Assessment of Operational Readiness of the Safety Class
Single Shell Tank Ventilation System

Site: Office of River Protection Hanford

Facility: Tank Farms

System: Single Shell Tank Ventilation Systems

System Classification: Safety Class

System Safety Function:
1. Prevention of In-Tank Flammable Gas Deflagration (Safety Class Function)
2. Confinement Ventilation (Environmental Protection Function)

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 safety function as described in the Tank Farms Final Safety Analysis Report (HNF-SD-WM-SAR-067, Rev. 2; FSAR, Chapter 4) of the SST active and passive ventilation system is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the frequency of the flammable gas deflagration accident (3.4.2.2).

The safety functions for Single Shell Tank (SST) passive ventilation systems are described in the Operational Specification Document (OSD-T-151-00013) and the FSAR.

The confinement ventilation function is not classified as either safety class or safety significant, but it is driven by environmental requirements.

The function of the ventilation system HEPA filters is to provide High Efficiency Particulate Air (HEPA) filtration of headspace gases before their release to the environment.

The surveillance that is done for the active ventilation system (LCO 3.2.2) is required to be verified operable every 7 days. This check is actually completed once every day in the operator roundsheets. The operator round procedures are listed below.

TF-OR-EF-C-D
TF-OR-WST-01-D

The surveillance performed for passive ventilation (LCO 3.2.3) requires that, every 10 days, the breather filter isolation valve be verified open. This check is actually completed once every week in accordance with the operator roundsheets. The operator round procedures are listed below.

TF-OR-EF-AAX-W
TF-OR-EF-C-W
TF-OR-WF-B-W
TF-OR-WST-02-W

The functional testing that is done for the confinement function is to verify that the HEPA filter passes a yearly aerosol test. The HEPA filter units shall be capable of removing at least 99.95% of particles, as small as 0.3 microns, of an approved challenge aerosol from the ventilation exhaust flow stream. This test is scheduled and tracked using the Job Control System (JCS).

From the information reviewed it can be concluded that the safety functions for Single Shell Tank (SST) active and passive ventilation systems are defined and that the systems are tested adequately to ensure operability.

As directed by the Office of River Protection, the contractor will be submitting an Authorization Basis amendment within the next several months to remove the requirement for active ventilation of the SSTs.

Essential drawings and other design baseline drawings are readily available via microfilm at Document Control Centers or on the on-line Hanford Document Control System (HDCS). Outstanding and incorporated Engineering Change Notices (ECNs) to these documents are identified in HDCS, and are readily available in HDCS or at the document centers. HDCS has the capability of identifying system cognizant engineers and system design authority engineers associated with the drawings.

The typical set of drawings used in daily operation of the SST ventilation system consist of; Piping and Instrument Diagrams, HVAC equipment schedules, electrical one-line diagrams and panelboard schedules, and HVAC equipment plans.

The safety systems will need to have the role of each unique piece of equipment defined. These requirements need to be defined in an update to the RPP Safety Equipment List.

Necessary and adequate procedures and policies are in place and have been effectively implemented supporting the conclusion that management understands their responsibilities.

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 –

There are 14 corrective maintenance packages on the work schedule for replacement/repair of equipment. Four packages are for the P16 exhauster (C105/C-106) and 10 packages are for the SX Tank Farm exhauster.

None of these packages will impact the ability of the exhausters to perform their safety function. There are zero surveillance tests or preventative maintenance items that are backlogged for the SST active ventilation systems. The system is maintained in operational status.

There are preventive maintenance packages that are continually being generated to perform the required aerosol test. If the filter fails the aerosol test then a package is generated to replace the filter. There are no backlog action items for the SST passive ventilation systems (breather filters).

Operators monitor the status of the SST ventilation systems (active and passive). The systems are maintained in operational status.

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 –

Daily, weekly, and monthly surveillance operator rounds are conducted to ensure tank farm operating equipment is functioning properly. These surveillances include items that are intended to ensure reliable performance of the SST ventilation systems.

Additionally, preventive maintenance and surveillance (PM/S) activities are regularly scheduled and conducted through the PM/S module of the Job Control System (JCS). These activities include the calibration, functional testing and other periodic maintenance items necessary for system components that assist operators in monitoring and controlling system operations, but are not necessarily tied directly to a safety-related function.

Regularly scheduled Environmental Surveillances and Compliance Inspections are also conducted within the SST tank farms. Included in these surveillances are SST ventilation systems.

The Facility Excellence Program (FEP) as described in Section 5.8.3, “Identify and Implement Improvement Opportunities” of the “Integrated Environment, Safety, and Health Management System Description for the Tank Farm Contractor” (RPP-MP-003, Rev. 1), provides regularly scheduled self-assessments of different facilities by employees.

Walk-down assessments are informal, but equipment condition issues have been addressed in these walk-downs.

The maintenance program is well established and procedures are in place. The operator routines, which review the systems operability, are performed daily. Configuration management of fieldwork and/or modifications is performed in accordance with procedures. The Shift Operations Manager is responsible for maintaining the system in operational status.

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 –

Two systems makeup the active ventilation system for SSTs. The SX exhauster was down for a total of 184 hours in the last three years. Therefore the SX sludge cooler was unavailable to perform its safety function 0.7 percent of the time over the last three years.

The P16 exhauster had a total of 8 hours of unplanned shutdowns in the last three years. Therefore the P16 exhauster was not capable of accomplishing its safety function 0.03 percent of the time over the last three years.

The overall SST active ventilation system was available to perform its safety function 99.6% of the time.

The HEPA filters were capable of performing their safety function 100% of the time. During the three-year time period the breather filters isolation valves could have been opened to performing their safety function 100% of the time. The overall availability of the SST passive ventilation breather filters to perform its safety function was 99.34% of the time, due to closures of the isolation valves.

During the three-year time period the West area breather filters were capable of performing their confinement function 100% of the time. During the three-year time period the East area breather filters were capable of performing their confinement function 100% of the time except for A-105. It was capable of performing its confinement function only 95.6% of the time.

The overall availability of the SST passive ventilation breather filters to perform its confinement ventilation function was 99.97%.

Electricity is the only utility system required by the C and SX Tank Farm active ventilation system exhausters. In addition, the associated stack monitoring system and differential pressure alarms need electricity to function.

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CONCLUSIONS:

The SST Ventilation Systems (active and passive) serve two primary functions: (1) dilution and removal of flammable gas buildup for prevention of a potential in-tank flammable gas deflagration accident (safety-class function) and (2) provide confinement ventilation to minimize fugitive unfiltered emission (environmental function). The systems are operable and available to perform their safety functions.

The systems are not required to be operable during planned shutdowns for maintenance. Additionally, should a ventilation system fail (unplanned shutdown) for any reason, there is sufficient time for recovery before flammable gas concentrations in a tank might reach the Lower Flammability Level (LFL) necessary for minimum combustion.

Without regard to actual ventilation system recovery periods for prevention of an in-tank gas deflagration accident, the ventilation systems were analyzed for availability over the past three years based upon down time as a result of unplanned shutdowns. Availability of the active systems to provide ventilation is greater than 99% for the SST active and passive ventilation systems.

As directed by the Office of River Protection, the contractor will be submitting an Authorization Basis amendment within the next several months to remove the requirement for active ventilation of the SSTs.

In addition, boundary drawings are needed to help clarify the safety systems within the facility and the interfaces to supporting structures, systems and components.

The safety systems will need to have the role of each unique piece of equipment defined. These requirements need to be defined in an update to the RPP Safety Equipment List.

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: __256__ Hrs.

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