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1.0 PURPOSE AND SCOPE

This procedure provides direction for managing potential exposures to tank waste vapors in accordance with the commitment established in TFC-PLN-34, “Industrial Hygiene Exposure Assessment Strategy,” to As Low As Reasonably Achievable (ALARA).

This procedure applies to all activities performed by the Tank Operations Contractor (TOC) and its subcontractors where there is potential for worker exposure to tank vapors.

2.0 IMPLEMENTATION

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

3.0 RESPONSIBILITIES

Responsibilities are contained within Section 4.0.

4.0 PROCEDURE

4.1 Management of Exposure Assessments

IH Department Manager /Industrial Hygienist 1. Utilize Exposure Assessments as described in TFC-PLN-34, Exposure Assessment Strategy and the current Tank Vapor Information Sheet (TVIS), and determine Chemicals of Potential Concern (COPC) and Chemicals of Concern (COC) sampling frequencies.

IH Exposure Assessment Owner 2. Determine and communicate the sampling protocol necessary to verify that the hazard control process is effective in controlling worker exposure to tank waste chemical vapors to below 50% of the Occupational Exposure Limit (OEL).

Industrial Hygienist 3. Direct sampling determined by the IH Technical Authority to satisfy the requirements of the exposure assessment.

4.2 Emission Point Evaluation

Industrial Hygienist 1. Review the results of the exposure assessment identified emission points, and verify that all emission points are adequately controlled.

2. Post fugitive emission source(s), upon discovery, as a temporary Vapor Control Zone (VCZ) until further characterization can be performed and/or permanent engineering controls (see Table 1) can be established.

3. Permanent VCZ locations are recorded on the TVIS and depicted electronically on the TOC Industrial Hygiene Web Page.
<table>
<thead>
<tr>
<th>Managing Tank Chemical Vapors</th>
<th>Manual</th>
<th>ESHQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document</td>
<td>TFC-ESHQ-S_IH-C-48, REV D-1</td>
<td></td>
</tr>
<tr>
<td>Page</td>
<td>3 of 17</td>
<td></td>
</tr>
<tr>
<td>Issue Date</td>
<td>February 5, 2018</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Work Risk Classification

Industrial Hygienist

1. Determine risk classification of work being performed, utilizing the information shown in Attachment A.

2. Document and ensure that appropriate controls are applied throughout the work planning process.

4.4 Determining Control Measures

NOTE: Table 1 contains examples of engineering controls that should be used preferentially unless it is evaluated to be a greater hazard. If this is the case, then other control methods must be evaluated. Active Construction activities may utilize these controls or controls equivalent to posting of VCZ; all controls must be documented, communicated and validated.

Industrial Hygienist

1. New or existing permanent emission points will be posted as permanent VCZ boundaries.

2. Evaluate whether fixed engineering controls (e.g., exhaust systems) are available or are already in use as a standard operating condition.

NOTE 1: The boundary of a VCZ is to be set at a radius of five feet or at a distance necessary to maintain exposure outside the boundary to less than the Action Level (AL), whichever is greatest, from the emission point. Table 2 contains additional guidelines on VCZ boundaries.

NOTE 2: Minimum Respiratory Protective Equipment (RPE) requirements are defined on the TVIS Respiratory Protection Forms (RPF).

3. If the exposure assessment results indicate that a farm COC and/or COPC exposure is unacceptable or undetermined as defined by TFC-PLN-34, ensure that the appropriate Personal Protective Equipment (PPE) is utilized to achieve that level.

4.5 Develop Personal Sampling and Monitoring Protocols

NOTE: Personal sampling media and criteria for Short-Term Exposure Limits (STELs), excursion, ceiling, and 8-hour Time Weighted Average (TWA), where established, in accordance with applicable regulations and industry standards, are to be included for each chemical identified on the farm COPC list. In addition, if work duration is anticipated to be less than the minimum time needed to collect a valid sample, COPC sampling is not required.

Industrial Hygienist

1. Develop a personal exposure sampling protocol for each COC and COPC in each Tank Farm. The frequency of sampling evaluation
for COPC list chemicals will be based on the minimum requirements identified in the exposure assessment.

2. Develop a monitoring protocol for leading indicator COCs in order to verify that control methods are effective at controlling exposure.


4. If the IHSP supports active retrieval or transfer activities, obtain review and signature approval of S&H Manager or the Industrial Hygiene (IH) Programs Manager.

5. Submit the IHSP to the Safety and Health Records Administrator.

### 4.6 Evaluating Field Activities

**Industrial Hygienist**

1. Define work area(s) and work activities through a review of work planning information (e.g., work instructions, procedure).

2. Identify Risk Classification (RC) from Attachment A, and document necessary controls to be implemented during the planned work activities.

3. If containment systems are to be used, give full consideration to the potential exposure changes during construction and removal of the containment systems and additional monitoring as part of the exposure analysis.

4. Document control requirements on Job Hazard Analysis (JHA), procedure, work instructions, or similar to ensure implementation during work evolution.

NOTE: Sampling/monitoring requirements, IHSP(s), and/or TVIS RPE may be deviated.

5. Document deviations to RC controls and/or sampling/monitoring requirements (e.g., work record entry, Safety and Health Field Surveillance, Industrial Hygiene Field Deviation [A-6004-451], Industrial Hygiene Exposure Assessment, Chemical Exposure Hazard Analysis [CEHA, see Attachment B]).

6. If control conditions in the field differ from those identified on the JHA, Exposure Assessment or work control requirements documented during the work planning process, or are found to be
not satisfactory, re-evaluate control measures and institute additional controls as necessary.

7. Provide TVIS(s), IHSP(s), and RPF(s) for inclusion in the work control document package.

8. At closure or completion of work activities and sampling/monitoring surveys in the Industrial Hygiene database, complete a review per TFC-PLN-34.

5.0 DEFINITIONS

Chemicals of Concern. Tank waste chemicals, based on statistical examination, which are reasonably likely to occur outside the tank headspace at a level at or greater than 50% of the OEL.

Chemical of Potential Concern. Tank waste chemicals, based on statistical examination, which are reasonably likely to occur outside the tank headspace at a level at or greater than 10% of the OEL.

Fugitive Emission Source. Tank vapor emission source discovered outside of current control systems.

Permanent Vapor Control Zone (VCZ). An administrative control boundary established around continuous exchange emission points (e.g., passive breather filters, exhauster stack openings during exhauster operation) where farm COPCs have the potential to exceed a respective AL (50% of OEL) utilizing an appropriate evaluative method in accordance with TFC-PLN-34. The VCZ boundary is to be identified using a physical barrier and signage in Attachment C.

Tank Vapor Information Sheet (TVIS). The TVIS is a written tool prepared by the Industrial Hygienist to communicate vapor hazards, COPCs, hazard controls, PPE and/or respiratory protection requirements, and IH monitoring requirements in a specific tank farm. It is posted at the site and on the Safety and Health website under TVIS. The TVIS information applies to all VCZs in a given tank farm.

Temporary Vapor Control Zone (VCZ). An administrative control boundary established when a temporary uncontrolled path to tank headspace is created, Ventilation Tank Primary System (VTP) is off, or fugitive emission source is discovered. The temporary VCZ boundary is to be maintained by an IHT or, if left unattended, identified using a physical barrier and signage in Attachment C.

6.0 RECORDS

The following records may be generated during the performance of this procedure:

- Chemical Exposure Hazard Analysis (Work Control)
- Industrial Hygiene Exposure Assessment (Work Control)
Records generated will be uploaded to IDMS for record retention by IH records management where indicated above and will be included in the appropriate work control process.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02, “Records Management.”

7.0 SOURCES

7.1 Requirements

No documents external to this procedure are required for performance.

7.2 References

1. RPP-22491, “Industrial Hygiene Chemical Vapor Technical Basis.”
2. TFC-BSM-IRM_DC-C-02, “Records Management.”
4. TFC-ESHQ-S_IH-C-46, “Industrial Hygiene Reporting and Records Management.”
5. TFC-PLN-34, “Industrial Hygiene Exposure Assessment Strategy.”
Table 1. Examples of Engineering Controls.

| Permanent Engineering Control | • Active ventilation  
|                              | • Blind flange with gasket  
|                              | • Hard rubber plugs  
|                              | • Threaded plugs with thread seal  
|                              | • Impermeable membrane (MDI Foam and Topcoat) WITH a proceduralized periodic surveillance and maintenance program. |

| Temporary Engineering Control | • Soft rubber (e.g., electrical putty, RTV)  
|                              | • Plastic sheeting or glove bags with work instructions to ensure that materials remain intact and in good condition if left for extended periods of time. |

*Not an Engineering Control: duct tape/electrical tape

The engineering controls in Table 1 may be designated permanent or temporary based upon the design, configuration or function of the equipment, systems or structures. During the work planning process, the hazard evaluation should identify and consider the applicability and effectiveness of the engineering controls associated with the work scope when determining the appropriate RC and any additional measures required to minimize potential exposure and to protect the worker.

If a system component is used as isolation (valves, plugs, or dampers), engineering control status (temporary vs. permanent) depends on system configuration:

If during normal tank farm operation a system component is configured to allow tank headspace vapors to exist inside of a system and said system component is re-configured to isolate the system from tank headspace vapors to perform work (isolation) this is considered a temporary engineering control.

If during normal tank farm operation a system component is configured to prevent the escape of tank headspace vapors from the system and is reconfigured to allow access to the system to perform work (penetration), this system component will be considered a permanent engineering control after its configuration is returned to the normal operating configuration.
<table>
<thead>
<tr>
<th>Table 2. Vapor Control Zone Parameters.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Permanent VCZ</strong></td>
</tr>
<tr>
<td>Boundary Controls</td>
</tr>
<tr>
<td>• Identified using a physical barrier and signage in Attachment C.</td>
</tr>
<tr>
<td><strong>Temporary VCZ</strong></td>
</tr>
<tr>
<td>Boundary Controls</td>
</tr>
<tr>
<td>• May be controlled by an Industrial Hygiene Technician (IHT) OR</td>
</tr>
<tr>
<td>• If left unattended the boundary is to be identified using a physical barrier and signage in Attachment C.</td>
</tr>
<tr>
<td>Passively Ventilated Tank Farm Entry Requirements</td>
</tr>
<tr>
<td>• Continuous direct reading instrument (DRI) monitoring is required when no engineering controls are established.</td>
</tr>
<tr>
<td>• Intermittent DRI monitoring is required when engineering controls are established.</td>
</tr>
<tr>
<td>• Respiratory Protection in accordance with TVIS Respiratory Protection Form.</td>
</tr>
<tr>
<td>Activey Ventilated Tank Farm Farm Farm Entry Requirements</td>
</tr>
<tr>
<td>• Continuous DRI monitoring is required.</td>
</tr>
<tr>
<td>• Respiratory Protection in accordance with TVIS Respiratory Protection Form.</td>
</tr>
<tr>
<td>Up Posting</td>
</tr>
<tr>
<td>• Established around permanent paths to tank head space or long-term temporary emission points are created during work evolutions.</td>
</tr>
<tr>
<td>• See Attachment D for establishing boundary distances.</td>
</tr>
<tr>
<td>Down Posting</td>
</tr>
<tr>
<td>• An updated exposure assessment has been completed documenting the elimination of an emission point with a permanent engineering control.</td>
</tr>
<tr>
<td>• When a permanent engineering control is established (see Table 1) and verified with DRI monitoring.</td>
</tr>
</tbody>
</table>
ATTACHMENT A – TANK VAPOR WORK CLASSIFICATION GROUPS

Tank vapor management will include implementation of a Risk Classification (RC) structure to conduct ongoing evaluation of potential exposures. RCs will be managed separately between the Single Shell Tank (SST) farms and Double-Shell Tank (DST) farms. The RC IHSPs will define sampling protocol necessary to control sample and monitor Tank Vapor hazard. Multiple RCs may be applied as appropriate during a single work evolution as work scope permits. Hazard control methods for each RC will be integrated into work instructions.

Single-Shell Tank Farms

The determination of RCs for each SST farm will be based upon the exposure pathway (open, restricted or controlled, or isolated). These RCs are contingent upon standard operating conditions (e.g., no indicators of non-standard conditions such as spills, releases, or increased odors). An additional RC will be maintained for the non-standard operating conditions (e.g., TF-AOP-011, “Response to Chemical and/or Radiological Events;” TF-AOP-015, “Response to Reported Odors or Unexpected Changes to Vapor Conditions”).

Tank status and exposure pathway will be recorded in the Industrial Hygiene database for each sampling or monitoring event. The RC evaluation will be conducted utilizing the RC assignment of the data based upon Table A-1.

Table A-1. SST RC Determination.

| General farm entry, no VCZ, pit, or ventilation system access | 1 |
| Restricted/Controlled pathway | 2 |
| Open pathway | 3 |
| Non-standard operating conditions | 4 |

RC 1 activity examples include:

- General farm entry. Would exclude any activities within a Vapor Control Zone (VCZ) or activities that include an open path, or temporarily restricted path to a tank head space
- Operator/HPT/IHT rounds and routines that do not require entering VCZs or pits
- Walkdowns (e.g., Employee Accident Prevention Council or JHA)

RC 2 activity examples include:
• Work performed in a Permanent VCZ boundary where isolation is used to temporarily downgrade from RC 3 to RC 2 control sets by utilizing isolation valves.
• Replacing radial filters where an upstream control valve remains closed during the work evolution
• Replacement or repair of ENRAFs where an upstream control valve remains closed during the work evolution.
• Open riser or pit work on SSTs with portable exhauster

ATTACHMENT A – TANK VAPOR WORK CLASSIFICATION GROUPS (cont.)

RC 3 activity examples include:

• Operator/HPT/IHT rounds and routines that require entering VCZs where emission point isolation is not applied (short duration tasks)
• Open riser work on SSTs without portable exhauster support
• SST pit work without drain seal isolation or portable exhauster support
• SST pit work in tank waste (defined as tank waste source reading above 50% OEL for Ammonia or VOCs) containing pits

RC 4 activity examples include:

• TF-AOP-011, “Response to Chemical and/or Radiological Events”
• TF-AOP-015, “Response to Reported Odors or Unexpected Changes to Vapor Conditions”
• TF-AOP-021, “Response to Tank Farm Ventilation Upset”

Table A-2. SST RC Sampling/Monitoring Requirements.

<table>
<thead>
<tr>
<th>RC</th>
<th>Sampling</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At Industrial Hygienist Discretion</td>
<td>At Industrial Hygienist Discretion</td>
</tr>
<tr>
<td>2</td>
<td>At Industrial Hygienist Discretion</td>
<td>Intermittent OR Continuous</td>
</tr>
<tr>
<td>3</td>
<td>Required*</td>
<td>Continuous</td>
</tr>
<tr>
<td>4</td>
<td>At Industrial Hygienist Discretion</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

*These are basic requirements. See Section 4.6.

NOTE: Sampling/monitoring requirements may be deviated by Industrial Hygienist after sufficient data has been collected, documented, and verified.

Double-Shell Tank Farms
The determination of RCs for each DST farm will be based upon the operational status and effectiveness of the ventilation system for controlling potential exposures to tank vapors. An additional RC will be maintained for the non-standard operating conditions (e.g., TF-AOP-011, TF-AOP-015, TF-AOP-021, inoperable DST ventilation).

Tank status and exposure pathway will be recorded in the Industrial Hygiene database for each sampling or monitoring event. The RC evaluation will be conducted utilizing the RC assignment of the data based upon Table A-2.

**ATTACHMENT A – TANK VAPOR WORK CLASSIFICATION GROUPS** (cont.)

**Table A-3. DST RC Determination.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>General farm entry, no VCZ, pit, or ventilation system access</td>
<td>1</td>
</tr>
<tr>
<td>Ventilation maintains negative pressure</td>
<td>2</td>
</tr>
<tr>
<td>Ventilation does not maintain negative pressure</td>
<td>3</td>
</tr>
<tr>
<td>Non-standard operating conditions</td>
<td>4</td>
</tr>
</tbody>
</table>

RC 1 activity examples include:

- General farm entry for operator rounds or walk downs. Would exclude any activities within a VCZ, pit, and components integrated to the air flow of the ventilation systems, or activities that include a direct open path to a tank head space.

RC 2 activity examples include:

- Exhauster system access on the negative pressure side where flow of atmosphere into primary tank head space occurs.
- Camera or probe installs in pits when drain seal is open to provide active ventilation.
- Camera or probe install/removal in tanks with active ventilation.
- Open riser work on DSTs actively ventilated by the exhauster system.
- Isolation: Intrusive work into systems that are restricted from the primary head space by physical barriers as engineering controls (i.e., ball valves, plugs).

RC 3 activity examples include:

- Exhauster system access on the positive pressure side.
- Work within a permanently established VCZ.
- Open pit work in tank waste (defined as tank waste source reading of 50% of OEL for Ammonia or VOCs) containing pits.
Intrusive activities into closed waste contacted pits without active ventilation through pit drain or other source

RC 4 activity examples include:

- TF-AOP-011
- TF-AOP-015
- TF-AOP-021
- Other conditions when exhauster is not operating
### ATTACHMENT A – TANK VAPOR WORK CLASSIFICATION GROUPS (cont.)

#### Table A-4. DST RC Sampling/Monitoring Requirements.

<table>
<thead>
<tr>
<th>RC</th>
<th>Sampling</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At Industrial Hygienist Discretion</td>
<td>At Industrial Hygienist Discretion</td>
</tr>
<tr>
<td>2</td>
<td>At Industrial Hygienist Discretion</td>
<td>Intermittent OR Continuous</td>
</tr>
<tr>
<td>3</td>
<td>Required*</td>
<td>Continuous</td>
</tr>
<tr>
<td>4</td>
<td>At Industrial Hygienist Discretion</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

*These are basic requirements. See Section 4.6.

NOTE: Sampling/monitoring requirements may be deviated by Industrial Hygienist after sufficient data has been collected to verify control sets are effective.
ATTACHMENT B – TANK FARM CHEMICAL EXPOSURE HAZARD ANALYSIS TEMPLATE

[This template has been developed to provide a consistent format for conducting tank farm chemical exposure hazard analysis. The description of the information to be provided in each section is the information at a minimum that should be included in the analysis.]

1. Summary

   [This section is a summary of work and should include at a minimum: 1) description of the work area, 2) sources with the potential to contribute to worker exposures, 3) adjacent activities that may contribute to potential exposure, 4) relationship to existing RCs, and 5) detailed description of work performed (e.g., waste transfer, chemical additions to tanks, installation of equipment).]

2. Source Evaluation

   [This section is a summary of source sampling and monitoring conducted and should include an evaluation, in accordance with TFC-PLN-34, of source information collected and comparison to existing TVIS information. If no source sampling or monitoring was conducted, document as such.]

3. Emission Point Evaluation

   [This section is a summary of the work activity relationship to emission points and should include emission points (TVIS listed and temporary) that may have contributed to potential exposures during the work evolution.]

4. Work Classification Group Evaluation

   [This section is a summary of the exposure evaluation. This section should include a discussion of how the work activities relate to RC(s) evaluated, an evaluation of the data collected, control measures utilized, and the role of work specifics that may affect understanding of interpretation of data (e.g., waste flow and volumes, waste status, work activities).]

5. Recommendations

   [This section is a summary of recommendations by the Industrial Hygienist and may include recommendations on TVIS content, IHSP content, improvement to field documentation, functioning of database.]

IH Author
Print (First and Last):
Signature:
Phone:
Date:

IH Peer Review
Print (First and Last):
Signature:
Phone:
Date:
ATTACHMENT C – ADMINISTRATIVE BOUNDARY SIGNAGE

Figure C-1. Vapor Control Zone Signage.
ATTACHMENT D – GUIDELINES FOR DETERMINING PERMANENT VCZ BOUNDARIES

Determining permanent VCZ boundary distance for new/existing emission points may include (but not be limited to) evaluation of the following sources:

- Existing physical boundaries
- Personal/area sampling data
- Monitoring data
- Management input
- Modeling data

NOTE: Permanent VCZ boundaries modified to support waste disturbing activities should be documented in applicable activity plans.

Adjust permanent VCZ boundary distances based on empirical data gathered.

Ensure clear communication of changes to all interested parties.