test
- The procedure cites applicable Technical Safety Requirements/Limiting Conditions for Operation
- Limits, precautions, system and test prerequisite conditions, data required, and acceptance criteria are included
- Appropriate data recording provisions are included or referenced and are used to record results
- The procedure includes provisions for listing discrepancies
- The procedure requires timely notification of facility management about any failure or discrepancy that could impact operability
- Appropriate personnel reviewed the test results and took appropriate action

3-1 For the surveillance and test procedures and records reviewed, determine whether the test equipment used for testing was calibrated.

Interviews:

Observations:

2-2a For 2-2 perform a walkthrough of the surveillance test procedure with appropriate facility personnel and verify:

- Validity of test results
- System performance meets system requirements
- Performance criteria are appropriate for current facility mission life-cycle
- Parameters that demonstrate compliance with the safety requirements can be measured
- Test personnel are knowledgeable and able to satisfactorily perform the test
- The procedure cites applicable Technical Safety Requirements/Limiting Conditions for Operation
- Limits, precautions, system and test prerequisite conditions, data required, and acceptance criteria are included
- Appropriate data recording provisions are included or referenced and are used to record results
- The procedure includes provisions for listing discrepancies
- The procedure requires timely notification of facility management about any failure or discrepancy that could impact operability
- Appropriate personnel reviewed the test results and took appropriate action

Process:

Records Reviewed:

Personnel/ Positions Interviewed:

Evolutions/Operations/Shift Performance Observed:

Results:

Discussion of Results:

Conclusion:

Issues:

Inspector: ______________________	Approved: ______________________ Team Leader
Date: ______________________	Date: ______________________

Appraisal Form

Transfer Leak Detection System

Topical Area: System Engineer Program Date:	Criteria Met [ ] Yes [ ] No

Objective:

A viable system engineer program exists.

Criteria:

1. Systems have been identified whose safety significance warrants the assignment of a safety engineer.

2. System engineers are assigned to all vital safety systems.

3. Minimum system engineering qualification and re-qualification requirements have been established.

4. System engineer qualification and re-qualification requirements have been incorporated into training and succession programs.

5. Budget and other impacts are communicated to appropriate line management.

Approach:

Records Review:

1-1. Review contractor procedures and verify that a system engineer program is documented.

1-2. Review independent and management assessment reports that address the system engineer program. Determine whether program weaknesses are being identified and resolved.

1-3. Review the system engineer program procedures and documents to determine if a current list of vital safety systems exist to which the system engineer program is applied.

1-4. Review system engineer assignments and the contractors vital safety system list. Verify that at least one system engineer is assigned to each system.

2-1. Select a sample of system engineers. Review evidence that these system engineers were qualified under the contractors program.

3-1. Review the system engineer training and qualification program. Verify that:
- There is an appropriate level of classroom coursework.
- Classroom coursework addresses both program and technical areas, including configuration management processes, technical characteristics of systems, and authorization basis requirements.
- There is an appropriate mentoring/OJT component in the qualification program.

Interviews:

5-1. Interview managers responsible for the system engineer program. Determine that they understand DOE expectations. Determine whether or not they are satisfied with the program as it stands.

5-2. If the managers are not satisfied with the program, determine if they have a suitable action plan for resolving program weaknesses.

Observations:

4-1. Evaluate system problems identified during the conduct of this assessment. Determine whether they indicate weaknesses in system engineer performance that can be linked to an inadequate qualification process.

Process:

Records Reviewed:

Personnel/ Positions Interviewed:

Evolutions/Operations/Shift Performance Observed:

Results:

Discussion of Results:

Conclusion:

Issues:

Inspector: ____________________	Approved: ____________________
Date: ____________________	Team Leader
	Date: ____________________

Appendix C

Deficiency Form

Deficiency Form

Topical Area:		Date: ID #:

Requirement:

Reference(s) (specific as to section):

Finding ____________________ Observation: ____________________.

Discussion:

Inspector:
Approved by: Assessment Team Leader Date:

Appendix B

Team List and Qualifications

David H. Brown – Assessment Team Leader, System Engineer Program

Mr. Brown has 30 years of experience in nuclear work. Fourteen of these years were in startup and testing work on submarine reactors at a naval shipyard. For the past 15 years he has worked at DOE-RL and DOE-ORP, primarily in the area of quality assurance and nuclear safety assessments. He holds a Bachelor of Science degree in nuclear science from the State University of New York Maritime College.

Mr. Brown is qualified as a lead auditor under the ORP NQA-1 qualification program, having held a DOE lead auditor certification since 1987. He has led many audits, assessments, surveillances, and employee concerns investigations, as well as two accident investigations. He has also led four ORRs and participated as a team member in several others.

Dale H. Splett – Configuration Management

Mr. Splett has over 27 years of experience in nuclear reactor operations, instrumentation & control systems, and in project management for nuclear material storage and handling facilities. He was a qualified nuclear power plant electrical operator with the U.S. Navy and later performed instrumentation, control, and electric power equipment installation and troubleshooting of nuclear systems at Puget Sound Naval Shipyard. Mr. Splett earned a Bachelor of Science degree in electrical engineering from Seattle University in 1990 and worked as an instrumentation & control systems engineer in the Puget Sound Shipyard Nuclear Engineering Department.

Mr. Splett joined the Department of Energy in 1994 and performed project engineering, management and facility operations oversight duties for the Hanford Spent Nuclear Fuel Project through 2001. In addition to new project development he was also responsible for issues concerning the Spent Nuclear Fuel authorization basis, review of the final safety analysis report, unreviewed safety questions and technical safety requirement violations, and has performed readiness assessments and operational readiness reviews for systems and facility startup. This work also included configuration control and management oversight of systems in facilities at or near their design life. He is currently a construction project manager with the DOE Office of River Protection.

Stephen H. Pfaff – Safety Function Definition

Mr. Pfaff has 16 years of experience in nuclear reactor operations and nuclear facility oversight. Seven years were devoted to naval nuclear propulsion plant operations and maintenance on two ships. For the past nine years, he has served as a Department of Energy Facility Representative in plutonium facilities at the Rocky Flats Site and in the Tank Farms at the Hanford Site. Mr. Pfaff earned a Bachelor of Science degree in

Business Administration with minors in Science and Naval Science in 1983 from Oregon State University. Mr. Pfaff is qualified as a lead auditor under the ORP NQA-1 qualification program and has led or participated in many assessments and surveillances.

Courtney Blanchard, P. E. – System Maintenance, System Surveillance and Testing

Mr. Blanchard has 21 years of industrial experience including 8 years in the nuclear field. In May of 2001, he transferred to the Department of Energy from the Nuclear Regulatory Commission (NRC) were his last assignment was Senior Resident Inspector at the Paducah Gaseous Diffusion Plant located in Paducah, Kentucky. Mr. Blanchard is a graduate of Michigan Technological University and has a professional engineering license in the State of Washington. His work experience includes construction engineering with Owens Illinois, design engineering and management with Puget Sound Naval Shipyard, as well as industrial and radiological inspection activities with the NRC. He presently works on technical interfaces for the Assistant Manager of System Requirements (AMSR) at ORP.

Mr. Blanchard was a qualified fuel cycle inspector and resident inspector with the NRC, now performs performance/compliance reviews of interface activities for AMSR, and has performed an inspection for the ORP Office of Safety Regulation. At the NRC he led several performance inspections and was a member of the ORR inspection for increasing the Paducah Gaseous Diffusion Plant assay enrichment.

James M. Leivo, P. E. – Safety Function Definition, Configuration Management (computer software control)

Mr. Leivo has over 34 years of experience in the nuclear industry, including technical direction of the design and retrofit of instrumentation, control, electrical, and computer systems for nuclear power plants and facilities. His experience includes design, regulatory submittal, regulatory inspections, and independent design inspections/assessments. His career includes 14 years with Westinghouse Nuclear Energy Systems Divisions; three years with NUS Corporation and Los Alamos Technical Associates; and 17 years as an independent consultant to the NRC I&C Branch, NRC Inspection Programs, nuclear utilities, and DOE. He holds a BSEE from Carnegie Mellon University, and completed various graduate level courses as a part of the Florida Institute of Technology Digital Systems Option.

Since 1986, Mr. Leivo has supported over 50 independent assessments of nuclear facilities, including design inspections for NRC and design assessments for nuclear utilities. This included thread audits and assessments of safety-related and critical computer-based systems retrofitted to operating plants. Examples of utility assessments include: the auto-essential feedwater control system at Davis-Besse; and the digital feedwater control system, switchyard SCADA system, and automatic test interface for the diesel generator load sequencer at Salem. Examples of NRC audits or inspections of digital systems include the reactor protection systems at D. C. Cook and Haddam Neck; thermal margin monitor at Palisades; and the plant safety monitoring system at Beaver Valley. He also supported preparation of safety evaluation reports for the DOE WERF and WSF facilities at INEL. Mr. Leivo has also served as team leader on several design assessments performed for nuclear utilities.

Appendix C

Evaluation of Criteria

Appraisal Form

Transfer Leak Detection System

Topical Area: Configuration Management	Criteria Met
Date:	[ ] Yes [X] No

Objective:

Changes to safety basis-related requirements, documents, and installed components are controlled.

Criterion:

1. Changes to system safety basis requirements, documents, and installed components are designed, reviewed, approved, implemented, tested, and documented in accordance with controlled procedures. Consistency is maintained among system requirements and performance criteria, installed system equipment and components, and associated documents as changes are made.

Approach:

Records Review:

1-1 On a sample basis, review and evaluate the change control process and procedures and associated design change packages and work packages to determine whether the change control process and procedures are adequate and effectively implemented. Determine whether:

- SSCs and documents affected by the change are identified
- Changes are accurately described, reviewed and approved as appropriate
- Installation instructions, post-modification testing instructions and acceptance criteria for turnover to facility operations are specified, and
- Important documents affected by the change (e.g., operating and test procedures, Master Equipment List, etc.) are revised in a timely manner.

Interviews:

1-2 Interview a sample of cognizant line, engineering, QA managers and other personnel to verify their understanding of the change control process and commitment to manage changes affecting design and safety basis in a formal, disciplined and auditable manner.

Observations:

N/A

Process:

Records Reviewed:

a. HNF-IP-0842 Vol. 4, "Engineering" Section 1.2 *Engineering Requirements*

b. HNF-IP-0842, Vol. 4, "Engineering" Section 3.11 *Commercial Grade Item Upgrade Dedication,* Revision 4b, January 17, 2002.

c. HNF-IP-0842, Vol. 4, "Engineering" Section 4.24 *Design Verification*, Revision 2.

d. HNF-IP-0842, Vol. 4, "Engineering" Section 4.29 *Engineering Document Change Control Requirements*

e. HNF-SD-ER-736, "*Intrinsically Safe Leak Detector Circuit Design Description,*" Revision 0, May 8, 1998.

f. RPP-5775, "*PLC/DTAM Software Programs for Pumping Instrumentation and Control Skid 'P'*," Revision 0, May 8, 2000.

g. HNF-4275, "*Commercial Grade Item (CGI) Dedication for Leak Detection Relays*, Revision 8, September 25, 2001.

h. HNF-1900 Rev. 1, *Configuration Management Plan for the Tank Farm Contractor.*

i. ECN 649790 to drawing H-2-34965, *Power for Leak Detector Panels*

j. ECN 657931 to drawing H-2-34965, *Leak Detector System*

k. ECN 644388 to drawing H-2-73823, *Tank Waste Remediation*

Personnel/ Positions Interviewed:

a. E. R. Hamm, manager, Tank Farms Configuration Management

b. C. DeFigh-Price, director, System Engineering

c. G. J. Coleman, system engineer, Interim Stabilization

d. W. F. Zuroff, design authority, Interim Stabilization

e. J. B. Roberts, system engineer, Cross Site Transfer

f. J. A. Bewick, system engineer, Single Shell Tanks

g. C. C. Scaief, design authority, Instrumentation and Control Systems, Design Engineering

Evolutions/Operations/Shift Performance Observed: N/A

Results:

Discussion of Results:

Management interviews

The assessment team interviewed the manager for Tank Farms configuration management concerning the status of the existing configuration management program. He believed that the existing configuration management plan was adequate as written but that there was room for improvement. At the time of the interview revision 2 to the current CM plan was in draft form. Revision 2 will update the existing plan. The CM manger emphasized that the CM plan was meant to describe the program as it was, rather than how it should be.

During the interview the CM manager suggested several areas in which the CM program could be improved. One area was the procedure for processing changes to engineering documents. A completely rewritten procedure for management of engineering change notices (ECN) was due for release in summer 2002. The new procedure was intended to be more in line with commercial nuclear practice, consisting of five separate change procedures in the areas of design, documentation, modifications, requests for engineering assistance, and equivalency substitutions.

During review of selected ECNs against transfer leak detection drawings some deficiencies were noted. In a subsequent interview the CM manager said that he was aware of potential weaknesses in the current CM program, particularly with regard to follow-up actions to the initial ECN submittal and attention to detail. Although this assessment did not entail a complete review of ECNs he agreed that the types of problem noted were not necessarily isolated events. He also stated that he expected the new change process, along with the roles and responsibilities for system engineers currently being implemented, to alleviate these types of problem from occurring in the future. The CM manager stated that the system engineers will be expected to own a change from issue to closure. The CM manager was also planning to implement changes to the program strategy for management of software.

Timely completion of ECN related modifications

The particular issue discussed with the CM manager involved ECN 657931 to drawing H-2-34965 *Leak Detector System*, which was issued in February, 2000. Both the ECN and the drawing were marked as essential. Among other things, the ECN revised the voltage rating of an indicating light transformer. A work package to replace the indicating light and transformer was referenced on the ECN, and the job control system showed the work package as having been closed in February 2000. The work completed signature had not been made on the ECN, and the copy of the drawing retrieved from the Hanford document control system had not been updated.

Subsequent information received from the design authority who issued the ECN showed that operations had chosen to issue two work packages using the same ECN. The second work package is still open and has yet to be completed. This ECN was approximately two years old, the work required by the ECN was still not complete, and the voltage rating on the transformer as shown on the drawing was still not updated. The procedure for engineering requirements, HNF-IP-0842 Vol. 4 Section 1.2, required ECNs to essential drawings be incorporated within 30 calendar days from the date the ECN is signed as work complete. This was to ensure timely incorporation of changes to those drawings deemed critical to the safe operation of the system. In this case all of the work initiated by the ECN had not been completed, hence the 30 day clock had not started for incorporation of the changes, even though the transformers had been changed two years previous.

Engineering change notice reviews

With exception of the item noted above, review of a random sample of ECNs against transfer leak detection system drawings found no deficiencies. For these ECNs the systems, structures, components, and documents affected by the change were identified, and the changes were accurately described, reviewed and approved.

Engineering interviews

During interviews, several systems engineers said that they used the Tank Farms change control process for those drawings and documents associated with their systems, including both temporary and permanent ECNs. Some of the leak detection systems, such as for interim stabilization, were relatively new. One system engineer indicated that, although he did not deal regularly with older equipment, he thought perhaps the change control process for older equipment was not implemented to the same extent as for the newer systems and equipment.

In interviews, the shift operating engineer in the tank farms Command and Control Center said that she was aware of the change control process. Although not directly responsible for issuing changes, she was familiar with the ECN process and procedures. The shift operating engineer said that she relied upon current and correct drawings from the Hanford document control system.

Design verification

The design description for the intrinsically safe leak detector circuit (HNF-SD-ER-736 Revision 0, May 8, 1998) had not been subject to design verification. In addition, initial software release packages such as RPP-5775, "PLC/DTAM Software Programs for Pumping Instrumentation and Control Skid 'P'," Revision 0, May 8, 2000 had not been subject to design verification.

Personnel/ Positions Interviewed:

a. C. Defigh-Price, Manager, System Engineering

b. M. R. Koch, Manager, Single Shell Tank System Engineering

c. M. J. Sutey, Manager, Single Shell Tank Engineering

d. J. A. Bewick, system engineer

e. J. B. Roberts, system engineer

f. D. A. White, system engineer

g. R. R. Bafus, system engineer

h. C. Rupp, ESG, Inc.

i. T. C. Oten, Manager, Double Shell Tanks System Engineering

Evolutions/Operations/Shift Performance Observed:
N/A

Results:

Discussion of Results:

There is a primary and backup system engineer assigned to each vital safety system. As discussed in criterion 1, there is not a controlled list of vital safety systems. There were system engineers assigned to every system identified on each version of the vital safety system list that the assessment team saw.

There was evidence that all system engineers had successfully completed the interim qualification process. This was based on their previous qualification as cognizant engineers, enhanced with training on system engineering processes. This included training on the processes described in the CHG procedures "Conduct of System Engineering" and "Operability Evaluations."

The interim qualification process was completed when a system engineer successfully completed an oral examination conducted by CHG management.

CHG has a program and schedule to have all system engineers fully qualified by August 2002.

Conclusion:

There is a primary and backup system engineer assigned to each vital safety system. However, as discussed under criterion 1, there are various versions of the list of vital safety systems. System engineers are assigned to all systems on each version of the list.

System engineers are qualified in accordance with CHG procedures.

Issues:

None

Appraisal Form

Transfer Leak Detection System

Topical Area: System Engineer Program Date: February 14, 2002	Criteria Met [ ] Yes [X] No

Objective:
A viable system engineer program exists.

Criterion:

3. Minimum system engineering qualification and re-qualification requirements have been established.

Approach:

Records Review:

3-1. Review the system engineer training and qualification program. Verify that:
- There is an appropriate level of classroom coursework.
- Classroom coursework addresses both program and technical areas, including configuration management processes, technical characteristics of systems, and authorization basis requirements.
- There is an appropriate mentoring/OJT component in the qualification program.

Interviews:
N/A

Observations:
N/A

Process:

Records Reviewed:

a. CHG system engineer assignment list

b. Trainee guide (course plan) for system engineer course 350861 "Determining System Operability"

c. Trainee guide (course plan) for system engineer course 350862 "Performance Monitoring Phase I" and "Performance Monitoring Phase II"

d. CHG training profile for cognizant engineers

e. Interim qualification card and guide for system engineer transition

f. Qualification card and guide for final system engineer transition

g. Course plan, "RPP Authorization Basis and Unreviewed Safety Question Program"

h. Course plan, "RPP Authorization Basis"

Personnel/ Positions Interviewed:

a. Van Herndon, CHG training

b. Cherri Defigh-Price, CHG System Engineering

c. Michael J. Sutey, manager of west tank farms system engineers

d. Timothy C. Oten, manager of east tank farms system engineers

e. Michael R. Koch, manager of west tank farms system engineers

Evolutions/Operations/Shift Performance Observed:
N/A

Results:

Discussion of Results:

There was a documented system engineer training and qualification program. It had an appropriate level of classroom training on system engineer administrative processes, but there was no technical coursework on tank farm systems. CHG management had not required formal technical training because system engineers were first qualified as cognizant engineers. However, cognizant engineers also did not receive formal technical training on either tank farm systems or the FSAR.

CHG assigned less experienced system engineers to work with more experienced system engineers. However, there was no formal OJT training module.

There was no training profile for system engineers, but one was in development. Except for the three training modules specific to system engineers, qualification requirements were the same as for cognizant engineers. There was a training profile for cognizant engineers.

CHG managers administered an oral examination as the last step in the interim qualification process. However, there was no question bank and no formal process for verifying answers.

Conclusion:

Minimum system engineering qualification and re-qualification requirements have been established. However, the requirements do not address technical training on tank farm systems and the FSAR. Also, there is no training module that specifies requirements for OJT.

Issues:

System engineers were not provided with systematic technical training on the final safety analysis report, the technical safety requirements, and the design features of their systems. (Finding 6)

Appraisal Form

Transfer Leak Detection System

Topical Area: System Engineer Program	Criteria Met
Date: February 14, 2002	[ ] Yes [X] No

Objective:

A viable system engineer program exists.

Criterion:

4. System engineer qualification and re-qualification requirements have been incorporated into training and succession programs.

Approach:

Records Review:
N/A

Interviews:
N/A

Observations:

4-1. Evaluate system problems identified during the conduct of this assessment. Determine whether they indicate weaknesses in system engineer performance that can be linked to an inadequate qualification process.

Process:

Records Reviewed:

a. Management Assessment by the System Engineering Manager "System Health Report Preparation," February 6, 2002 (draft)

b. CHG system engineer assignment list

c. Trainee guide (course plan) for system engineer course 350861 "Determining System Operability"

d. Trainee guide (course plan) for system engineer course 350862 "Performance Monitoring Phase I" and "Performance Monitoring Phase II"

e. CHG training profile for cognizant engineers

f. Interim qualification card and guide for system engineer transition

g. Qualification card and guide for final system engineer transition

Personnel/ Positions Interviewed:

a. Cherri Defigh-Price, Manager, Systems Engineering

b. David C. Lowe, Chief Engineer

c. J. A. Bewick, system engineer

d. J. B. Roberts, system engineer

e. D. A. White, system engineer

f. R. R. Bafus, system engineer

Evolutions/Operations/Shift Performance Observed:

a. Operability evaluation for leak detectors at diversion box 241-AR-151 and tank farm 241-AY

Results:

Discussion of Results:

Generally, system engineers displayed competence in their work. They had completed their interim qualification process and displayed diligence about carrying out their duties.

CHG management uses oral examinations to provide assurance that system engineers possess sufficient technical knowledge of their systems and the FSAR. As discussed in the assessment form for criterion 3 (System Engineer Program), system engineers have not received formal training on their systems or on the FSAR.

In interviews with system engineers for the transfer leak detection system, the assessment team found that they were unaware of some leak detectors associated with encased piping. These are items used to provide defense in depth and are discussed briefly in the FSAR.

Conclusion:

System engineer qualification and re-qualification requirements were being incorporated into training and succession programs. This process was incomplete, but its maturity was consistent with the time that had elapsed since its inception.

While CHG management and the system engineers have worked hard to establish their program, CHG has not provided assurance that system engineers possess sufficient technical knowledge of their systems and the FSAR. This problem is illustrated by the fact that system engineers for the transfer leak detection system were unaware of some leak detectors in their system.

The oral examination is not sufficient to assure that system engineers possess adequate knowledge of the FSAR and their systems. Oral examinations can only be a spot check of what system engineers know, and there are no controls to assure that managers administering the examination would necessarily recognize incorrect answers.

Issues:

a. System engineers are not provided with systematic technical training on the final safety analysis report, the technical safety requirements, and the design features of their systems. (Finding 6)

Appraisal Form

Transfer Leak Detection System

Topical Area: System Engineer Program	Criteria Met
Date: February 14, 2002	[X] Yes [ ] No

Objective:
A viable system engineer program exists.

Criterion:

5. Budget and other impacts are communicated to appropriate line management.

Approach:

Records Review:
N/A

Interviews:

5-1. Interview managers responsible for the system engineer program. Determine that they understand DOE expectations. Determine whether or not they are satisfied with the program as it stands.

5-2. If the managers are not satisfied with the program, determine if they have a suitable action plan for resolving program weaknesses.

Observations:
N/A

Process:
Records Reviewed:

a. Management Assessment by the System Engineering Manager "System Health Report Preparation," February 6, 2002 (draft)

Personnel/ Positions Interviewed:

a. C. Defigh-Price, Manager, Systems Engineering

b. D. C. Lowe, Chief Engineer

c. M. R. Koch, Manager, Single Shell Tank System Engineering

d. M. J. Sutey, Manager, Single Shell Tank Engineering

e. T. C. Oten, Manager, Double Shell Tanks System Engineering

Evolutions/Operations/Shift Performance Observed:
N/A

Results:

Discussion of Results:

In interviews, CHG managers described expectations for system engineers and the system engineer program that coincided with ORP's expectations.

At the time of the assessment, the manager of the system engineering organization was completing a management assessment of the system health report process. Developing system health reports was an important part of the system engineer duties. It was evident that managers were aware of the status of the system engineering program, and they were in a position to identify factors impacting the program.

Conclusion:

Line management is aware of factors impacting the system engineering program. Because the program is new, it is too early to tell if management will consistently correct problems and impacts as they arise. So far, management has identified and resolved impacts, as evidenced by the good progress the program has made.

Issues:

None

Appraisal Form

Transfer Leak Detection System

Topical Area: System Surveillance and Testing	Criteria Met
Date: February 27, 2002	[ ] Yes [X] No

Objective:

Surveillance and testing of the safety system demonstrates that it is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria.

Criterion:

1. Requirements for surveillance and testing are adequate for demonstrating overall system reliability and operability, and are linked to the technical safety basis.

Approach:

Records Review:

1-1 Identify the acceptance criteria from the surveillance test procedures used to verify that the system is capable of performing its safety functions. Compare the acceptance criteria with the safety functions, functional requirements, performance criteria, assumptions and operating characteristics discussed in safety documents. Verify that there is a clear linkage between the test acceptance criteria and the safety documentation, and that the acceptance criteria are capable of confirming that safety/operability requirements are satisfied.

Interviews:

N/A

Observations:

N/A

Process:

Records Reviewed:

a. HNF-SD-WM-SAR-067, Revision 3a, Tank Farms Final Safety Analysis Report

b. HNF-SD-WM-TSR-006, Revision 2g, Tank Farms Technical Safety Requirements

c. RPP-5667, Revision 0c, Stochastic Consequence Analysis for Waste Leaks

d. Unusual Occurrence Report RP—CHG-TANKFARM-2001-0049, *Transfer Leak Detector Functional Test Requirements Not Met*, latest update 01/18/2002.

e. Deficiency Evaluation Form, Document Number RP-CHG-TF-2001-0049 (form used to document Deficiency Evaluation Group actions in response to the above occurrence report.)

f. HNF-IP-0842, Volume 5, Section 7.1, *Production Control*, Attachment F, item 14.

g. TO-020-270, *Preparation for Work in Diversion Boxes or Pits*, paragraph 5.3.1.

h. Problem Evaluation Request PER-2002-1176.

i. Several tank farm leak detector functional test procedures (single-shell tanks, double-shell tanks, interim stabilization.)

Personnel/ Positions Interviewed:

a. C. DeFigh-Price, System Engineering Manager

b. M. R. Koch, Deputy System Engineering Manager

c. R. E. Larson, Design Engineering

Evolutions/Operations/Shift Performance Observed:

N/A

Results:

Discussion of Results:

The transfer leak detection system operates, in most cases, on the simple principle of conductivity of electricity. When the dual element leak detection probe becomes immersed in liquid, presumably from a leak into a transfer-related structure, the electrical circuit is completed, initiating a local alarm and, where equipped, a remote alarm in a tank farm instrument building or control room.

The functional tests that are used to satisfy the TSR surveillance requirements are correspondingly simple. However, the detectors themselves are not readily accessible so the functional test introduces a simulated electrical current at the local leak detector station and tests the circuitry both in the local panel and to any remote alarm stations. There are no failure mechanisms identified for the conductivity probes short of losing power to the probe itself, and this would be detected by fail-safe circuitry.

The remaining significant criteria then for leak detector operability would be how the probe is positioned in the waste transfer-related structure. The intent is for the probe to initiate an alarm by the time the liquid in the pit or diversion box has reached 5% of the structure's total volume. RPP-5667 provides the analysis assumptions for leak detector positioning by describing how consequences do not increase significantly even if the leak detector does not alarm until 50% of the pit volume is filled with liquid.

The related surveillance requirement to verify that leak detector probes are positioned to meet those assumptions is described in the TSR basis for SR 3.1.3.1 where it states that the quarterly TSR functional test "includes a VERIFICATION that prior maintenance activities have not affected probe positioning, such that it is capable of detecting a leak in a manner consistent with the assumptions within RPP-5667."

The assessor determined that this requirement has likely not been routinely performed since the TSRs were implemented beginning in 1997. The contractor discovered this discrepancy and reported it as a TSR violation in an unusual occurrence report in June 2001. Although some corrective actions have been accomplished, and most of the functional test procedures for SR 3.1.3.1 have the requirement to verify prior maintenance has not affected probe positioning, eight months after the initial report, the root cause analysis and corrective action plan have not been developed.

Conclusion:

Generally, requirements for surveillance and testing are adequate for demonstrating overall system reliability and operability, and are linked to the technical safety basis. However, there are some TSR surveillance procedures that do not capture all of the requirements in the TSR bases. The contractor reported this issue as a TSR violation eight months ago, but had not completed important parts of the occurrence reporting process – analysis of root cause and development of a corrective action plan.

Issues:

a. During some transfer leak detector quarterly functional tests, the tank farm contractor did not perform a verification described in the TSR bases. The contractor self-identified this issue as a TSR violation eight months ago but had not completed root cause analysis and corrective action planning and implementation. (Finding 2)

Appraisal Form

Transfer Leak Detection System

Topical Area: System Surveillance and Testing Date: 2/27/2002	Criteria Met [ ] Yes [X] No

Objective:

Surveillance and testing of the safety system demonstrates that it is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria.

Criterion:

2. Surveillance and test procedures confirm that key operating parameters for the overall system and its major components are maintained within operating limits.

Approach:

Records Review:

2-1 Review surveillance and testing procedures for the system's major components. Review a sample of the test results and verify:

- Validity of test results
- System performance meets system requirements
- Performance criteria are appropriate for current facility mission life-cycle
- Parameters that demonstrate compliance with the safety requirements can be measured
- Test personnel are knowledgeable and able to satisfactorily perform the test
- The procedure cites applicable Technical Safety Requirements/Limiting Conditions for Operation
- Limits, precautions, system and test prerequisite conditions, data required, and acceptance criteria are included
- Appropriate data recording provisions are included or referenced and are used to record results
- The procedure includes provisions for listing discrepancies
- The procedure requires timely notification of facility management about any failure or discrepancy that could impact operability
- Appropriate personnel reviewed the test results and took appropriate action

Interviews:

N/A

Observations:

2-2a For 2-2 perform a walkthrough of the surveillance test procedure with appropriate facility personnel and verify:

- Validity of test results
- System performance meets system requirements
- Performance criteria are appropriate for current facility mission life-cycle
- Parameters that demonstrate compliance with the safety requirements can be measured
- Test personnel are knowledgeable and able to satisfactorily perform the test
- The procedure cites applicable Technical Safety Requirements/Limiting Conditions for Operation
- Limits, precautions, system and test prerequisite conditions, data required, and acceptance criteria are included
- Appropriate data recording provisions are included or referenced and are used to record results
- The procedure includes provisions for listing discrepancies
- The procedure requires timely notification of facility management about any failure or discrepancy that could impact operability
- Appropriate personnel reviewed the test results and took appropriate action

Process:

Records Reviewed:

HNF-IP-0842, Volume 1, Section 2.11, Technical Procedure Control and Use

HNF-IP-0842, Volume 2, Section 2.3, Technical Safety Requirement Compliance

HNF-IIP-0842, Volume 2, Section 4.1.1, Operations Organization and Administration (contains the Conduct of Operations Matrix)

HNF-IP-0842, Volume 5, Section 7.1, Tank Farm Contractor Work Control

HNF-IP-0842, Volume 5, Section 7.3, Preventive Maintenance

Tank Farm Maintenance Procedure 3-LDD-042, Testing of Liquid Detector

Tank Farm Maintenance Procedure 3-LDD-055, Troubleshooting and Repair of Liquid Detector

Several functional test procedures developed to accomplish the quarterly TSR leak detector surveillances.

Several completed quarterly TSR surveillance work packages.

Several completed transfer procedures (which relied upon successful leak detector surveillances).

Personnel/ Positions Interviewed:

K. E. Drakulich, SST Electrical Supervisor

J. B. Roberts, SST Waste Transfer Instrumentation System Engineer

J. A. Bewick, SST Waste Transfer Instrumentation System Engineer

Several SST maintenance electricians

Evolutions/Operations/Shift Performance Observed:

Quarterly TSR surveillances on two diversion box and four catch tank pump pit leak detectors.

Results:

Discussion of Results:

The assessors observed electricians perform routine quarterly TSR leak detector functional tests. During the pre-job briefing, the SST electrical supervisor stated that he expected the surveillance to fail because of an old transmitter panel in the signal path from the local leak detector panel to the remote alarm station. This was based on frequent failures of this piece of equipment, particularly in the last year according to the supervisor.

During the conduct of the surveillance, the transmitter panel, LDT-15, malfunctioned as expected and did not relay the alarm signal from two local leak detector panels on to the remote alarm station. The material condition of the transmitter panel was very poor – the interior electrical-mechanical parts were very dirty. The surveillance should have stopped there and a sequence of notifications and reporting mechanisms should have begun. However, one electrician manipulated an internal part to the transmitter panel, presumably to check the follow-on circuitry. This extra work was not authorized by the procedure.

As noted in the system maintenance portion of this report, a common practice regarding this leak detector panel was to try the surveillance, clean the electrical contacts in LDT-15 when the surveillance failed, try the surveillance again until the surveillance "passed."

This "in-process" troubleshooting and repair was not authorized and not recorded and gave incorrect information to operations and engineering regarding the true operability of the system.

Ultimately, the Central Command and Control (CCC) station was not notified as required by procedure, and the assessment team prompted the system engineering organization to initiate appropriate reporting of the failed surveillance.

Two weeks later, two other quarterly TSR leak detector functional tests were not completed satisfactorily. A DOE facility representative found that again, the CCC station was not notified and the failed surveillance was not recorded in the logbook and in the PER system as required by procedure.

Conclusion:

The assessment team considered the TSR surveillance functional test procedures to contain sufficient detail and direction to allow satisfactory verification of the operability of the transfer leak detection equipment. Inappropriate maintenance on a system that frequently failed prevented accurate understanding of the true operability of some of the systems in the single-shell tanks area. Failure to notify the CCC station upon unsatisfactory completion of the TSR surveillances also inhibited proper knowledge of system status and could have made a TSR violation more likely during saltwell pumping operations.

Issues:

Contractor personnel violated administrative procedures during and after a TSR functional test. (Finding 1)

Contractor personnel did not properly report two failed saltwell transfer leak detector TSR surveillances to the Central Command and Control Station. (Finding 4)

Appendix D

Findings

Deficiency Form

Topical Area: System Surveillance and Testing		**Date**: 2/20/2002 **ID #**: F-1

Issue: *Contractor personnel violated administrative procedures during and after a TSR functional test.*

Requirement:

a. HNF-IP-0842, Volume 5, Section 7.3, *Preventive Maintenance*, paragraph 4.4.6 directs craft personnel when it states, "Perform preventive maintenance in accordance with approved procedures or authorized work packages."

Paragraph 4.5.1 states, "When unexpected conditions or out-of-tolerance as found readings are observed in plant equipment, immediately notify the field work supervisor. If taking readings, and any reading is out of tolerance, finish the set of readings on that equipment, if possible, to allow providing more information to the field work supervisor."

It further states in paragraph 4.5.1.a and b, "Troubleshooting is not authorized without an approved procedure or work package that specifically calls out troubleshooting steps. Visual inspection for obvious problems is allowed as long as no disassembly is required."

In defining field work supervisor responsibilities, the above procedure states in paragraph 4.5.2, "Upon notification of an unexpected condition or out-of-tolerance reading on TSR or environmental equipment, immediately notify the shift manager and Facility Operations manager, document notification in the work record, ..."

For the shift manager, paragraph 4.5.4 states, "If an out-of-tolerance reading is reported by Maintenance during a surveillance, or a piece of equipment requiring repair will prevent a TSR PM/S activity from being completed on operable equipment by its due date, initiate a PER (A-6003-130) and provide it to the shift director." (Problem Evaluation Request)

Finally, the shift director must follow paragraph 4.5.5 which states, "When informed that a TSR PM/S reading is out of tolerance or TSR equipment is entering its frequency extension (grace period), enter in the CCC logbook..." (Central Command and Control)

b. HNF-IP-0842, Volume 1, Section 2.11, *Technical Procedure Control and Use*, defines procedure user responsibilities in paragraphs 3.7.2 and 3.7.3 which state, "Work is to be stopped, management notified, and the system returned to a safe condition, IF:
   - Problems are noted while performing a procedure (equipment malfunctions or unanticipated results obtained).

If a procedure cannot be followed as written, or unexpected results occur,
   - Halt the activity.
   - Place equipment or system in a safe condition.
   - Notify the manager."

c. Tank farm maintenance procedure 3-LDD-042, *Testing of Liquid Detector*, contains several sections to direct functional testing of different types of leak detector panels. Each section contains statements such as:
   - "CONFIRM that listed interlocks have been activated correctly."
   - "RECORD results on the data sheet(s)."

Reference(s) (specific as to section): As identified herein

Finding ______X____________ **Observation:** ____________________.

Discussion: The following is a list of the procedure violations:

- Personnel did not stop the surveillance and notify management when a step in the surveillance could not be completed due to equipment failure.
- One electrician, without a procedure, manually manipulated the internal mechanical parts of the failed leak detector transmitter panel to send a signal to the remote annunciator.
- Personnel did not confirm that listed interlocks would actuate.
- Personnel did not promptly complete the surveillance data sheets in the field.
- The field work supervisor did not notify the shift manager of the failed surveillance and record the notification in the work package.
- The shift manager did not initiate a PER.
- The shift director did not record the failed surveillance in the CCC logbook.

On February 7, 2002, tank farm electricians performed TSR surveillance SR 3.1.3.1, which is the quarterly functional check of safety significant transfer leak detectors. Using work package 2W-02-00020/P, they tested leak detector panels at the 241-U-151 and 152 diversion boxes, the 241-U-301 catch tank, and the 241-UX-302A catch tank.

The procedure 3-LDD-042 directs the electrician to introduce an alarm signal at the leak detector panels. For the U-151 and U-152 diversion box leak detector panels, the alarm signal would run through leak detector transmitter panel LDT-15 near the 244-U double-contained receiver tank (across the street from the diversion box), then through a Gamewell® cabinet in the 242-S control room, and finally activate a Panalarm® module on the alarm panel also in that control room.

The LDT-15 transmitter panel is an old electro-mechanical device that was very dirty inside – a condition that appeared to interfere with the proper movement of its gears and contacts.

When the electrician introduced an alarm signal at the U-151 diversion box, the internal parts of LDT-15 did not move at all, and therefore LDT-15 did not activate as required by the data sheet. Without authorization and without any procedure, another electrician manually moved the internal parts of LDT-15, which then sent a signal to the remote annunciator in the 242-S control room. The two electricians repeated this sequence of steps at the U-152 diversion box. The data sheets were not completed during the field part of this surveillance.

On the data sheets for the leak detector panels at U-301 and UX-302 catch tanks, there is an instruction that reads, "ALRM @ 1 IN ABVE PIT FLR, SHTS DWN PUMP." (sic) This appeared to indicate that these leak detector panels are interlocked to shut down their respective transfer pumps. The electricians did not test these interlocks.

Upon completion of the functional checks, the electricians returned to their shop and completed the data sheets. For U-151 and U-152, they correctly recorded that the local alarm light worked, but that the LDT-15 transmitter panel did not. Because the electrician manually forced the internal parts of LDT-15 to move and send a signal to the remote annunciator in the 242-S control room, they considered that portion of the system to have functioned properly and recorded that part of the test as satisfactory. Ultimately, they did note that the entire functional check at U-151 and U-152 had not been completed satisfactorily and noted the failure of LDT-15 in the comment section.

The field work supervisor did not call the shift manager to notify him that the TSR surveillance had failed. There was no record of notification in the work package, or in the CCC logbook, and the shift manager did not initiate a PER – all required actions.

On February 8, 2002, the assessor visited CCC and questioned personnel on duty regarding notification of the failed surveillance. The personnel on shift were from a different crew than the previous day, and they also took no action in response to learning that a TSR surveillance had failed. Only after the assessment team brought up the failed surveillance for a second time during the February 8 daily debrief meeting did the contractor initiate a PER.

Deficiency Form

Topical Area: System Surveillance and Testing		**Date**: 2/27/2002 **ID #**: F - 2

Issue: During some transfer leak detector quarterly functional tests, the tank farm contractor did not perform a verification described in the TSR bases. The contractor self-identified this issue as a TSR violation eight months ago but had not completed root cause analysis and corrective action planning and implementation.

Requirement:

a. The tank farms TSR basis for surveillance requirement 3.1.3.1 describes the quarterly functional tests for transfer leak detection conductivity probes and states, "The FUNCTIONAL TEST includes a VERIFICATION that prior maintenance activities have not affected probe positioning, such that it is capable of detecting a leak in a manner consistent with the assumptions within RPP-5667."

b. DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information*, paragraph 4.k states, "A Final Report shall be prepared and submitted to the Facility Representative when the root cause of the occurrence has been analyzed, corrective actions determined with actual or target completion dates identified, and lessons learned identified. The Final Report shall be submitted as soon as possible, but no later than 45 calendar days after initial categorization. If the required analysis cannot be completed within 45 calendar days, an Update Report shall be submitted within the 45 days and include a detailed explanation of the delay and an estimated date for submittal of the Final Report."

Reference(s) (specific as to section):

a. Unusual Occurrence Report RP—CHG-TANKFARM-2001-0049, *Transfer Leak Detector Functional Test Requirements Not Met*, latest update 01/18/2002.

b. Deficiency Evaluation Form, Document Number RP-CHG-TF-2001-0049 (form used to document Deficiency Evaluation Group actions in response to the above occurrence report.)

c. HNF-IP-0842, Volume 5, Section 7.1, *Tank Farm Contractor Work Control*, Attachment F, item 14.

d. TO-020-270, *Preparation for Work in Diversion Boxes or Pits*, paragraph 5.3.1.

e. Problem Evaluation Request PER-2002-1176.

Finding ______X__________ **Observation**: ________________.

Discussion: During a review of at least eight completed leak detector functional test work packages and at least three completed transfer procedures, the assessor found no evidence that the tank farm contractor had performed a verification described in the TSR bases. This was a verification that prior maintenance had not affected probe positioning. The contractor had self-identified this issue in an occurrence report (reference a), but after eight months had not completed root cause analysis or developed and implemented a corrective action plan.

Despite the lack of a plan, the contractor had instituted a combination of compensatory measures and procedure changes to attempt to address the TSR violation. Among these were the following:

- The Central Command and Control (CCC) station maintains an Action Tracking Book to document verification of leak detector operability prior to waste transfers.
- Most TSR surveillance functional test procedures were updated to include the required verification described in the TSR bases.
- Work control and work package development procedures were changed to require a verification that maintenance in a transfer pit did not disturb leak detection positioning prior to reinstallation of cover blocks.

Some engineering and production control personnel were unaware of the changes. In general, contractor engineering management was not actively pursuing resolution of the TSR violation. The occurrence report due date had been extended twice without meaningful explanation, and it did not appear that the contractor could perform sufficient analysis in time to meet the latest due date of March 1, 2002.

The deficiency evaluation form (reference b) provided a simple causal analysis, with both the direct cause and root cause identified as "Defective or inadequate procedure." Without the benefit of reviewing any other documented causal analysis in this case, there appears to be no mention of what failed in the TSR implementation process that would allow incomplete surveillance performance for at least two years. The assessment team judged the analysis of Reference b to be inadequate.

Deficiency Form

Topical Area: System Maintenance		Date: 2/21/2002 ID #: F-3

Issue: The contractor performed unauthorized and undocumented maintenance on a transfer system leak detector transmitter panel, obscuring an actual operability problem. This was a safety significant component, and the problem occurred repeatedly over a period of two years.

Requirement:

a. HNF-IP-0842, Volume 5, Section 7.1, *Tank Farm Contractor Work Control*, paragraph 1.0 states, "Troubleshooting is only allowed when working with a pre-approved procedure, RWR, or work package where troubleshooting is called out as part of the work."

Attachment B states, "Activities that require lockout/tagout, modification work (ECN), or safety class/safety significant equipment cannot be performed with verbal direction."

b. HNF-IP-0842, Volume 5, Section 7.3, *Preventive Maintenance*, paragraph 4.5.1.a states, "Troubleshooting is not authorized without an approved procedure or work package that specifically calls out troubleshooting steps."

It states further in paragraph 4.5.1.f, "If the preventive maintenance being performed is part of a functional test procedure, and one of the individual components on a data sheet fails the test, initiate a work request to document the repair needed, and record the work request number on the data sheet. Fail the data sheet (Complete Satisfactory No) and close the work package."

The procedure details several maintenance and reliability engineering/system engineer responsibilities in paragraph 4.7.11 including,

- "Equipment history information, including M&TE review
- Overall activity evaluation (as-found, out-of-tolerance, frequency, scope, work record comments/notes, etc.)
- Trend analysis; this includes observing for drift and pending failure signs"

c. Tank farm maintenance procedure 3-LDD-042, *Testing of Liquid Detector*, paragraph 5.12 states regarding the surveillance data sheets, "RECORD information relating any failure(s), in sufficient detail to initiate a work package, in COMMENTS/REMARKS section of Recall data sheet."

d. Tank farm maintenance procedure 3-LDD-055, *Troubleshooting and Repair of Liquid Detector*, is referenced by 3-LDD-042 as the required procedure for troubleshooting. The scope of 3-LDD-055 is limited however to a list of components in paragraph 1.2. Paragraph 1.2.1 states, "This procedure does not cover more complex problems, other than items listed in Section 1.2, which will require the craftsmen to refer to the appropriate H-2 drawings and use logical troubleshooting techniques to make necessary repairs."

This maintenance procedure also requires thorough documentation of work as described in paragraph 5.8.2 which states, "RECORD all findings and repairs on CRAFT/RESOURCE USAGE LOG/J-5."

Reference(s) (specific as to section): As identified herein

Finding ______X__________ **Observation:** ________________.

Discussion:

Maintenance craft personnel were performing troubleshooting and maintenance activities on the LDT-15 transmitter panel without a procedure and without documenting the activities performed. Specifically, the assessors noted that the maintenance records for the leak detector LDE-DB-U-151 and LDE-DB-U-152 92-day TSR surveillance identified one failed surveillance (2W-00-01207P, performed on October 23, 2000) for the eight surveillances conducted between December 2000 and August 2001. However, some craft supervision, craft personnel, and system engineers told the assessors that the LDT-15 transmitter panel would not operate properly during the first surveillance attempt due to the accumulation of dust and dirt on the electro-mechanical components. Instead of using the appropriate work controls, craft had been cleaning the LDT-15 transmitter panel's internal components then retesting the system to satisfactorily complete the 92-day TSR surveillances for LDE-DB-U-151 and LDE-DB-U-152.

The supervisor and maintenance craft told the assessors that the workers believed their past troubleshooting activities for the LDT-15 transmitter panel were performed in accordance with Procedure 3-LDD-055, *Troubleshooting and Repair of Liquid Detector*. TSR Surveillance Procedure 3-LDD-042, *Testing of Liquid Detector* directed craft personnel to use 3-LDD-055 to troubleshoot and repair certain specific problems identified during TSR surveillances of liquid detection equipment. This procedure did not authorize cleaning the enclosure to remove dirt interfering with operation of some mechanisms.

Procedure 3-LDD-055 provided no authorization for troubleshooting the LDT-15 transmitter panel. Any work outside the scope of 3-LDD-055 required use of engineering drawings, logical troubleshooting techniques, and a properly approved procedure. Even if the work on the LDT-15 transmitter panel was included in the scope of procedure 3-LDD-055, workers failed to document their findings and repairs in the work package as required by 3-LDD-055.

Unauthorized and undocumented maintenance, especially when performed to complete TSR surveillance requirements, defeats the reliability and system engineering processes that would identify aging and failure-prone equipment. It also obscures accurate knowledge of the operability of the safety significant system. Waste transfer procedures do not re-perform applicable TSR surveillances prior to the transfer, but rely on a review of surveillance documentation. CHG assumed that equipment that successfully passed its last surveillance will remain operable throughout the surveillance interval. Finally, failure to properly document all surveillance failures can result in inappropriate surveillance frequencies. The TSR bases for this surveillance stated, “This FUNCTIONAL TEST Frequency has been established based on operating experience and the maintenance recall system.”

Deficiency Form

Topical Area: System Surveillance and Testing		**Date**: 2/21/2002 **ID #**: F-4

Issue: Contractor personnel did not properly report two failed saltwell transfer leak detector TSR surveillances to the Central Command and Control Station.

Requirement:

a. HNF-IP-0842, Volume 5, Section 7.3, *Preventive Maintenance*, paragraph 4.5.1 states, "When unexpected conditions or out-of-tolerance as found readings are observed in plant equipment, immediately notify the field work supervisor. If taking readings, and any reading is out of tolerance, finish the set of readings on that equipment, if possible, to allow providing more information to the field work supervisor."

In defining field work supervisor responsibilities, the above procedure states in paragraph 4.5.2, "Upon notification of an unexpected condition or out-of-tolerance reading on TSR or environmental equipment, immediately notify the shift manager and Facility Operations manager, document notification in the work record, ..."

For the shift manager, paragraph 4.5.4 states, "If an out-of-tolerance reading is reported by Maintenance during a surveillance, or a piece of equipment requiring repair will prevent a TSR PM/S activity from being completed on operable equipment by its due date, initiate a PER (A-6003-130) and provide it to the shift director." (Problem Evaluation Request)

Finally, the shift director must follow paragraph 4.5.5 which states, "When informed that a TSR PM/S reading is out of tolerance or TSR equipment is entering its frequency extension (grace period), enter in the CCC logbook..." (Central Command and Control)

Reference(s) (specific as to section):

a. Tank farm plant operating procedure TO-420-111, *Perform 241-S-111 Saltwell Pumping*,
   - Section 4.3, *Field Preparations*
   - Section 5.9, *Restart from Short Term Shutdown*
   - 241-S-111 SST to 241-SY-102 DST Pre-Transfer Checklist
   - 241-S-111 SST to 241-SY-102 DST Transfer Data Sheet 1

Finding ____X____ **Observation:** __________

Discussion: An ORP facility representative discovered on 2/21/2002 that two saltwell transfer leak detector TSR surveillances had failed on the previous day and had not been reported to the CCC as required. This was the second instance of failure to report an unsatisfactory surveillance in two weeks. With respect to saltwell transfers, this failure to report can quickly lead to a TSR violation, because saltwell transfer procedures allow restart from a short term shutdown (up to 72 hours) without re-verification that all leak detectors and instrumentation are calibrated/functional tested and operable.

Specifically, the ORP facility representative learned at the daily interim stabilization work release meeting that TSR surveillances for saltwell transfer leak detectors had failed for the 241-S-111 pit and the 241-AX-A pit. These surveillance failures had not been logged into the CCC logbook, and no PER had been generated.

The assessor examined transfer procedure TO-420-111 and determined that the status of leak detectors and instrumentation operability was only verified for pumping starts following a shutdown of ≥72 hours. Without proper notification and documentation of the unsatisfactory surveillances, the likelihood of an error is increased since CCC could authorize restart of tank 241-S-111 saltwell pumping from a short-term shutdown with an inoperable leak detector. Operation of the saltwell pump with an inoperable leak detector would constitute a TSR violation.

Deficiency Form

Topical Area: Configuration management		**Date**: 2/25/2002 **ID #**: F-5

Issue: Degraded voltage or degraded power conditions were not addressed in the FSAR or hazards analysis.

Requirement:

10 CFR 830.2021, *Safety Basis*, para.(b)(4) and (b)(5) require in part that the contractor responsible for the facility must "...prepare a documented safety analysis for the facility and establish the hazard controls upon which the contractor will rely to ensure adequate protection of workers, the public, and the environment."

Reference(s) (specific as to section): As identified herein.

Finding X **Observation**: ______

Discussion:

In attempting to identify the authorization basis requirements for degraded voltage conditions at the tank farms (for the purpose of determining what voltage tolerances should be used as design inputs for hardware), the team noted that FSAR 4.5.1, "Tank Farm Electrical Distribution System" addressed complete loss or interruption of electrical power. However, it was silent on addressing the effects of degraded voltage or degraded power quality. Representatives of the nuclear safety and licensing organization told the assessment team that degraded voltage conditions had not been specifically addressed in the hazard analysis.

Notwithstanding the conclusion in FSAR 4.5.1.4 that "Electrical power systems in the tank farms do not appear to be major contributors to the failures of safety SSCs," degraded voltage was not addressed. Degraded voltage events can result in overheating and subsequent failure of motors, selective drop-out (or selective pickup failures) of contactors and relays, and other disruptions that can complicate and alter accident scenarios. Other degraded power conditions could include surges and excessive harmonic content (waveform distortion).

Of interest during this assessment was the impact on PLC functions under degraded power conditions because the impact might be selective and unpredictable. However, of greater concern would be other types of loads such as critical ventilation fans required to run continuously and continuous air monitors (CAMs). Degraded voltage/power conditions represent a potential common cause failure mode which could result in challenging the timely identification, diagnosis, repair, and replacement of multiple components that had failed as a result of the condition.

Deficiency Form

Topical Area: System Engineer Program		**Date**: February 11, 2002 **ID #**: F-6

Issue: System engineers were not provided with systematic technical training on the final safety analysis report, the technical safety requirements, and the design features of their systems.

Requirement:

a. 10 CFR 830.122(1) states, "Train and qualify personnel to be capable of performing their assigned work."

b. CHG RPP-MP-600, *Quality Assurance Program Description,* Part 2, Section 2, paragraph 3.2.3 states, "Training and indoctrination of personnel shall be performed to ensure proficiency is achieved and maintained, including changes in technology, methods, or job responsibilities."

Reference(s) (specific as to section):

Finding ____X____ **Observation**: ________.

Discussion:

System engineers receive training on management systems such as USQ evaluations and the conduct of system engineering, but do not receive systematic technical training directly relevant to their systems. They have been drawn from the ranks of the cognizant engineers who are understood to have accumulated knowledge of their systems and of the authorization basis. However, cognizant engineers also have not been provided with systematic technical training directly relevant to their systems.

CHG tries to assure that system engineers are technically knowledgeable of their systems by the final oral examination. Managers require qualification candidates to draw their systems on a whiteboard and answer technical questions regarding them. However, there is no question bank for oral exams with corresponding technically verified answers.

Deficiency Form

Topical Area: System Engineer Program		**Date:** February 13, 2002 **ID #:** F-7

Issue: There was no controlled list of vital safety systems recognized by both DOE and CHG.

Requirement:

a. RPP-MP-600, "Quality Assurance Program Description," part 2, section 5, para. 3.3 states, "Project managers and functional managers of other organizations responsible for work processes shall ensure that work processes are controlled by procedures, instructions, design documents, or other means appropriate to the specific tasks to be performed, referred to collectively as 'work process documents.' Work process documents shall be controlled documents…"

b. DOE O 414.1, "Quality Assurance," section 4.b.1.(d).1 states, "Documents must be prepared, reviewed, approved, issued, used, and revised to prescribe processes, specify requirements, or establish design."

c. DOE O 414.1, "Quality Assurance," section 4.b.2.(a).2 states, "Items must be identified and controlled to ensure their proper use."

Reference(s) (specific as to section):

1. DOE-ORP letter 01-OPD-026, Ami B. Sidpara to M. P. DeLozier, CHG, "Direction to Provide a List of System Engineers to Meet the Defense Nuclear Facilities Safety Board Recommendation 2000-2," dated March 21, 2001

2. DOE-ORP memorandum 01-TOD-T008, Dana C. Bryson to Michael J. Oldham, EM-3, "Transmittal of the Vital Safety System Information (Commitment 5) for the River Protection Project," dated August 8, 2001

Finding ____X____ **Observation:** ________.

Discussion:

In Reference 1, DOE-ORP transmitted to CHG a list of those systems considered to be vital safety systems. While the letter was from DOE, it actually formalized the preliminary agreement between ORP and CHG defining the vital safety systems. However, in the memorandum of Reference 2, ORP submitted a list of vital safety systems to EM-3 that contained differences from the list of Reference 1. The new list was the result of further collaboration between ORP and CHG, and CHG was included on copy coverage of the memorandum. At the time of this assessment ORP and CHG were considering more changes to the list of vital safety systems.

Representatives of both ORP and CHG said that there was a difference in view regarding who was actually maintaining the controlled list of vital safety systems. CHG said they were using the list provided by ORP, but ORP believed that they were reporting what was on a controlled list maintained by CHG. CHG and ORP had recently recognized this difference in view, and they were acting to resolve it.

Deficiency Form

Topical Area: Safety Function Definition		**Date**: 2/25/2002 **ID #**: F-8

Issue: The tank farms FSAR did not adequately describe all safety-significant components of the transfer leak detection system.

Requirement:

a. 10 CFR 830.204 (b) (1) states, "The documented safety analysis for a hazard category 1, 2, or 3 DOE nuclear facility must, as appropriate for the complexities and hazards associated with the facility:
   Describe the facility (including the design of safety structures, systems and components) and the work to be performed;"

b. 10 CFR 830 Subpart B, Appendix A, Section G.3 states, "Safety structures, systems, and components require formal definition of minimum acceptable performance in the documented safety analysis."

c. DOE-STD-3009-94 Guiding Principles, page vi states, "Facility descriptive material is intentionally split to emphasize structures, systems, and components of major significance:
   - Chapter 2, "Facility Description," provides a brief, integrated *overview* of the facility structures, systems, and components.
   - Chapter 4, "Safety Structures, Systems, and Components," provides detailed information *only* for those structures, systems, and components that are safety class and safety significant. This application of the graded approach will provide for a significant reduction of safety analysis report volume, while maintaining a focus on *safety*." (italics included in quote)

Reference(s) (specific as to section): As identified herein.

Finding _____X_____ **Observation**: __________

Discussion: The tank farms FSAR did not describe two types of safety significant transfer leak detection equipment, namely the leak detectors in the replacement cross-site transfer system diversion box and vent station, and the weight factor instrumentation in the Aging Waste Facility (AWF) transfer leak detection pits. The nuclear safety management rule and referenced standard require detailed information and performance criteria for these components.

By far the predominant type of safety-significant transfer leak detector in tank farms is the dual-electrode conductivity probe installed on the bottom of transfer pits and diversion boxes. The FSAR, therefore, appropriately describes the basic operation of this type of leak detector. However, the FSAR does not mention the other two types at all.

The first is the new style of leak detector used in the replacement cross-site transfer system diversion box 6241-A and vent station 6241-V. These detectors employ resistance temperature detectors and circuitry that send a signal when the probe is immersed. Although the end result is the same, the principle of detection and testing procedures are sufficiently different to warrant discussion in the FSAR and technical safety requirements (TSR). For example, due to an analyzed potential failure mode, there must be two redundant leak detector elements in a given location for the leak detection system to be operable. This is unique to waste transfer structures 6241-A and 6241-V.

The second type is the AWF weight factor transfer leak detection systems. These level monitoring systems, located only in 241-AY and 241-AZ tank farms, reside in leak detection pits that collect leakage from the side-fill transfer line encasements. Chapter 2 of the FSAR mentions weight factor monitoring and leak detection pits, but only in the context of collecting and measuring double-shell tank annulus leakage.

Despite the lack of information in the FSAR, the TSR limiting condition of operation (LCO) 3.1.3, "Transfer Leak Detection Systems," mentions the AWF weight factor transfer leak detection system when it prescribes a semi-annual surveillance:

SR 3.1.3.2	Perform FUNCTIONAL TEST on the weight factor leak detection systems used in AWF leak detection pits.

This level monitoring system in the transfer leak detection pits is also briefly mentioned in the TSR bases for LCO 3.1.3, but there are no *performance* criteria, either here or in FSAR Chapter 4, *Safety Structures, Systems, and Components*, to adequately define operability.

The lack of FSAR documentation contributed to poor understanding of actual leak detection system configuration on the part of the assigned double-shell tank leak detection instrumentation system engineers and at least one nuclear safety and licensing (NS&L) engineer. The assessor found that the system engineers had never heard of the weight factor instrumentation in AWF transfer leak detection pits.

The assessor also found an authorization basis clarification request (Log number 02-005, Rev. 0) and discussed the resolution with the applicable NS&L engineer. This engineer was also unaware of the unique aspects of the AWF transfer leak detection pits. The resolution was based on assumptions made regarding conductivity leak detectors in transfer related structures, and may not be correct for the actual configuration.