

## **Assessment of Operational Readiness of the General Service 242-T Evaporator Fire Protection System**

**Site:** Office of River Protection, Hanford

**Facility:** Tank Farms, 242-T Evaporator

**System:** Fire Protection System

**System Classification:** General Service System

**System Safety Function:** Provide Fire Detection Coverage for the 242-T Evaporator Facility

### **OBJECTIVE:**

**VSS-1**      **This vital safety system is operational and personnel and processes are in place that ensures its continued operational readiness.**

**VSS-1.1**      VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability. (Review Approach items 1, 2, 3 and 7)

### **Discussion of Results –**

The 242-T Evaporator Building has a fire detection system. The 242-T Evaporator Facility Shutdown/Standby to Condition V Safety Analysis Report (SD-HS-SAR-009, Rev. 0) identifies fire as a hazard (Table 9-1, 242-T Evaporator - Shutdown Condition Hazards). The postulated cause of the fire is from electrical problems, lightning or personnel actions. Mitigation of the fire hazard is identified as “low combustible loading” and “surveillance.” In addition, the Tank Farm Final Safety Analysis Report (HNF-SD-WM-SAR-067, Rev. 2) does not identify any fire protection systems as Safety Class, Safety Significant, or Defense-in-Depth. Department of Energy (DOE) Order, DOE 5480.7A, "Fire Protection" establishes the requirements for contractor fire protection programs. Administrative procedure HNF-IP-0842, Volume IX, Section 5.1, “Fire Protection Program,” identifies the responsibilities for the fire protection program policy.

As defined in Section 11.5.2 of the FSAR the fire protection program shall:

- Minimize the potential for the occurrence of a fire or related perils by implementing industry standards and reduced-risk criteria on fire protection and prevention.
- Ensure that fire does not cause an unacceptable onsite or offsite release of hazardous material that will threaten the public health and safety or the environment.
- Ensure that process controls and safety systems are not damaged by fire or related perils.

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- Establish requirements consistent with NFPA 101-1994, *Life Safety Code*, to provide an acceptable degree of life safety to DOE and contractor personnel and to ensure that the public will not be exposed to undue hazards associated with fire and its effects in DOE facilities.

The current Fire Hazards Analysis (WHC-SD-WM-FHA-023, Rev. 0) identifies that several potential fire scenarios were identified which could potentially expose the evaporator equipment and/or site personnel to flames, combustible products, toxic/corrosive materials, and a process release (uncertainties due to hydrogen generation from the process tanks).

Facilities with a fire loss replacement cost exceeding \$1M require automatic fire suppression systems. The 242-T facility does not have a fire suppression system installed in the building. When the facility was constructed it was valued at less than \$1M and when shutdown in the early 1980's the facility was planned to be decommissioned, hence no fire suppression system has been installed in the structure. The combustible loading within the facility has been minimized. A new Tank Farm Contractor fire hazards analysis (FHA) has been initiated. The FHA is scheduled for completion in FY 2001 and is funded. The process will include a review of all facilities especially in regards to facilities that are being decontaminated and decommissioned. The process includes as a final step, issuing exemptions for those facilities that will not meet code requirements as specified in the Standards/Requirements Identification Document (HNF-SD-MP-SRID-001, Section 12.8).

All fire protection systems are inspected, tested, and maintained in accordance with National Fire Protection Association (NFPA) Codes as implemented through the Standards/Requirements Identification Document (HNF-SD-MP-SRID-001, Section 12.8). The implementation of NFPA codes for fire protection system testing, inspection and maintenance are detailed in HNF-IP-0842, Volume IX, Section 5.6, "Fire Protection System Testing, Inspection, and Maintenance." The Hanford Fire Department using their procedures conducts testing on the fire protection system equipment; however, HNF-IP-0842, Volume IX, Section 5.6 specifically states "Although support in achieving the requirements of this section is provided by the Hanford Fire Department, the final responsibility for ensuring full compliance with this section shall belong to facility management."

Configuration management of the system design media for fire protection systems is maintained under the CH2M HILL Hanford Group, Inc. (CHG) procedures. Drawings and other design media are available for the fire detection and suppression systems installed in the 242-T facility. Necessary and adequate procedures and policies are in place and have been effectively implemented supporting the conclusion that management understands their responsibilities.

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- VSS-1.2** The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum. (Review Approach item 6)

### Discussion of Results –

Testing is accomplished at the frequencies established by the RPP fire protection maintenance program. The Hanford Fire Department conducts testing of the fire protection system components. Repairs are performed as components and/or systems fail. No backlog exists for this facility.

No major upgrades are envisioned. However, a plan is being developed to replace the existing (obsolete) fire alarm panel in the future. Although the existing fire alarm panel is in good operational status, very few spare parts are available for maintaining the existing fire alarm panel. The fire alarm panel will be relocated into the 242-T structure or a better location. This shall be accomplished prior to transitioning the facility to the environmental restoration contractor.

- VSS-1.3** Configuration Management and Maintenance programs effectively ensure operational availability of the system. (Review Approach items 5, 8 and 9)

### Discussion of Results –

Procedure HNF-IP-0842, Volume IX, Section 5.4, "Fire Hazards Analysis/Fire Protection Facility Assessment Requirements," establishes the criteria for conducting formal assessments of CHG facilities. All Tank Farm Fire Protection Facility Assessments are conducted at frequencies established in this procedure. The procedure is in accordance with DOE Order 5480.7A, "Fire Protection."

A complete update/rewrite of the Tank Farm Fire Hazards Analysis has been funded and scheduled for completion during FY 2001.

A fire protection assessment is performed every three years on the 242-T facility, under the direction of a qualified fire protection system expert (as specified in HNF-IP-0842, Volume IX, Section 5.4, "Fire Hazards Analysis/Fire Protection Facility Assessment Requirements"). A qualified fire protection engineer trends the fire protection systems availability. In addition, a qualified fire protection engineer performs trending of the equipment failures.

Power operators perform scheduled tests on the emergency lights (for access and egress) in accordance with written procedures. The facility is an unmanned facility and operators visit the facility, daily.

Procedure HNF-IP-0842, Volume IX, Section 5.1, "Fire Protection Program," assigns the overall lead for the River Protection Project (RPP) Fire Protection Program to the RPP Safety & Health organization.

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The RPP Safety and Health organization is responsible for ensuring “testing/inspection/preventive maintenance for fire protection systems are performed in accordance with HNF-IP-0842, Volume IX, Section 5.6, “Fire Protection System Testing, Inspection, and Maintenance”.

The Hanford Fire Department performs and documents the inspection, testing and maintenance of fire alarm and fire suppression systems, maintains all records of inspection/testing, and manages the fire system impairment tracking system (in accordance with HNF-PRO-372, “Hanford Fire Department”). RPP facility management is responsible for scheduling, authorizing and establishing appropriate facility conditions per HNF-PRO-372, Section 2.2, and HNF-IP-0842, Volume IX, Section 5.1, “Fire Protection Program.”

Drawings and other design media (e.g., supporting documents) supporting the 242-T fire protection system are maintained per the following list of established engineering procedures (not all inclusive).

- HNF-IP-0842, Volume IV, Section 3.5 – Engineering Documents
- HNF-IP-0842, Volume IV, Section 4.25 – Equipment Temporary Modifications and Bypasses
- HNF-IP-0842, Volume IV, Section 4.29 – Engineering Document Change Control Requirements
- HNF-IP-0842, Volume IV, Section 5.4 – Unreviewed Safety Question Requirements
- RPP-PRO-1819 – Engineering Requirements
- HNF-PRO-224 – Document Control Program Standards

Documentation to allow field work/modifications to be performed on the 242-T fire detection system is produced in accordance with the RPP work control process (HNF-IP-0842, Volume V, Section 7.1 – Tank Farm Contractor Work Control) and the Hanford Fire Departments procedures.

Maintenance, test, and operating procedures/roundsheets are generated and modified in accordance with the RPP procedure (HNF-IP-0842, Volume I, Section 2.11- Technical Procedure Control and Use). In addition, test procedures meet the requirements referenced within the RPP testing procedure (HNF-IP-0842, Volume IV, Section 4.28 – Testing Practices Requirements).

**VSS-1.4** The system is operable and available to fulfill its safety function when required. (Review Approach items 4 and 10)

### Discussion of Results –

The Hanford Fire Department conducts testing. System restrictions and impairments are tracked and formally reported monthly. Discrepancies are responded to in a timely fashion.

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The RPP fire protection engineers track system availability for impairments and system restrictions separately. The following availability information is based upon all facilities under the control of the Tank Farm Contractor.

Over the past three years system availability due to impairments has averaged 99.84% (0.16% system downtime). During the last twelve months failures have occurred and the system availability due to impairments averaged 99.97% (0.03% system downtime). The exact numbers of failures, for each individual facility under the cognizance of the TFC, that have occurred during the past three years is unavailable.

During the past three years, the system availability due to system restrictions has averaged 99.70%. During the last twelve months failures have occurred and the system availability due to system restrictions averaged 99.92% (0.08% system restricted). The exact numbers of failures, for each individual facility under the cognizance of the TFC, that have occurred during the past three years is unavailable. The Hanford Fire Department performs fire protection system testing, inspection, and maintenance in accordance with National Fire Protection Association (NFPA) Codes. If a system restriction occurs, planned fire watches are instituted.

All facilities are analyzed for compliance with NFPA 80A, "Recommended Practice for Protection of Buildings from Exterior Fire Exposures." This analysis helps assure that fire from the outside of the building will not affect the facility. The gravel, concrete pads and pavement ground cover around the 242-T building provide good fire breaks from potential range fires. Operations personnel routinely clean up transient combustibles that may accumulate near the structure.

Electricity is the only utility system required by the 242-T building's fire protection (detection) system. In addition, the radio frequency alarm system ties the 242-T fire alarm panel to the Hanford Fire Department 600 Area Fire Station. The Hanford Fire Department performs constant monitoring of the facility's fire alarm panel status.

### **CONCLUSIONS:**

The 242-T fire protection system (fire alarm panel) is operating as designed. The 242-T fire detection system is operating reliably as it performs its general service safety function. Normal maintenance activities and response to system problems are performed well, which is evidenced by the high availability of the system. Procedures, design media and policies are in place to maintain configuration control of the system. No outside source of fire could potentially harm the structure or its contents.

The fire alarm system is located in a structure (242-T-601) that is no longer maintained and will soon be decommissioned. Plans are being developed to replace and relocate the fire alarm panel into the 242-T structure or a better location (ref. VSS-1.2).

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An update to the Fire Hazards Analysis has been initiated to re-evaluate the fire hazards and determine adequate required protection.

DOE employee who reviewed this assessment DOE Review Team Date 2/28/01  
(\*See below)

Hours required for completing the assessment.

DOE: 40 Hrs.

Contractor: 104 Hrs.

\*Harkins, BA  
Harp, BJ  
Harwood, RG  
Noorani, YG  
Sullivan, RS  
Trenchard, GD  
Wade, KG  
Williamson, BI  
Wright, TC