1.0 PURPOSE AND SCOPE

This document will outline the Industrial Hygiene (IH) program’s strategy for developing a written Exposure Assessment (EA) program in accordance with guidelines from the American Industrial Hygiene Association.

The scope of the WRPS IHEA strategy is to:

- Develop goals for the EA
- Define Roles and Responsibilities within the EA program
- Identify the decision statistics for determining an exposure profile for SEG
- Systemize prioritizing and gathering additional information
- Define an exposure thresholds and criteria performance strategy for conducting monitoring
- Systemize prioritizing non-compliant exposures
- Communicate the system for documenting EA findings
- Define criteria for periodic reassessment of work-place exposures.

The scope of applicable work for the IHEA program comprises of the Tank Farm Operation Contract (Contract) work scope. This includes Tank Farm work, Effluent Treatment Facility (ETF), 222-S Laboratory Facilities, and all other work performed under Tank Operations Contractor (TOC), including subcontracted work.

2.0 PROCESS

2.1 Overall Strategy Goals

The WRPS IHEA program best fits a comprehensive strategy. This strategy is directed at assessing exposures for all workers, on all days, to all Industrial Hygiene hazards (biological, physical and chemical) present at the work location. In addition to assuring compliance with established occupational exposure limits (OELs), this strategy assesses exposure to hazards in order to keep exposures as minimal as reasonably possible.

Comprehensive EA strategies provide a more complete understanding of exposures than other types of strategies. They enable better management of IH related risks, including both acute and chronic exposure that may be damaging to employee health. Comprehensive strategies also provide additional assurance to various stake holders, employees, and management that occupational health risks are understood and proper steps are in place to manage risks.
2.2 Similar Exposure Grouping

Similar exposed groups (SEG) are groups of workers with similar exposure profiles. Initially, the TOC will group SEGs using qualitative data. These profiles will be categorized by primary worker location (Tank Farms, 222-S, or ETF) and stratified further by additional metrics (e.g., worker skill or craft). Additional stratification will further define SEGs as necessary to identify the appropriate exposure profile. Each worker will be grouped into an SEG based on their specific profile.

Evaluation of appropriate SEGs and SEG stratification will be refined by reviewing objective sampling results for each of the various SEGs. All the SEGs will be prioritized and ranked based on risk potential to workers. SEGs with agents that are presenting significant risk will require immediate attention and will be defined as a critical SEG. Critical SEGs will require additional sampling, controls, or SEG refinement. Non-critical SEGs with similar sample profiles can be condensed.

2.3 Establish Baseline

Establishing the baseline hazard analysis for hazards identified in the tank farms and other locations managed by the TOC is accomplished by utilizing existing information when available. This information typically includes, but is not limited to:

- Process knowledge
- Historical data
- Results of walk downs
- Results of previous sampling and monitoring.

In addition, sampling may be performed to establish a baseline for a hazard identified in a specific location. If sampling is required in order to establish a baseline, then the method of analysis must be documented for each respective work location. Initial monitoring or sampling provides data for determination by decision statistics of hazardous conditions.

Radiological Hazards present at the tank farms, however, are not addressed as part of the IHEA. All Radiological Hazards are controlled and managed by the TOC Radiological Control program, HNF-5183, “Tank Farms Radiological Control Manual.”

2.4 Decision Statistic

Based on the SEG exposure profile and the information regarding the toxicity of the agent, a judgment (decision statistic) is made about the exposure. Specifically, the exposure profile along with any uncertainty in the exposure profile is compared to the OEL, and a decision is made regarding the acceptability of the risk posed by the exposure. The decision statistic may be based on quantitative or qualitative data.

Each exposure sample result will be judged against the decision statistic (quantitative or qualitative). All exposures will be categorized based on this statistic into one of the three following exposure types:
2.4.1 Compliant Exposures

Exposures judged as compliant are documented as such and are scheduled for a periodic routine assessment to verify exposures remain acceptable. Scheduled sampling/monitoring will be documented in relevant Industrial Hygiene Sampling Plans (IHSPs) for verification of compliant exposures. Compliant exposures are those that are below OELs for the respective contaminant and/or hazard identified.

2.4.2 Non-Compliant Exposures

Non-Compliant Exposures will be documented as such in the EA report along with schedules for sampling and monitoring in appropriate IHSPs for reassessment of exposure. Continued sampling/monitoring of hazards is required until final controls are verified to be below the decision statistic. Non-Compliant exposures are those that are in excess of OELs for the respective contaminant and/or hazard identified.

2.4.3 “Undetermined” Exposures

“Undetermined” exposures apply to those scenarios when:

- OEL for a particular chemical/s is unavailable
- A new/rare/infrequently-encountered/etc., contaminant is detected in chemical analyses.

Exposures judged as undetermined will be prioritized for further information gathering (monitoring/sampling). Sampling and monitoring schedules will be outlined in each EA. IH will determine the required information necessary to resolve the uncertainty associated with the exposure.

The quantitative decision statistic for hazards with OELs and sufficient monitoring/sampling data is based on 95% confidence of the hazard’s Action Limit (AL). Samples falling within the decision statistic are considered compliant exposures. Any sample results above the OEL will be categorized as Non-Compliant. All others will be deemed undetermined.

For hazards without an established OEL, insufficient monitoring/sampling data, or for baseline sample results containing tentatively identified compounds (TICs), applicable health effect data will be qualitative and will be utilized in determining the acceptability of the exposure. The criteria for including TICs obtained from personal and area sample results is detailed below:

- >100 ng of material for volatile organic agents reported as mass by the analytical laboratory
- >150 ng of material for semi-volatile organic agents reported as mass by the analytical laboratory
- >75% match to the NIST mass spectral library.
Utilizing information acquired during basic characterization, judgments will be made on the acceptability of exposures associated with the specific SEG. A risk rating will then be calculated using the following formula:

$$ER = \frac{FDR + CR + LR}{3}$$

where:
- ER = exposure rating
- FDR = frequency/duration rating
- CR = control rating
- LR = exposure concentration level rating

### 2.5 Documentation and Communication of Exposure Assessments

#### 2.5.1 Documentation of an EA

The EA will be completed in accordance with the implementing procedure TFC-ESHQ-IH-C-69. Record Retention methods for EAs and controlling record revisions is documented and controlled in TFC-ESHQ-IH-C-46.

#### 2.5.2 Communication of Exposure Assessment

Electronic posting of an EA will be made available on the IH program web page. Both personal monitoring results and the distribution of exposures within similarly exposed groups will be provided to the occupational medical contractor, per TFC-ESHQ-IH-C-46.

### 2.6 Criteria for Document Revision

EA document revisions may be necessary if any of the following conditions are met:

- An exposure is determined to be Non-Compliant
- Change in uncertain or non-compliant exposure status
- Permanent loss or decrease in prescribed controls documented in the EA
- The EA expiration date is met.

Although an EA can be revised based on the criteria above, the EA is a living document with continuous minor updates. Updates can include the addition of job specific or EA required monitoring or sampling data or safety in depth control. Revisions that do not affect the technical content of the EA are considered inconsequential changes and will not trigger a full revision unless one or more of the criteria discussed above are met.

### 2.7 Roles & Responsibilities

#### 2.7.1 IH Exposure Assessment SME

- Ownership and Maintenance responsibilities for TFC-PLN-34 and all other subsequent documents directly associated with Exposure Assessments.

#### 2.7.2 Industrial Hygienist

- Maintains Exposure Assessments.
• Tracks individual Exposure Assessment expiration date and revisions.

• Defines data needs for individual Exposure Assessments.

• Prioritizes additional information gathering.

• Retains EA data and analyses.

• Communicates of EA updates/revisions/required notifications to Field Industrial Hygienists.

• Collects specifically requested information and project or work specific data.

• Communicates EA updates/revisions/required notifications to industrial hygiene technicians, field work supervisors, and crew.

2.7.3 **Industrial Hygiene Technician**

• Provides IH sample collection support.

• Provides data collection input.

2.8 **Exposure Assessment Use and Application**

Completed EAs will be utilized as the work site generalized hazard assessment for Job Hazard Analysis (JHA) purposes. Additional hazard analyses will be performed on job specific hazards and referenced on the JHA document. Controls required for job specific hazards will be documented on the JHA and within the work instructions to maintain compliant exposures.

SEG and location/task specific sample collection requirements will be established in the EA.

The EA will be utilized to identify potential exposures to various SEG groups. The individuals in each group will have an assigned Employee Job Task Analysis (EJTA) that is aligned with the exposure potential outlined in all applicable EAs. The EJTA will then trigger the required medical monitoring program for that individual.

3.0 **DEFINITIONS**

**Compliant Exposures.** Compliant exposures are those that are below OELs for the respective contaminant and/or hazard identified.

**COPC.** Chemicals of Potential Concern. A list of chemicals identified in the tank farm headspaces, and classified according to their carcinogenicity, concentration compared to their OELs, prevalence in tanks and toxicity.

**Exposure Assessment.** The systematic collection and analysis of potential exposures in the tank farm work place in view of all exposure determinants, (e.g., task frequency, duration, variability, meteorology, etc.). EA outcomes include judgments about the acceptability of each exposure profile and the institution of appropriate controls, as well as linkages to occupational medicine and epidemiological information for the purposes of risk management and health surveillance.
Industrial Hygiene Technician. Worker responsible for performing sampling and monitoring in the field. Collects raw data and sampling media to be analyzed by cognizant IHs and scientists.

Job Hazard Analysis. A process used to identify, evaluate, control, and communicate potential hazards associated with performing WRPS activities.

Non-Compliant Exposures. Non-Compliant exposures are those that are in excess of OELs for the respective contaminant and/or hazard identified.

Occupational Exposure Limit. A term used to represent: (1) the concentration or intensity of an airborne agent that is allowable, (2) the time period over which workplace concentrations are averaged to compare with the allowable exposure, and (3) the allowable concentration of a biological exposure index (BEI) in a biological sample. Thus, each OEL consists of an exposure limit and an averaging time, which are set by the sponsor of the OEL and must be used together, as prescribed by DOE. A substance may have several OELs for short term or acute exposures (e.g., 15-minute STEL or 30-minute Excursion Limit), long term or chronic exposures (e.g., 8-hour Time Weighted Average), or not-to-exceed limits (Ceiling Limit).

Similar exposed groups. A group of workers having the same general exposure profile for hazards because of the similarity and frequency of the tasks they perform, similarity of material and processes with which they work, and similarity of training and the way they perform the tasks.

Tank Vapor Inventory Sheet (TVIS). A document that contains farm-specific information such as COPCs, emission points, and the definition of SEG.

Undetermined Exposures. Undetermined exposures are when a chemical does not have an established OEL or when a new/rare/infrequently-encountered contaminant is detected in chemical analyses.

4.0 SOURCES

4.1 Requirements

No documents external to this plan are required for performance.

4.2 References


4.2.2 HNF-5183, “Tank Farms Radiological Control Manual.”


4.2.4 TFC-ESHQ-IH-C-17, “Employee Job Task Analysis.”

4.2.5 TFC-ESHQ-IH-C-46, “Industrial Hygiene Reporting and Records Management.”

4.2.6 TFC-ESHQ-IH-C-69, “Industrial Hygiene Exposure Assessments.”