1.0 PURPOSE AND SCOPE
(5.1.1, 5.1.2)

This standard provides requirements for flammable gas monitoring to ensure that representative samples are obtained using consistent industry standard methods.

Flammable gas monitoring is required by Tank Operations Contractor (TOC) technical safety requirements (TSRs) to meet Surveillance Requirements, Required Actions, and Administrative Controls. TOC field work is screened for flammable gas hazard controls in accordance with TFC-ENG-FACSUP-P-17. Flammable gas monitoring is also performed on request to support other functional area needs such as environmental compliance, health and safety, or other engineering activities.

2.0 IMPLEMENTATION

This standard is effective on the date shown in the header.

3.0 STANDARD

3.1 Tank and Annulus Headspace Monitoring
(5.1.1)

3.1.1 Actively Ventilated Tanks
(5.1.1)

Flammable gas monitoring for actively ventilated tanks shall be performed in the tank headspace by monitoring in one of the following locations:

- The tank headspace at a location at least three feet below the bottom of a riser (i.e., through a permanently installed or temporary sample tube, through a Standard Hydrogen Monitoring System (SHMS) probe or Multi-Functional Instrument Tree (MIT) middle or lower gas sample port). The three foot requirement ensures a representative tank headspace sample even if the riser is open.

For gas sampling tubes in closed risers, there is no required minimum distance of the sampling location below the bottom of the risers (i.e., the sampling tube inlet must simply be in the tank headspace below the riser).

- In the exhaust ventilation system up to the suction side of the first mixing point for a tank exhausted through a common header.

- In the exhaust ventilation system up to the discharge location for a tank that has a dedicated ventilation exhaust system.

- At another location as evaluated and approved in accordance with Section 3.2.3.

3.1.2 Passively Ventilated Tanks
(5.1.1)
Flammable gas monitoring for passively ventilated tanks shall be performed by monitoring in one of the following locations:

- The tank headspace at a location at least 3 feet below the bottom of a riser (i.e., through a permanently installed or temporary sample tube, through a SHMS probe or MIT middle or lower gas sample port). The three foot requirement ensures a representative tank headspace sample even if the riser is open.

For gas sampling tubes in closed risers, there is no required minimum distance of the sampling location below the bottom of the risers (i.e., the sampling tube inlet must simply be in the tank headspace below the riser).

- Inside a sealed riser through a sealed connection such as an Enraf flush port which utilizes quick-disconnect plugs with a positive shutoff valve for passively ventilated tanks with no induced gas release event hazard present.

No induced gas release event hazard is present if no flammable gas controls for induced gas release event hazards are required by HNF-IP-1266, AC 5.8.1, “DST Induced Gas Release Event Evaluation.”

- At another location as evaluated and approved in accordance with Section 3.2.3. For example, see TE-09-022 for DCRTs 244-BX, 244-S, and 244-TX.

3.1.3 **Double-Shell Tank Annuli**

Flammable gas monitoring for DST annuli shall be performed in the annulus headspace by monitoring in the annulus headspace at a location at least three feet below the bottom of the riser (i.e., through a permanently installed or temporary sample tube. The three-foot requirement ensures a representative tank headspace sample even if the riser is open. The length of the annulus riser should be factored into any preparations for sampling in the annulus headspace.

For gas sampling tubes in closed risers, there is no required minimum distance of the sampling location below the bottom of the risers (i.e., the sampling tube inlet must simply be in the annulus headspace below the bottom of the riser).

For cases in which the height of waste in the annulus precludes insertion of a sampling tube to a distance of three feet below the bottom of the riser (i.e., when the waste level in the annulus is such that less than three feet remains between the bottom of the riser and the surface of the waste), the sampling location should be as near as practicable to the surface of the waste.
3.1.4 Selection of Other Monitoring Locations

An alternative sampling location in an actively or passively ventilated tank, DST annulus, or annulus ventilation system requires a technical evaluation performed in accordance with TFC-ENG-FACSUP-C-03 that demonstrates the alternative sampling location meets the requirements for tank headspace monitoring in accordance with this standard.

In passively ventilated tanks when no gas release event hazard is present, monitoring locations for flammable gas monitoring other than in the tank headspace may be used if an evaluation is performed that ensures the flammable gas measurement is representative of the tank headspace flammable gas concentration. The evaluation shall consider the following:

- The monitoring location shall be sealed to ensure that the flammable gas concentration in the monitored location is not diluted by in flowing air
- Physical connection of the flammable gas monitor shall not dilute the flammable gas concentration in the monitored location. If connecting the flammable gas monitor dilutes the flammable gas concentration in the location to be monitored, monitoring may be allowed if: (1) the location is purged to replace the diluted air with air drawn from the tank headspace or (2) the flammable gas concentration measurement is delayed by the time required for diffusion to return the flammable gas concentration in the location to a concentration that is representative of the tank headspace (see RPP-19013).

3.2 Waste Transfer Primary Piping and Encasements

Monitoring locations for waste transfer primary piping and encasements, generally performed to support manned work activities on waste transfer primary piping or encasements, should be selected such that the location is as close as practicable to the location at which the work is to be performed. As described in RPP-RPT-59770, Hydrogen Gas Diffusion from Waste Transfer Associated Piping, a concentration gradient can exist along the length of the piping or encasement, regardless of whether the piping or encasement is vented. Therefore, taking the sample at the location at which the work is to be performed, or as close as practicable to that location, is necessary to ensure that the sample is representative of the flammable gas concentration to be subjected to the work activity.

The sample may be taken at a point outside the system, immediately adjacent to the point at which the system was breached, where it is impracticable to obtain a sample from inside the system. This approach is also valid for non-waste related piping systems that may contain flammable gas generated by corrosion.

The information contained in RPP-RPT-59770 may also be used to estimate the time required for venting of waste transfer primary piping or encasements when venting is required to allow dispersion of flammable gas from the piping or encasement, to reduce the flammable gas concentration. The data contained in RPP-RPT-59770 is also valid for venting of non-waste related piping systems that may contain flammable gas generated by corrosion, but not for piping systems that may contain flammable gas not generated by either tank waste or corrosion (e.g., piping systems used or previously used for combustible or flammable liquids).
3.3 Other Monitoring Locations
(5.1.1, 5.1.2)

For equipment or systems that are gas-trapping that are not addressed in the previous sections, including such items as waste transfer pumps, air-lift circulators, dip tube systems, 242-A Evaporator waste feed transfer piping, waste slurry transfer piping, and C-A-1 vessel drain (dump) piping; and other miscellaneous systems or equipment where the Section 3.2 and 3.3 requirements for flammable gas monitoring are not applicable, the location for flammable gas sampling requires a technical evaluation performed in accordance with TFC-ENG-FACSUP-C-03 that demonstrates the sampling location ensures a representative sample of the vapor space of concern.

4.0 DEFINITIONS

Manned work activities are activities that can cause an uncontrolled ignition source (e.g., errant spark) as a result of the use or manipulation of equipment or material by personnel or human error. The evaluation of manned work activities to determine whether ignition controls are required, and what controls are appropriate, is conducted in accordance with TFC-ENG-FACSUP-P-17.

Gas-trapping systems and equipment are systems or equipment that may contain flammable gases generated by tank wastes, including flammable gases generated by corrosion in a tank-waste environment, and that have a configuration that can trap flammable gases and accumulate a flammable gas concentration >25% lower flammability limit (LFL).

5.0 SOURCES

5.1 Requirements


5.2 References

1. HNF-IP-1266, “Tank Farm Operations Administrative Controls.”
2. RPP-19013, “Measuring Headspace Flammability Through Tank Risers.”
3. RPP-RPT-59770, “Hydrogen Gas Diffusion from Waste Transfer Associated Piping.”
5. TFC-ENG-FACSUP-C-03, “Technical Evaluation.”
6. TFC-ENG-FACSUP-P-17, “Flammable Gas Activities Ignition Source Control.”