

Washington River Protection Solutions  
**EVENT SUMMARY**

**NOTE:** This form provides timely notification to management and documents preliminary information of an event that may require a more formal investigation. Details may change upon further examination and analysis. The following is a current status of available information:

1. **Project:** Effluent Treatment Facility (ETF)      2. **Report Date:** 12/17/2024

3. **Investigation Title:** C-67 Response at ETF Process Floor

4. **Investigation Report Number:** EIR-2025-017

5. **Responsible Manager:** [REDACTED]

6. **Event Investigator:** [REDACTED]

7. **Area / Building / Location:** 200 East Area/ETF/2025E/Process Floor

8. **Date and Approximate Time of Event:** **Date:** 11/26/2024    **Time (military):** 2016 hours

9. **Associated Action Request (AR) Number:** WRPS-AR-2025-0566

10. **Associated Occurrence Report Number (if applicable):** N/A

11. **Event Investigation Meeting Held:** Yes [ ] or No [x]    **Date:** N/A      **Time (military):** N/A

**12. Activity in Progress:** (What activity was under way, include procedures and work order numbers, as applicable)

Workers were conducting daily facility rounds per procedure ETF-OR-DR-STT, *ETF STT Operator Rounds*.

**13. Personnel Involved:** (Job positions, number of personnel, identify any support organizations or subcontractors)

- WRPS Nuclear Chemical Operators (NCO) - 2
- WRPS Shift Operations Manager (SOM) - 1

**14. What Happened:** (Provide a short discussion of what happened)

On 11/26/2024 at approximately 2016 hours, three workers reported a stronger than normal odor described as "ammonia", "musty", "rotten", "stale water" and "earthy" when performing daily facility rounds on the 2025E process floor at ETF. Odors were reported most concentrated near Sump Tank 1, 20B-TK-1. Two workers reported experiencing no symptoms and declined a precautionary medical evaluation. One worker reported symptoms of a "warm throat" and "burning in the nose." The worker was taken to the Inomedic Health Applications (IHA) on-site medical provider for evaluation and was released to work without restriction.

At 2041 hours, the ETF SOM notified the Central Shift Manager (CSM) of the stronger than normal odors. Access was restricted in-place on the process floor.

At 2050 hours, The CSM contacted Direct Feed Low Activity Waste (DFLAW) Industrial Hygiene (IH) to request for TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*, field response actions.

At 2105 hours, the CSM notified the Department of Energy (DOE) Facility Representative to provide event notification.

At 2129 hours, the ETF Area Manager recommended removing temporary equipment from sump tank 1 20B-TK-1, closing the access hatch, and sealing penetrations to reduce the emission of odors.

On 11/27/2024 at 0016 hours, the IH field response was initiated, and direct reading instrument (DRI) monitoring was performed per Industrial Hygiene Sampling Plan (IHSP), IHSP-POE-MULTI-TFCOPSOPERC67, *Industrial Hygiene Odor Evaluation*. DRI readings were taken throughout the process floor and at the trenches around sump tank

Washington River Protection Solutions  
**EVENT SUMMARY**

1 20B-TK-1. All readings were less than detectable. All DRI instruments passed the post-use function tests. Four grab samples were collected from sump tank 1 20B-TK-1 for analytical processing.

At 0056 hours, TFC-OPS-OPER-C-67 response actions were completed. Normal Access was restored to the process floor.

**15. Where Did It Happen:** *(Description of work area and working conditions. Include information on weather conditions, PPE, Postings, etc.)*

- Odors were reported at the ETF 2025E building process floor. The odors were reported most concentrated near sump tank 1, 20B-TK-1
- At the time odors were reported the workers were wearing Level D Personal Protective Equipment (PPE). The workers were not in an area requiring respiratory protection. Personal ammonia monitors (e.g., VentisPro or ToxiRAE) are not required for work at the ETF. The work location is posted as a Radiological Buffer Area (RBA)/Radiological Material Area (RMA).

**16. Impact to Facility:** *(Caused by the event or a description of known consequences)*

No impacts to facility safety status and operational capabilities occurred.

**17. Immediate Actions Taken:** *(List immediate actions taken to stabilize the scene or respond to the event)*

- The workers were offered precautionary medical evaluation.
- The CSM initiated TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*, response actions.
- Access was restricted to the 2025E process floor.
- The CSM made required TFC-OPS-OPER-C-67 notifications.
- Industrial Hygiene Technicians (IHTs) took readings throughout the 2025E processing floor per survey plan IHSP-POE-MULTI-TFCOOPSOPERC67.
- IHTs surveyed the area around sump tank 1 20B-TK-1 for potential odor sources and collected grab samples of 20B-TK-1 headspace for analytical processing per survey plan IHSP-POE-MULTI-TFCOOPSOPERC67.
- Event Investigation EIR-2025-017, *C-67 Response at ETF Process Floor*, was initiated.

**18. Compensatory Actions Taken:**

None.

**19. Remedial Actions Taken:**

None.

**20. Key Elements of the Investigation:** *(Key investigation points)*

Per Industrial Hygiene Event Investigation Report, IHIR-00109, based on the odor descriptors provided upon submission of the Odor/Vapor Response Cards (OVRC) DRI monitoring for Ammonia, Volatile Organic Compounds (VOCs) (10.6 eV Photo Ionization Detector (PID) and 11.7 eV PID), and Hydrogen Sulfide was requested. Figure 1 below identifies the DRI readings acquired during the initial field response. All readings were less than detectable.

## Washington River Protection Solutions EVENT SUMMARY

Location	2025E Process Floor (initial entry)	20B-TK-1 and trench (source reading)	General accessible areas of 2025E
NH <sub>3</sub>	< 1 ppm	< 1 ppm	< 1 ppm
VOCs (10.6 eV PID)	< 0.010 ppm	< 0.010 ppm	< 0.010 ppm
VOCs (11.7 eV PID)	< 0.010 ppm	< 0.010 ppm	< 0.010 ppm
H <sub>2</sub> S	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
NO	< 0.5 ppm	< 0.5 ppm	< 0.5 ppm
NO <sub>2</sub>	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
SO <sub>2</sub>	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
CO	< 1 ppm	< 1 ppm	< 1 ppm
Hg	< 50 ng/m <sup>3</sup>	< 50 ng/m <sup>3</sup>	< 50 ng/m <sup>3</sup>
O <sub>2</sub>	20.9 %	20.9 %	20.9 %
LEL	0.0 %	0.0 %	0.0 %

Figure 1: DRI Readings Acquired During the Field Response.

Minimal odors associated with stagnant water is an anticipated occurrence at the ETF. Low levels of Hydrogen Sulfide (H<sub>2</sub>S) gas, Ammonia (NH<sub>3</sub>), and various Volatile Organic Compounds (VOCs) may be produced by the stagnant water at the ETF when within a confined area for an extended period.

- Low levels of Hydrogen Sulfide (H<sub>2</sub>S) gas are produced at the ETF when sulfate containing water, low airflow, and sulfur seeking bacteria stagnate within a confined area for an extended period. Hydrogen Sulfide gas has an offensive distinct rotten egg odor that is detectable at very low concentrations.
- Low levels of NH<sub>3</sub> gas are produced at the ETF primarily as the result of natural decay of organic material through biological decomposition. NH<sub>3</sub> gas has an offensive pungent, irritating odor that is detectable at very low concentrations. While odors may be readily perceived, concentrations are still well below levels of worker exposure concern.
- Low levels of volatile organic compounds (VOC) are produced at the ETF primarily as the result of natural decay of organic material through biological decomposition.

The IHR noted the analytical results of the grab air sample specific chemical mixture within the sump tank that were contributing to the reported odors could not be positively determined, therefore, the resulting chemical reaction products could not be hypothesized. As the specific odorant chemical mixture was unknown, evaluation of exposure compared to applicable Occupational Exposure Limits (OELs) could not be performed. However, the source 20B-TK-1 grab air sample results were found to be below OELs for the chemical compounds identified and below the applicable OELs for the tentatively identified compounds. Reference figure 2 below.

Tentatively Identified Compounds <sup>1)</sup> :				
Acetaldehyde	0.0011	25	STEL	ACGH TLV
Isoprene	0.0011	N/A		
Acetic acid	0.0003	10	TWA	ACGH TLV
1-Butanol	0.0003	20	TWA	ACGH TLV
4-methyl-Octane	0.0003	N/A		
1-butyl-3-Propanol	0.0004	N/A		
6-methyl-5-Hepten-2-one	0.0003	N/A		
3,7-dimethyl-Decane	0.0004	N/A		
3,3-dimethyl-Hexane	0.0005	100	TWA	NIOSH REL
Nonanal	0.0011	N/A		
Dodecane	0.0003	200	TWA	ACGH TLV
Decanal	0.0006	N/A		
Methanamine	0.0003	N/A		
Tridecane	0.0031	N/A		
Tetradecane	0.0021	N/A		

<sup>1)</sup> Tentatively Identified Compounds are analytes not associated with a calibration standard, but instead identified only through a Data System Library search based on retention time and mass. Results are not definitive as results are not subject to Laboratory Quality Control requirements.  
NOTE: All analytes were below 10% of applicable OELs.

Figure 2: Grab Sample Results Collected from the Opening of Sump Tank 1, 20B-TK-1

The analytical results from the grab samples collected from the 20B-TK-1 hatch opening were at or above published odor detection concentrations for some Tentatively Identified Compounds with similar odor descriptors as provided on the OVRs. Analytes detected at concentrations above published odor thresholds are highlighted in figure 3 below.

## Washington River Protection Solutions EVENT SUMMARY

Identified Compounds	Result (ppm)	Odor Threshold		Odor Characteristic
		Detectable	Recognizable	
Acetaldehyde	0.0028	0.001 ppm	0.015 ppm	"ethereal", "fresh", "fruity", "musty", "pungent"
Propene	0.0004	0.001 ppm	0.015 ppm	"ethereal", "musty", "pungent"
Dichlorodifluoromethane	0.0006	199790 ppm		"ether-like"
Chloromethane	0.0004		> 10 ppm	"sweet"
n-Butane	0.0004	6.5 ppm	12 ppm	"gasoline-like"
Ethanol	0.0076	0.09 ppm	4.6 ppm	"alcohol", "ethereal"
Trichlorofluoromethane	0.0002	~ 200,000		"ether-like"
Acrolein	0.0011	0.0036 ppm	0.21 ppm	"almond", "cherry", "disagreeable", "pungent"
n-Pentane	0.0001	1.29 ppm	1147 ppm	"gasoline-like", "pleasant"
Acetone	0.0056	0.42 ppm	1.7 ppm	"apple", "chemical", "ether-like", "fruity"
Isopropanol	0.0004	1.6 ppm	3.2 ppm	"alcohol", "ethereal"
Dichloromethane	0.0003	1.2 ppm		"sweet", "chloroform-like"
trans-1,2-Dichloroethene	0.0002	1.2 ppm		"sweet", "chloroform-like"
Methyl Ethyl Ketone	0.0003	0.07 ppm	5.4 ppm	"acetone", "camphor", "ethereal", "fruity", "sweet", "sharp"
Methyl methacrylate	0.0015	0.049 ppm	0.21 ppm	"acid", "acrylic", "aromatic", "fruity", "plastic", "sharp"
1,4-Dioxane	0.0001	24 ppm		
Toluene	0.0002	0.032 ppm	0.93 ppm	"benzene", "burnt", "floral", "mothballs", "paint thinner", "pungent"
<b>Tentatively Identified Compounds</b>				
Acetaldehyde	0.0011	0.001 ppm	0.015 ppm	"ethereal", "fresh", "fruity", "musty", "pungent"
Isoprene	0.0011	0.047 ppm		"isoprene"
Acetic acid	0.0003	0.0004 ppm	0.02 ppm	"vinegar"
1-Butanol	0.0003	0.02 ppm		"banana-like", "harsh", "sweet"
4-methyl-Octane	0.0003	No data available	No data available	
1-butyl-2-Propanol	0.0004	No data available	No data available	"ether-like"
6-methyl-5-Hepten-2-one	0.0003	No data available	No data available	"citrus-like", "fruity"
3,7-dimethyl-Decane	0.0004	No data available	No data available	
3,3-dimethyl-Hexane	0.0005	No data available	No data available	"odorless"
Nonanal	0.0011	0.0009 ppm		"old-people"
Dodecane	0.0003	0.62 ppm		"gasoline-like"
Decanal	0.0006	0.0063 ppm		"sweet", "aldehydic", "orange", "waxy", "floral"
Methenamine	0.0003	No data available	No data available	"odorless"
Tridecane	0.0031	No data available	No data available	"gasoline-like"
Tetradecane	0.0021	No data available	No data available	"gasoline-like"

Figure 3: Grab Sample Results Collected from the Opening of Sump Tank 1; 20B-TK-1 Compared to Published Odor Thresholds.

While odors may be perceived, concentrations are still well below levels of worker exposure concern.

IHIR-000109 provided the following recommendations:

- Communication that odors are common and expected at ETF should be increased. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.
- Evaluation of operational processes in which process chemicals and/or effluent contaminants are mixed should be performed to the extent that resulting gases/vapors can be ranked based on possible odorant formation and/or emission. Then processes which are anticipated to result in odorous emissions should not be performed without additional controls (e.g. ventilation, access restriction, communication) in place to eliminate potential worker exposure until exposure assessment can be performed to ensure that exposure to odorous emissions does not equate to potential exposure above OELs.
- An evaluation should be performed by ETF Engineering to determine the specific requirements, standards, and/or regulations related to ventilation of 20B-TK-1. The frequent presence of odors attributed to 20B-TK-1 suggests that ventilation is ineffective, which may indicate a non-conformance.

### 21. Positive Aspects Identified:

None.

### 22. Key Take Aways / Learning Opportunities:

Odors associated with stagnant water are anticipated at the ETF. Low levels of Hydrogen Sulfide gas, Ammonia, and various Volatile Organic Compounds may be produced by the stagnant water within confined areas for extended periods. Communication that odors are common and expected at ETF should be increased.

Washington River Protection Solutions  
**EVENT SUMMARY**

Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.

**23. Event Investigation:**

- An Event Investigation will be completed per [TFC-OPS-OPER-C-14](#).
- This event will be managed by another process, i.e., Operability Evaluation, Engineering Technical Evaluation, etc.
- This event does not require continuation of the Event Investigation process.

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**Responsible Manager Approval:**

 _____ <i>Name (First, Middle Initial, Last)</i>	 _____ <i>Signature / Date</i>
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**CAS Manager Approval:**

 _____ <i>Name (First, Middle Initial, Last)</i>	 _____ <i>Signature / Date</i>
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Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)**

Event Title:	IHIR Number:
<b>TFC-OPS-OPER-C-67 Response at 2025E.</b>	<b>IHIR-000109</b>
	IHEI Number:
	N/A

Table of Contents

Event Summary and Timeline.....	2
Event Summary .....	2
Field Response Timeline .....	2
Sampling/Monitoring Results.....	4
Direct Reading Instrument Monitoring Results.....	4
Sampling Results .....	4
Event Response DRI and Air Surveys.....	8
Additional Information .....	8
Review of the Data Fusion & Advisory System (DFAS).....	9
Vapor Monitoring Detection System (VMDS).....	10
Monitoring Selections .....	12
Odor Characteristics and Odor Thresholds of Identified and Tentatively Identified Compounds .....	14
Chemicals associated with Odor Descriptors provided by O/VRCs and Associated Odor Thresholds .....	15
ETF Operational Configuration Timeline.....	17
Recommendations/Conclusions .....	19
Recommendations .....	19
Conclusions.....	19

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

<b>Date:</b> 11/26/2024	<b>Time:</b> 2016	<b>Location:</b> 2025E Process Floor
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## Event Summary and Timeline:

### Event Summary:

At approximately 2016 on November 26th 2024, two employees reported stronger than normal “ammonia”, “musty”, “rotten”, “stale water” and “earthy” odors when performing routine work near 20B-TK-1 in the 2025E Process Floor. Symptoms of “warm throat” and “burning in nose” were reported. The affected employee was transported to the occupational medical provider for precautionary medical evaluation.

### Field Response Timeline:

November 26<sup>th</sup> 2024:

2044 Shift Operations Event Notification (SOEN): “Responding to stronger than normal odors per C-67 on the ETF Process Floor. Access is Restricted to ETF Process Floor. CSM”

2048 Central Shift Manager (CSM) consults Data Fusion Advisory System (DFAS) for current weather conditions:

- Stability Class F/G (moderate/extremely stable)
- Wind speed 7.2 mph from 278° (from West)
- Mixing height 1000 ft above grade

2050 CSM contacts Direct Feed Low Activity Waste (DFLAW) Safety & Health Manager to request support for field response actions.

2055 CSM contacts DFLAW Industrial Hygienist (IH) to request support for field response actions.

2105 CSM Notifies Department of Energy (DOE) Field Representative of event initiation.

2115 CSM provides DFLAW IH draft TFC-OPS-OPER-C-67 Attachment A “Response Plan”. DFLAW IH recommends ensuring end state of response actions includes access restriction around 20B-TK-1 as consistent with previous odor response evolutions to provide Shift Operations Manager (SOM) opportunity to adequately brief facility personnel about prevalence of odors in area.

2118 DFLAW Safety & Health Manager briefs DFLAW Industrial Safety (IS) Supervisor, ETF Area Manager, DFLAW Level 1 Operations Manager, and Environmental Safety Health & Quality (ESH&Q) Deputy Level 1 Manager on event.

2118 DFLAW IH approves TFC-OPS-OPER-C-67 Attachment A “Response Plan”.

2120 DFLAW IH provides event response briefing to Field Response Team (1Production Operations [PO] Shift Industrial Hygiene Technician [IHT]):

- Perform monitoring as per IHSP-POE-MULTI-TFCOPSOPERC67:
  - Ammonia (NH<sub>3</sub>) – Action Limit 12 parts per million (ppm)
  - Volatile Organic Compounds (VOCs) (10.6 eV PID) – Action Limit N/A, for indication purposes only.
  - VOCs (11.7 eV PID) - Action Limit N/A, for indication purposes only.
  - Hydrogen Sulfide (H<sub>2</sub>S) – Action Limit 0.5 ppm
  - Survey areas around 20B-TK-1 for potential odor sources, collect grab sample(s) of 20B-TK-1 headspace for analytical processing.
  - Survey all accessible areas of the 2025E Process Floor.
- Respiratory Protection Equipment (RPE) – voluntary use

2129 ETF Area Manager recommends removing temporary equipment from 20B-TK-1, closing access hatch, and sealing penetrations to reduce emission of odors.

2130 CSM initiates Event Investigation (EIR-2025-017), Point-of-Contact (POC) assigned.

2138 DFLAW Safety & Health Manager contacts ESH&Q Manager to provide briefing on event.

Note: Field Response Timeline continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Field Response Timeline continued:

November 27<sup>th</sup> 2024:

0016 CSM Contacts DFLAW Safety & Health Manager to provide results of field response actions:

- At and trenches around 20B-TK-1:
  - Ammonia (NH<sub>3</sub>) – Less than Detectable (< 1.0 ppm)
  - Volatile Organic Compounds (VOCs) (10.6 eV PID) – Less than Detectable (< 0.01 ppm)
  - VOCs (11.7 eV PID) - Less than Detectable (< 0.01 ppm)
  - Hydrogen Sulfide (H<sub>2</sub>S) – Less than Detectable (< 0.1 ppm)
- Area readings throughout process floor, mezzanine:
  - Ammonia (NH<sub>3</sub>) – Less than Detectable (< 1.0 ppm)
  - Volatile Organic Compounds (VOCs) (10.6 eV PID) – Less than Detectable (< 0.01 ppm)
  - VOCs (11.7 eV PID) - Less than Detectable (< 0.01 ppm)
  - Hydrogen Sulfide (H<sub>2</sub>S) – Less than Detectable (< 0.1 ppm)
- Direct Reading Instrumentation (DRI) passed post use function test at 0010 11/27/2024.
- Four grab samples were collected from 20B-TK-1 for analytical processing.

0056 SOEN: “C-67 Response actions for stronger than normal odors on the ETF Process Floor have been completed. Normal access is restored to ETF Process Floor. CSM”

Field Response Timeline Acronyms:

CSM	Central Shift Manager
CSO	Central Shift Office
DFAS	Data Fusion & Advisory System
DFLAW	Direct Feed Low Activity Waste
DOE	Department of Energy
DRI	direct reading instrument
ESH&Q	Environmental, Safety, Health, & Quality
ETF	Effluent Treatment Facility
eV	electron-volts
H <sub>2</sub> S	Hydrogen Sulfide
IH	Industrial Hygienist
IHT	Industrial Hygiene Technician
IS	Industrial Safety
mph	miles per hour
NH <sub>3</sub>	Ammonia
O/VRC	Odor/Vapor Response Card
PID	photoionization detector
POC	Point of Contact
PO	Production Operations
ppm	parts per million
S&H	Safety & Health
SOEN	Shift Office Event Notification
VOC	Volatile Organic Compound

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- DRI readings acquired during field response:

Location	2025E Process Floor (initial entry)	20B-TK-1 and trench (source reading)	General accessible areas of 2025E
NH <sub>3</sub>	< 1 ppm	< 1 ppm	< 1 ppm
VOCs (10.6 eV PID)	< 0.010 ppm	< 0.010 ppm	< 0.010 ppm
VOCs (11.7 eV PID)	< 0.010 ppm	< 0.010 ppm	< 0.010 ppm
H <sub>2</sub> S	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
NO	< 0.5 ppm	< 0.5 ppm	< 0.5 ppm
NO <sub>2</sub>	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
SO <sub>2</sub>	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
CO	< 1 ppm	< 1 ppm	< 1 ppm
Hg	< 50 ng/m <sup>3</sup>	< 50 ng/m <sup>3</sup>	< 50 ng/m <sup>3</sup>
O <sub>2</sub>	20.9 %	20.9 %	20.9 %
LEL	0.0 %	0.0 %	0.0 %

Sampling Results:

- Grab samples were collected from the opening of 20B-TK-1 access hatch. One grab sample was transferred to Carbotrap 300 TDU media for VOC analysis by Gas Chromatography/Mass Spectrometry by method TO-17A.

Analytes	Results (ppm)		Applicable OEL (ppm)		
	20B-TK-1 headspace				
Bromochloromethane	< 0.0025		200	TWA	NIOSH REL
Propene	0.0004		500	TWA	ACGIH TLV
Dichlorodifluoromethane	0.0006		1000	TWA	NIOSH REL
Chloromethane	0.0004		50	TWA	ACGIH TLV
1,2-Dichloro-1,1,2,2-tetrafluoroethane	< 0.0001		1000	TWA	ACGIH TLV
Vinyl chloride	< 0.0001		1	TWA	OSHA PEL
n-Butane	0.0004		800	TWA	NIOSH REL
1,3-Butadiene	< 0.0001		1	TWA	OSHA PEL
Chloroethane	< 0.0001		100	TWA	OSHA PEL
Vinyl bromide	< 0.0001		0.5	TWA	ACGIH TLV
Ethanol	0.0076		1000	STEL	ACGIH TLV
Trichlorofluoromethane	0.0002		1000	TWA	OSHA PEL
Acrolein	0.0011		0.1	TWA	NIOSH REL
n-Pentane	0.0001		120	TWA	NIOSH REL
Acetone	0.0056		240	TWA	NIOSH REL
Isopropanol	0.0004		200	TWA	ACGIH TLV
1,1-Dichloroethene	< 0.0001		5	TWA	ACGIH TLV
1,1,2-Trichloro-1,2,2-trifluoroethane	< 0.0001		1000	TWA	ACGIH TLV

Note: Sample Results continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Sample Results continued:

t-Butyl alcohol	< 0.0001	100	TWA	NIOSH REL
3-Chloropropene	< 0.0001	1	TWA	NIOSH REL
Dichloromethane	0.0003	25	TWA	OSHA PEL
Carbon disulfide	< 0.0001	1	TWA	ACGIH TLV
trans-1,2-Dichloroethene	0.0002	5	TWA	ACGIH TLV
Methyl-t-Butyl Ether	< 0.0001	50	TWA	ACGIH TLV
1,1-Dichloroethane	< 0.0001	100	TWA	ACGIH TLV
Hexane	< 0.0001	50	TWA	ACGIH TLV
Methyl Ethyl Ketone	0.0003	200	TWA	ACGIH TLV
cis-1,2-Dichloroethene	< 0.0001	5	TWA	ACGIH TLV
Ethyl acetate	< 0.0001	400	TWA	ACGIH TLV
Chloroform	< 0.0001	10	TWA	ACGIH TLV
Tetrahydrofuran	< 0.0001	50	TWA	ACGIH TLV
1,1,1-Trichloroethane	< 0.0001	350	TWA	ACGIH TLV
1,2-Dichloroethane-d4	< 0.0001	5	TWA	ACGIH TLV
1,4-Difluorobenzene	< 0.0001	N/A		
1,2-Dichloroethane	< 0.0001	5	TWA	ACGIH TLV
Cyclohexane	< 0.0001	100	TWA	ACGIH TLV
Benzene	< 0.0001	0.5	TWA	ACGIH TLV
Carbon tetrachloride	< 0.0001	5	TWA	ACGIH TLV
Isooctane	< 0.0001	N/A		
n-Heptane	< 0.0001	85	TWA	NIOSH REL
1,2-Dichloropropane	< 0.0001	10	TWA	ACGIH TLV
Trichlorethene	< 0.0001	10	TWA	ACGIH TLV
Bromodichloromethane	< 0.0001	N/A		
Methyl methacrylate	0.0015	50	TWA	ACGIH TLV
1,4-Dioxane	0.0001	20	TWA	ACGIH TLV
Methyl isobutyl Ketone	< 0.0001	20	TWA	ACGIH TLV
cis-1,3-Dichloropropene	< 0.0001	1	TWA	ACGIH TLV
Toluene-d8	0.0001	20	TWA	ACGIH TLV
trans-1,3-Dichloropropene	< 0.0001	1	TWA	ACGIH TLV
Toluene	0.0002	20	TWA	ACGIH TLV
1,1,2-Trichloroethane	< 0.0001	350	TWA	ACGIH TLV
2-Hexanone	< 0.0001	1	TWA	NIOSH REL
Chlorodibromomethane	< 0.0001	N/A		
1,2-Dibromoethane	< 0.0001	N/A		
Tetrachloroethylene	< 0.0001	25	TWA	ACGIH TLV
Chlorobenzene-d5	< 0.0001	10	TWA	ACGIH TLV
Chlorobenzene	< 0.0001	10	TWA	ACGIH TLV
Ethyl Benzene	< 0.0001	20	TWA	ACGIH TLV
m,p-Xylene	< 0.0003	20	TWA	ACGIH TLV
n-Nonane	< 0.0001	200	TWA	ACGIH TLV

Note: Sample Results continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Sample Results continued:

Bromoform	< 0.0001	0.5	TWA	ACGIH TLV
Styrene	< 0.0001	10	TWA	ACGIH TLV
o-Xylene	< 0.0001	20	TWA	ACGIH TLV
1,1,1,2-Tetrachloroethane	< 0.0001	350	TWA	ACGIH TLV
Cumene	< 0.0001	50	TWA	ACGIH TLV
4-Bromofluorobenzene	< 0.0001	N/A		
n-Propylbenzene	< 0.0001	N/A		
2-Chlorotoluene	< 0.0001	50	TWA	ACGIH TLV
4-Ethyltoluene	< 0.0001	20	TWA	ACGIH TLV
1,3,5-Trimethylbenzene	< 0.0001	10	TWA	ACGIH TLV
1,2,4-Trimethylbenzene	< 0.0001	10	TWA	ACGIH TLV
1,3-Dichlorobenzene	< 0.0001	10	TWA	ACGIH TLV
1,4-Dichlorobenzene	< 0.0001	10	TWA	ACGIH TLV
Benzyl chloride	< 0.0001	1	TWA	ACGIH TLV
1,2-Dichlorobenzene	< 0.0001	25	TWA	ACGIH TLV

**Tentatively Identified Compounds\*<sup>1</sup>:**

Acetaldehyde	0.0011	25	STEL	ACGIH TLV
Isoprene	0.0011	N/A		
Acetic acid	0.0003	10	TWA	ACGIH TLV
1-Butanol	0.0003	20	TWA	ACGIH TLV
4-methyl-Octane	0.0003	N/A		
1-butoxy-2-Propanol	0.0004	N/A		
6-methyl-5-Hepten-2-one	0.0003	N/A		
3,7-dimethyl-Decane	0.0004	N/A		
3,3-dimethyl-Hexane	0.0005	100	TWA	NIOSH REL
Nonanal	0.0011	N/A		
Dodecane	0.0003	200	TWA	ACGIH TLV
Decanal	0.0006	N/A		
Methenamine	0.0003	N/A		
Tridecane	0.0031	N/A		
Tetradecane	0.0021	N/A		

\*<sup>1</sup> Tentatively Identified Compounds are analytes not associated with a calibration standard, but instead identified only through a Data System Library search based on retention time and mass. Results are not definitive as results are not subject to Laboratory Quality Control requirements.

**NOTE:** All analytes were below 10% of applicable OELs.

NOTE: Sampling/Monitoring Results continued on next page:

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)** (Continued)

Sampling/Monitoring Results continued.

- Grab samples were collected from the opening of 20B-TK-1 access hatch. One grab sample was transferred to SKC-226-119-7 media for Aldehyde analysis by High Performance Liquid Chromatography as per EPA method TO-11A.

Analytes	Results (ppm)	Applicable OEL (ppm)		
	<b>20B-TK-1 Headspace</b>			
Formaldehyde	< 0.0105	0.3	Ceiling	ACGIH TLV
Acetaldehyde	0.0028	25	TWA	ACGIH TLV
Acrolein	< 0.0017	0.1	TWA	ACGIH TLV
Propionaldehyde	< 0.0054	20	TWA	ACGIH TLV
Butyraldehyde (Butanal)	< 0.0037	25	TWA	ACGIH TLV
Valeraldehyde	< 0.0039	50	TWA	ACGIH TLV
Hexanal	< 0.0034	N/A		

**NOTE:** All analytes were below 10% of applicable OELs.

**Sampling/Monitoring Results Acronyms:**

ACGIH	American Conference of Governmental Industrial Hygienists
CO	Carbon Monoxide
DRI	Direct Reading Instrumentation
eV	Electron Volts
Hg	Mercury
H <sub>2</sub> S	Hydrogen Sulfide
LEL	Lower Explosive Limit
mg/m <sup>3</sup>	Milligrams per cubic meter
MW	Molecular Weight
NH <sub>3</sub>	Ammonia
NIOSH	National Institute of Occupational Safety and Health
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
O <sub>2</sub>	Oxygen
PID	Photo Ionization Detector
ppm	Parts Per Million
RCA	Radiological Controlled Area (ventilation)
RDL	Reporting Detection Limit
REL	Recommended Exposure Limit
SO <sub>2</sub>	Sulfur Dioxide
STEL	Short Term Exposure Limit (typically 15 minutes)
TLV	Threshold Limit Value
TWA	Time Weighted Average (typically 8 hours)
VOCs	Volatile Organic Compounds

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)** (Continued)

### SWIHD References:

#### Event Response Site Wide Industrial Hygiene Database DRI and Air Surveys:

- DRI # 24-09452 "TFC-OPS-OPER-C-67 response at ETF"
- Air # 24-09457 "TFC-OPS-OPER-C-67 Grab Sample 2025E 20B-TK-1"

### Additional Information:

Respiratory Protection Equipment was not prescribed for the Initiating Event. Accordingly, at the time of the Initiating Event, the Affected Workers were not wearing Respiratory Protection Equipment. Respiratory Protection Equipment was not required, nor worn, for Response Actions. Voluntary-use of Respiratory Protection Equipment was offered to event response participants, but was declined.

While the odor description is inconsistent with Tank Waste Chemical Vapors, due to the proximity to the Tank Farms and workforce cultural expectations, monitoring for Tank Waste Chemical Vapors was performed:

Ammonia is used as a sentinel Tank Waste Chemical Vapor for chemicals of potential concern (COPC). Each Hanford production process had different feedstock chemicals and generated different waste streams. Hanford production processes were also separated temporally, with different processes being performed at different times in the history of Hanford production (1943 – 1986). Some chemicals are common to all processes/waste streams (e.g., nitric acid), while others are specific to particular processes/waste streams. Some in-tank waste treatment processes (e.g., neutralization and de-nitrification) used the same chemical feed stocks (e.g., sodium hydroxide solution) in most, if not all Tank Farms. The chemistry and radiochemistry of these compounds result in waste stream similarities across all tank farms. Because nitric acid was common to nearly all processes that generated tank waste, and the most common result of those processes was reduction of nitrate ion to ammonia during the dissolution (oxidation) of irradiated fuel, ammonia is the most common COPC and is found in all tanks. It is logical to choose ammonia for the sentinel as it is a byproduct of all production processes and found in all tanks.

Therefore, when monitoring for Tank Waste Chemical Vapors/COPCs, DRI equipped with an ammonia sensor is utilized at a minimum. Additional COPC monitoring was conducted concurrently with ammonia during the event response. The COPC with DRI monitoring capabilities readily available at the Tank Farms includes VOCs. As individual agents are not identified when monitoring for VOCs, an Action Limit was developed as an indicator of Tank Farm emissions (mixture of organic vapors) that could impact workers' health and conservatively set at 2 ppm. When monitoring for Tank Waste VOC vapors, DRI equipped with a 10.6 eV PID is utilized to detect multiple VOC COPCs simultaneously.

**NOTE:** The 2 ppm Action Limit is not applicable to chemical use.

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Review of the Data Fusion & Advisory System (DFAS) application, powered by SmartSite™, dashboard for the approximate time of the Event:

DFAS Multi-Farm View Exhauster Plume Model: 11/26/2024 @ 2015 (approximate time of first indication of odors as provided on O/VRCs):



**NOTE:** 241-AN, 241-AW Farm and POR-518/519 Exhausters are not connected to the DFAS; however, approximate exhauster plumes were added based on other modeled plumes.

DFAS Weather Conditions: 11/26/2024 @ 2015 (approximate time of first indication of odors as provided on O/VRCs):

- Wind Speed: 7.2 mph (15-minute average)
- Wind Direction: 278° (out of West)
- Mixing Height: 1000 feet above grade
- Stability Class: F/G (moderate/extremely stable conditions)

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

The atmospheric stability is the tendency of the atmosphere to increase or decrease the vertical displacement of air through mode of force such as the wind. This function is closely related to the ability of the atmosphere to disperse pollutants. Atmospheric stability cannot be measured directly. Rather, it is generally estimated based on the wind velocity and the solar radiation (Casal, 2008). The stability is also impacted by the slope of the temperature relative to altitude (environmental lapse rate) (CushmanRoisin, 2012). The National Oceanic and Atmospheric Administration (NOAA) Pasquill stability classes are denoted by 7 letters ranging from A (extremely unstable conditions) to G (extremely stable conditions). An unstable atmosphere is characterized by significant vertical displacement of air, a negative vertical temperature gradient (the temperature decreases with height), along with frequent fluctuations in wind direction and strong solar radiation. A stable atmosphere has low turbulence, positive vertical temperature (temperature increases with height), little fluctuation in the wind direction, and limited solar radiation (Casal, 2008). Exhauster plumes may move horizontally (stability classes A, B, C, and D) or vertical (stability classes E, F, and G). Horizontal plumes found during unstable and neutral states are further characterized by their pattern: fanning, fumigation, coning, looping, and lofting. At Hanford Tank Farms exhauster plumes may interact with ground level during stability class A conditions if the Mixing Height constricts plume dispersion at sufficiently low levels (typically less than 100 ft. above grade). The concentration of plume-borne contaminants at the ground level receptor is dependent on the concentration of the emission and the factor of dilution occurring through dispersion as the plume emission moves away from the emission point.

References:

- Casal, J. (2008). Chapter 6 Atmospheric dispersion of toxic or flammable clouds. Industrial Safety Series, 8, 195-248. Retrieved from [https://doi.org/10.1016/S0921-9110\(08\)80008-0](https://doi.org/10.1016/S0921-9110(08)80008-0)
- Cushman-Roisin, B. (2012). Environmental Transport and Fate- Smokestack Plumes (lecture slides). Dartmouth College: Thayer School of Engineering. Retrieved from <https://cushman.host.dartmouth.edu/courses/engs43/Smokestack-plumes.pdf>

Vapor Monitoring Detection System (VMDS)

Active ventilation systems exhaust a mixture of all connected tanks with output through a “stack”. The emission of exhaust ventilation systems is monitored either continuously by the VMDS or periodically by alternate monitoring.

VMDS exhauster ammonia readings on 11/26/2024 @ 2015 (approximate time of first indication of odors as provided on O/VRCs):

- POR518 (241-A): 1.609 ppm
- POR519 (241-A): 3.078 ppm
- 241-AN: N/A
- 241-AW: 11.267 ppm
- POR126 (241-AX): 0.000 ppm
- POR127 (241-AX): N/A
- 702AZ (241-AY/AZ): 17.888 ppm
- 241-AP: 0.000 ppm

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Memo WRPS-1904672.1, TANK FARM EXHAUST ~ CK CONCENTRATION ALARM/ ACTION LEVELS FOR AMMONIA establishes stack alarm/action set points for Tank Farm Exhausters. The alarm/action set points are based on a linear extrapolation of the Quantitative Risk Assessment (QRA) model prediction; conservatively established at the ammonia stack concentration that could result in various ammonia concentrations at an unspecified ground receptor:

- High Alarm → ammonia concentration of 2.5 ppm at an unspecified ground receptor
- High High Alarm → ammonia concentration of 5 ppm at an unspecified ground receptor

Memo WRPS-1904672.1, TANK FARM EXHAUST ~ CK CONCENTRATION ALARM/ ACTION LEVELS FOR AMMONIA:

Tank Farm	Exhauster	High Alarm	High High Alarm
241-A	POR518/POR519	160 ppm	320 ppm
241-AN	Primary		
241-AP	Primary		
241-AW	Primary	460 ppm	920 ppm
241-AX	POR126/POR127		
241-AY/AZ	702AZ		
241-SY	Primary	310 ppm	620 ppm

Vapor Monitoring Detection System (VMDS) summary: 11/19/2024 @ 2015 to 11/26/2024 @ 2015:

Tank Farm	Exhauster	Minimum* <sup>A</sup>	Maximum* <sup>A</sup>
241-A	POR518/POR519	N/A	7.881 ppm
241-AN	Primary	N/A	0.000 ppm
241-AP	Primary	0.000 ppm	15.889 ppm
241-AW	Primary	6.896 ppm	21.516 ppm
241-AX	POR126/POR127	0.000 ppm	17.298 ppm
241-AY/AZ	702AZ	0.000 ppm	20.168 ppm
241-AY	Primary	0.000 ppm	34.868 ppm

\*<sup>A</sup> VMDS Alternate Real Time Monitoring performed 11/19/2024 to 11/26/2024 for 241-A (POR518/POR519), 241-AN, and 241-AY/AZ.

When stack monitoring via the VMDS is unavailable, and ventilation is operating, IH will conduct alternate monitoring for ammonia. Report TOC-IH-RPT-50042, Ammonia Monitoring- Rate of Change of Tank Vapor Source Concentration and Monitoring Frequency, recommends measuring the exhaust ventilation systems once every 4 days. Conservatively, stack readings are required once per calendar day, in accordance with ARP-T-041-00002 and are acquired in accordance with TF-OPS-IHT-037.

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)** (Continued)

Additional Information continued:

Vapor Monitoring Detection System (VMDS) Alternate Monitoring 11/19/2024 to 11/26/2024:

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR518/POR519	0 ppm	1 ppm
241-AN	Primary	3 ppm	23 ppm
241-AP	Primary	N/A	N/A
241-AW	Primary	N/A	N/A
241-AX	POR126/POR127	N/A	N/A
241-AY/AZ	702AZ	25 ppm	29 ppm
241-SY	Primary	N/A	N/A

Odor descriptors provided by Affected Workers are inconsistent with Tank Vapors. Additionally, review of the DFAS application, powered by SmartSite™, Weather Details dashboard and VMDS exhauster ammonia readings for the approximate time of the Event, indicate the cause of the odor is unlikely to be from Tank Farm Exhauster emissions; as concentrations at emission points was insufficient to allow for the possibility of notable concentrations at the ground receptor, weather conditions did not allow for ground-plume interaction, and the event location was located a significant distance from ant Tank Farm chemical vapor emission points.

Monitoring Selections Based on Information Provided by Affected Workers:

Based on the odor descriptors provided upon submission of the Odor/Vapor Response Cards DRI monitoring for Ammonia, VOCs (10.6 eV PID and 11.7 eV PID), and Hydrogen Sulfide was requested:

ETF specific monitoring strategy:

Minimal odors associated with stagnant water is an anticipated occurrence at the Effluent Treatment Facility (ETF). Low levels of Hydrogen Sulfide (H<sub>2</sub>S) gas, Ammonia (NH<sub>3</sub>), and various Volatile Organic Compounds (VOCs) may be produced by the stagnant water at the ETF when within a confined area for an extended period.

Low levels of Hydrogen Sulfide (H<sub>2</sub>S) gas is produced at the ETF when sulfate containing water, low airflow, and sulfur seeking bacteria stagnate within a confined area for an extended period. Hydrogen Sulfide gas has an offensive distinct rotten egg odor that is detectable at very low concentrations. The American Industrial Hygiene Association (AIHA) Odor Threshold for Chemicals with Established Health Standards, 2nd Edition, lists the lower range of odor values for H<sub>2</sub>S as 40 ppt (or 0.04 ppb or 0.00004 ppm). While odors may be readily perceived, concentrations are still well below levels of worker exposure concern. H<sub>2</sub>S gas production rate is a function of sulfate/bacteria/organics concentrations, temperature, and dissolved oxygen. Relatively moderate levels of sulfate ions are both introduced (via sulfuric acid) and inherent in the wastewater treated at the ETF. High source concentrations are not expected as the ETF wastewater streams do not contain the high sulfate/bacteria/organics found with sanitary waste (i.e. sewage). The limiting factor at the ETF is primarily the relatively low bacterial levels, followed by moderate to low levels of sulfate.

The resolution of direct reading instrument (DRI) equipped with a H<sub>2</sub>S sensor (0.1 ppm) is comparatively inadequate as a detection tool at the concentrations perceived by the human olfactory sense. While the resolution of the direct reading instrument (DRI) equipped with a H<sub>2</sub>S sensor is insufficient to detect H<sub>2</sub>S at the lower range of odor threshold values, it is sufficient to detect H<sub>2</sub>S at concentrations that approach the established occupational exposure limits (OELs).

- Action Limit: 0.5 ppm
- ACGIH 8-hour time-weighted-average (TWA) Threshold Limit Value (TLV): 1 ppm
- ACGIH 15-minute short-term-exposure-limit (STEL) TLV: 5 ppm

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Low levels of NH<sub>3</sub> gas are produced at the ETF primarily as the result of natural decay of organic material through biological decomposition. The biological decomposition process produces a great number of odors from decomposition of organic material into simpler intermediate chemical compounds which can be re-introduced into the environment in the form of solids (particulates), liquids (volatile organic compounds such as alcohols, organic acids), and gases (H<sub>2</sub>S, sulfur dioxide [SO<sub>2</sub>], ammonia, methane[CH<sub>4</sub>]) (Silva, 2002; Texas A&M, 2009). NH<sub>3</sub> gas has an offensive pungent, irritating odor that is detectable at very low concentrations. The American Industrial Hygiene Association (AIHA) Odor Threshold for Chemicals with Established Health Standards, 2nd Edition, lists the lower range of odor values for H<sub>2</sub>S as 43 ppb (or 0.043 ppm). While odors may be readily perceived, concentrations are still well below levels of worker exposure concern.

The resolution of direct reading instrument (DRI) equipped with a NH<sub>3</sub> sensor (1 ppm) is comparatively inadequate as a detection tool at the concentrations perceived by the human olfactory sense. While the resolution of the direct reading instrument (DRI) equipped with an NH<sub>3</sub> sensor is insufficient to detect NH<sub>3</sub> at the lower range of odor threshold values, it is sufficient to detect NH<sub>3</sub> at concentrations that approach the established occupational exposure limits (OELs).

- Action Limit: 12 ppm
- ACGIH 8-hour time-weighted-average (TWA) Threshold Limit Value (TLV): 25 ppm
- ACGIH 15-minute short-term-exposure-limit (STEL) TLV: 35 ppm

Low levels of volatile organic compounds (VOC) are produced at the ETF primarily as the result of natural decay of organic material through biological decomposition. The biological decomposition process produces a great number of odors from decomposition of organic material into simpler intermediate chemical compounds which can be re-introduced into the environment in the form of solids (particulates), liquids (volatile organic compounds such as alcohols, organic acids), and gases (H<sub>2</sub>S, SO<sub>2</sub>, NH<sub>3</sub>, CH<sub>4</sub>) (Silva, 2002; Texas A&M, 2009). DRI monitoring for VOCs at ETF is utilized for indication purposes only.

#### Chemical Use Vapors:

If chemical use is the suspected source of odors, a review of the applicable MSDS/GHS-SDS will be conducted to determine the appropriate DRI and applicable manufacturer's correction factor (CF). The development of a compound specific AL will be performed on a case-by-case and documented on the Response Plan.

As specific chemical constituents in use at ETF general area or 20B-TK-1 could not be identified at the time of response plan development, VOC monitoring utilizing both 10.6 eV PID and 11.7 eV PID was selected for indication purposes only.

#### Monitoring Strategy References:

- Refer to [TOC-IH-58956](#) for more detail on the monitoring strategy for response to odors.
- Refer to [SIHEA-PO-ETF-01](#) Attachment F for more detail on the monitoring strategy utilized for routine work at ETF.

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Odor Characteristics and Odor Thresholds of Identified and Tentatively Identified Compounds:

Some analytical results from the grab sample collected from the 20B-TK-1 hatch opening were at or above published odor detection concentrations for some Tentatively Identified Compounds with similar odor descriptors as provided on O/VRCs. Analytes detected at concentrations above published odor thresholds are highlighted in gray.

Identified Compounds	Result (ppm)	Odor Threshold		Odor Characteristic
		Detectable	Recognizable	
Acetaldehyde	0.0028	0.001 ppm	0.015 ppm	"ethereal", "fresh", "fruity", "musty", "pungent"
Propene	0.0004	0.001 ppm	0.015 ppm	"ethereal", "musty", "pungent"
Dichlorodifluoromethane	0.0006	199790 ppm		"ether-like"
Chloromethane	0.0004		> 10 ppm	"sweet"
n-Butane	0.0004	6.5 ppm	12 ppm	"gasoline-like"
Ethanol	0.0076	0.09 ppm	4.6 ppm	"alcohol", "ethereal"
Trichlorofluoromethane	0.0002	~ 200,000		"ether-like"
Acrolein	0.0011	0.0036 ppm	0.21 ppm	"almond", "cherry", "disagreeable", "pungent"
n-Pentane	0.0001	1.29 ppm	1147 ppm	"gasoline-like", "pleasant"
Acetone	0.0056	0.42 ppm	1.7 ppm	"apple", "chemical", "ether-like", "fruity"
Isopropanol	0.0004	1.6 ppm	3.2 ppm	"alcohol", "ethereal"
Dichloromethane	0.0003	1.2 ppm		"sweet", "chloroform-like"
trans-1,2-Dichloroethene	0.0002	1.2 ppm		"sweet", "chloroform-like"
Methyl Ethyl Ketone	0.0003	0.07 ppm	5.4 ppm	"acetone", camphor", "ethereal", "fruity", "sweet", "sharp"
Methyl methacrylate	0.0015	0.049 ppm	0.21 ppm	"acrid", "acrylic", "aromatic", "fruity", "plastic", "sharp"
1,4-Dioxane	0.0001	24 ppm		
Toluene	0.0002	0.032 ppm	0.93 ppm	"benzene", "burnt", "floral", "mothballs", "paint thinner", "pungent"
<b>Tentatively Identified Compounds</b>				
Acetaldehyde	0.0011	0.001 ppm	0.015 ppm	"ethereal", "fresh", "fruity", "musty", "pungent"
Isoprene	0.0011	0.047 ppm		"isoprene"
Acetic acid	0.0003	0.0004 ppm	0.02 ppm	"vinegar"
1-Butanol	0.0003	0.02 ppm		"banana-like", "harsh", "sweet"
4-methyl-Octane	0.0003	No data available		No data available
1-butoxy-2-Propanol	0.0004	No data available		"ether-like"
6-methyl-5-Hepten-2-one	0.0003	No data available		"citrus-like", "fruity"
3,7-dimethyl-Decane	0.0004	No data available		No data available
3,3-dimethyl-Hexane	0.0005	No data available		"odorless"
Nonanal	0.0011	0.0009 ppm		"old-people"
Dodecane	0.0003	0.62 ppm		"gasoline-like"
Decanal	0.0006	0.0063 ppm		"sweet", "aldehydic", "orange", "waxy", "floral"
Methenamine	0.0003	No data available		"odorless"
Tridecane	0.0031	No data available		"gasoline-like"
Tetradecane	0.0021	No data available		"gasoline-like"

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Chemicals associated with Odor Descriptors provided by O/VRCs and Associated Odor Thresholds:

The American Industrial Hygiene Association “Odor Thresholds for Chemicals with Established Health Standards” (2<sup>nd</sup> Edition) and the American Industrial Hygiene Association “Odor Thresholds for Chemicals” (4<sup>th</sup> Edition) provides a reference list of chemicals associated with typical odor descriptors. Below is the reference list of chemicals associated with odor descriptors provided by O/VRCs and their applicable OELs. Chemicals where the odor detection concentration is similar to or greater than the associated OEL are notated in gray.

**NOTE:** Odor character of “stale”, “water”, and “stale water” as provided on submitted O/VRCs was not referenced in AIHA Odor Threshold publications or the Agency for Toxic Substances and Disease Registry Environmental Odor Index.

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Ammonia (ammoniacal)	1,1-Dimethylhydrazine	6.1 to 14 ppm	N/A	0.01 ppm TWA (ACGIH TLV)
	1-Methoxy-2-Propanol	0.0029 ppm	N/A	50 ppm TWA (ACGIH TLV)
	Ammonia	0.057 ppm	0.57 ppm	25 ppm TWA (ACGIH TLV)
	Amyl Amine (1-Pentanamine)	15.8 ppm	N/A	N/A
	Cycloheptylamine	67 ppm	N/A	10 ppm TWA (NIOSH REL)
	Cyclohexylamine	2.42 ppm	N/A	10 ppm TWA (ACGIH TLV)
	Diethanolamine	N/A	0.279 ppm	1 mg/m <sup>3</sup> TWA (ACGIH TLV)
	Diethylamine	0.0033 to 0.033 ppm	0.06 ppm	5 ppm TWA (ACGIH TLV)
	Diethylaminoethanol	0.01 ppm	0.04 ppm	10 ppm TWA (NIOSH REL)
	Diisopropylamine	0.14 ppm	0.39 ppm	5 ppm TWA (ACGIH TLV)
	Dimethylamine	0.00076 ppm	0.012 ppm	5 ppm TWA (ACGIH TLV)
	Ethanolamine	2.6 ppm	24 ppm	3 ppm TWA (ACGIH TLV)
	Ethyl Acrylate (Acrylic Acid Ethyl Ester)	0.0000066 ppm	0.00037 ppm	5 ppm TWA (ACGIH TLV)
	Ethylamine	0.045 ppm	0.81 ppm	5 ppm TWA (ACGIH TLV)
	Ethylenediamine	0.71 ppm	2 ppm	10 ppm TWA (ACGIH TLV)
	Ethyleneimine (Aziridine)	0.71 ppm	N/A	0.05 ppm TWA (ACGIH TLV)
	Formamide	82 ppm	N/A	10 ppm TWA (ACGIH TLV)
	Hydrazine	3 ppm	N/A	0.01 ppm TWA (ACGIH TLV)
	Isopropylamine (2-Propylamine)	0.025 ppm	0.7 ppm	5 ppm TWA (ACGIH TLV)
	Methyl Hydrazine	1.01 to 3.03 ppm	N/A	0.01 ppm TWA (ACGIH TLV)
	Methylamine	0.00095 ppm	0.0095 ppm	5 ppm TWA (ACGIH TLV)
	Morpholine	0.01 ppm	0.07 ppm	20 ppm TWA (ACGIH TLV)
	n,n-Dimethylacetamide	3.199 ppm	48 ppm	10 ppm TWA (ACGIH TLV)
	n-Butylamine (1-Butanamine)	0.08 ppm	0.24 ppm	5 ppm STEL (ACGIH TLV)
	n-Dipropylamine	0.02 ppm	N/A	5 ppm TLV (ACGIH TLV)
	n-Ethylmorpholine	0.085 ppm	0.25 ppm	5 ppm TWA (ACGIH TLV)
	n-Propyl Amine (1-Propanamine)	0.061 ppm	N/A	N/A
	Propylene Diamine	0.014 ppm	0.048 ppm	0.1 mg/m <sup>3</sup> TWA (NIOSH REL)
	Pyrrolidine (Azacyclopentane)	20 ppm	N/A	N/A
	sec-Butylamine	0.17 ppm	N/A	N/A
	tert-Butylamine	0.17 ppm	N/A	N/A
	Triethanolamine (Trolamine)	> 10 ppm	N/A	5 mg/m <sup>3</sup> TWA (ACGIH TLV)
	Triethylamine	0.0053 ppm	0.27 ppm	0.5 ppm TWA (ACGIH TLV)
Trimethylamine	0.00011 ppm	0.00021 ppm	5 ppm TWA (ACGIH TLV)	

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Earthy	Ethyl Acrylate (Acrylic acid ethyl ester)	0.0000066 ppm	0.00037 ppm	5 ppm TWA (ACGIH TLV)
	2-Ethylhexyl Acetate	0.073 ppm	0.137 ppm	N/A
	Ethyl Mercaptan (Ethanethiol)	0.000017 ppm	0.00029 ppm	0.5 ppm TWA (ACGIH TLV)
	Hexyl Propionate	0.008 ppm	N/A	10 ppm TWA (ACGIH TLV)
	Mesityl Oxide (Methyl Isobutyl Ketone)	0.017 ppm	0.05 ppm	20 ppm TWA (ACGIH TLV)
	Picolines (Methyl Pyridines)	0.0026 ppm	0.0236 ppm	1 ppm TWA (ACGIH TLV)
	Propionaldehyde (Propanal)	0.001 ppm	0.015 ppm	100 ppm TWA (ACGIH TLV)
	Quinoline	0.0057 ppm	0.0095 ppm	N/A
	Turpentine	0.0000003 ppm	4.49 ppm	20 ppm TWA (ACGIH TLV)

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Musty	2-Butoxyethanol	0.043 ppm	0.35 ppm	2 ppm TWA (ACGIH TLV)
	2-Ethoxyethanol	0.3 ppm	0.54 ppm	5 ppm TWA (ACGIH TLV)
	2-Ethylhexyl Alcohol (2-Ethyl Hexanol)	0.024 ppm	N/A	N/A
	Acetaldehyde	0.001 ppm	0.015 ppm	25 ppm Ceiling (ACGIH TLV)
	Acetophenone	0.002 ppm	0.59 ppm	10 ppm TWA (ACGIH TLV)
	Benzene Hexachloride (Lindane)	0.00013 ppm	N/A	0.5 mg/m <sup>3</sup> TWA (ACGIH TLV)
	Butyraldehyde (Butanal)	0.00035 ppm	0.004 ppm	N/A
	Diethylamine	0.00076 ppm	0.012 ppm	5 ppm TWA (ACGIH TLV)
	Ethylenediamine	1.3 ppm	4.5 ppm	10 ppm TWA (ACGIH TLV)
	Furfuryl Alcohol (2-furanmethanol)	8 ppm	N/A	10 ppm TWA (ACGIH TLV)
	Hydrogen Cyanide	0.009 ppm	1.99 ppm	4.7 ppm Ceiling (ACGIH TLV)
	Isobutyl Alcohol (Isbutyl Cellosolve)	0.019 ppm	0.11 ppm	50 ppm TWA (ACGIH TLV)
	Isophorone	0.0003 ppm	0.53 ppm	5 ppm Ceiling (ACGIH TLV)
	Isopropyl Alcohol	1.6 ppm	3.2 ppm	400 ppm TWA (NIOSH REL)
	Methyl n-butyl Ketone (2-Hexanone)	0.024 ppm	N/A	1 ppm TWA (NIOSH REL)
	n-Butyl Acrylate	0.00055 ppm	0.0027 ppm	2 ppm TWA (ACGIH TLV)
	Nickel Carbonyl	0.5 ppm	N/A	0.05 ppm Ceiling (ACGIH TLV)
	n-Propyl Alcohol (1-Propanol)	0.03 ppm	0.081 ppm	100 ppm TWA (ACGIH TLV)
	Phosgene	0.12 ppm	0.12 ppm	0.1 ppm TWA (ACGIH TLV)
	Quinoline	0.0057 ppm	0.0095 ppm	N/A

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Rotten	Diethanolamine	N/A	0.279 ppm	1 mg/m <sup>3</sup> TWA (ACGIH TLV)
	Dimethylamine	0.00076 ppm	0.012 ppm	5 ppm TWA (ACGIH TLV)
	Ethyl Mercaptan	0.000017 ppm	0.00029 ppm	0.5 ppm TWA (ACGIH TLV)
	Hydrogen Sulfide	0.00007 ppm	0.00046 to 0.00093 ppm	1 ppm TWA (ACGIH TLV)
	Methyl Mercaptan	0.0000002 ppm	0.000071 ppm	0.5 ppm TWA (ACGIH TLV)

**Odor Threshold References:**

- American Industrial Hygiene Association (2013). Odor Thresholds for Chemicals with Established Health Standards, 2<sup>nd</sup> Edition.
- American Industrial Hygiene Association (2024). Odor Thresholds for Chemicals, 4<sup>th</sup> Edition.
- Agency for Toxic Substances and Disease Registry Environmental Odors Library. Retrieved from: <https://www.atsdr.cdc.gov/odors/php/search/index.html>

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

**ETF Operational Configuration Timeline:**

At the time of the initiating event the ETF Main Treatment Train (MTT) was not in operation, however start-up activities had been initiated. Both the Radiologically Controlled Area (RCA) and Vessel Off Gas (VOG) ventilation were in operation. To support initiation of MTT operations a routine transfer of 20B-TK-1 contents to Secondary Waste Receiving Tank (SWRT) B was performed. The initial level of 20B-TK-1 was approximately 40% and was reduced to approximately 16% at 0300 on 11/26/2024. At the time of the initiating event the level of 20B-TK-1 was approximately 20% capacity. Rate of increase of 20B-TK-1 volume was not significant enough to displace a significant volume of headspace into atmosphere via penetrations in the 20B-TK-1 access hatch. Although 20B-TK-1 is nominally provided negative ventilation by the VOG, the specific 1.5 inch diameter piping leg (45D-017-155) is not instrumented, therefore flow cannot be verified. Negative ventilation of 20B-TK-1 is typically determined by the presence of equipment (temporary portable sump pumps) installed through the access hatch. Hoses and cords necessary for operation of temporary equipment prevents closure of the hatch and/or other penetrations.

**Additional Information Acronyms:**

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Limit
CF	correction factor
CH <sub>4</sub>	Methane
COPC	chemicals of potential concern
DFAS	Data Fusion & Advisory System
DRI	direct reading instrument
ETF	Effluent Treatment Plant
eV	electron-volts
GHS-SDS	Globally Harmonized System Safety Data Sheet
H <sub>2</sub> S	Hydrogen Sulfide
MSDS	Material Safety Data Sheet
NH <sub>3</sub>	Ammonia
NOAA	National Oceanic and Atmospheric Administration
OEL	Occupational Exposure Limit
OSHA	Occupational Safety & Health Administration
O/VRC	Odor/Vapor Response Card
PEL	Permissible Exposure Limit
pH	Percent Hydrogen
PID	photoionization detector
ppb	parts per Billion
ppm	parts per million
ppt	Parts per trillion
QRA	Quantitative Risk Assessment
RCA	Radiologically Controlled Area (ventilation)
REL	Recommended Exposure Limit
RPE	Respiratory Protection Equipment
SO <sub>2</sub>	Sulfur Dioxide
STEL	Short Term Exposure Limit
SWRT	Secondary Waste Receiving Tank
TLV	Threshold Limit Value
TWA	Time Weighted Average
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compounds
VOG	Vessel Off Gas (ventilation)

NOTE: Additional Information continued on next page.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Additional Information continued:

Additional Information References:

- Agency for Toxic Substances and Disease Registry Environmental Odors Library. Retrieved from: <https://www.atsdr.cdc.gov/odors/php/search/index.html>
- American Conference of Governmental Industrial Hygienists (2016). TLVs® and BEIs® Based on the Documentation of the Threshold Limit Values for Chemicals Substances and Physical Agents & Biological Exposure Indices.
- American Industrial Hygiene Association (2024). Odor Thresholds for Chemicals, 4<sup>th</sup> Edition.
- American Industrial Hygiene Association (2013). Odor Thresholds for Chemicals with Established Health Standards, 2<sup>nd</sup> Edition.
- Honeywell (2018). Technical Note TN-106: A Guideline for PID Instrument Response. Retrieved from [https://prod-edam.honeywell.com/content/dam/honeywell-edam/sps/his/en-us/products/gas-and-flame-detection/documents/Technical-Note-106\\_A-Guideline-for-Pid-Instrument-Response.pdf](https://prod-edam.honeywell.com/content/dam/honeywell-edam/sps/his/en-us/products/gas-and-flame-detection/documents/Technical-Note-106_A-Guideline-for-Pid-Instrument-Response.pdf)
- Memo WRPS-1904672.1, TANK FARM EXHAUST ~ CK CONCENTRATION ALARM/ ACTION LEVELS FOR AMMONIA
- National Institute of Standards and Technology. NIST Chemistry WebBook, SRD#69. Retrieved from: <https://webbook.nist.gov/chemistry/>
- NIOSH Pocket Guide to Chemical Hazards. Dept. of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.
- Occupational Safety & Health Administration (n.d.). Permissible Exposure Limits- Annotated Tables, OSHA Annotated Table Z-1. Retrieved from <https://www.osha.gov/annotated-pels/table-z-1>
- [SIHEA-PO-ETF-01](#) "Routine Work Activities at ETF" Attachment F
- [TOC-IH-58956](#). Monitoring Strategy for Response to Odors: Common Odor Sources in the 200 East, 200 West, & 600 Areas.
- Casal, J. (2008). Chapter 6 Atmospheric dispersion of toxic or flammable clouds. Industrial Safety Series, 8, 195-248. Retrieved from [https://doi.org/10.1016/S0921-9110\(08\)80008-0](https://doi.org/10.1016/S0921-9110(08)80008-0)
- Cushman-Roisin, B. (2012). Environmental Transport and Fate- Smokestack Plumes (lecture slides). Dartmouth College: Thayer School of Engineering. Retrieved from <https://cushman.host.dartmouth.edu/courses/engs43/Smokestack-plumes.pdf>

## Recommendations/Conclusions:

### Recommendations:

Communication that odors are common and expected at ETF should be increased. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.

Evaluation of operational processes in which process chemicals and/or effluent contaminants are mixed should be performed to the extent that resulting gases/vapors can be ranked based on possible odorant formation and/or emission. Then processes which are anticipated to result in odorous emissions should not be performed without additional controls (e.g ventilation, access restriction, communication) in place to eliminate potential worker exposure until exposure assessment can be performed to ensure that exposure to odorous emissions does not equate to potential exposure above OELs.

An evaluation should be performed by ETF Engineering to determine the specific requirements, standards, and/or regulations related to ventilation of 20B-TK-1. The frequent presence of odors attributed to 20B-TK-1 suggests that ventilation is ineffective, which may indicate a non-conformance.

### Conclusions:

Odor descriptors provided by Affected Workers are inconsistent with Tank Vapors. Based on a review of the DFAS application, powered by SmartSite™, Weather Details dashboard and VMDS exhauster ammonia readings for the approximate time of the Event, and distance of event location from Tank Farm emission points, the cause of the odor is unlikely to be from Tank Farm Exhauster emissions. The atmospheric stability at the time of the event was moderately to extremely stable conditions and the mixing height was 1000 feet above grade.

Although a source was identified by affected personnel, the specific chemical mixture contributing to the odors would not be positively identified utilizing available DRI equipment and analytical techniques applied to the source grab sample. The diversity of odor descriptors reported did not allow for deductive determination of chemical constituents. Tank contents could not be positively determined, and so resulting reaction products could not be hypothesized. As the specific odorant chemical mixture is unknown, evaluation of exposure as compared to applicable OELs could not be performed, however source sample results were found to be below OELs for chemical compounds identified. A review of possible chemicals based on odor descriptors shows that most plausible chemical odor thresholds are well below applicable TWA OELs. As the event was of short duration, and personnel exited the area soon after odors were reported, it is unlikely applicable OELs were exceeded.

DRI instrumentation results indicated that further actions were not necessary to protect worker safety and health, however it was advised that restricted access around 20B-TK-1 should remain in place to provide an opportunity for ETF Management (specifically the Shift Operations Manager) to provide personnel accessing the area adequate briefing about frequent and expected 20B-TK-1 related odors.

### Other:

Similar odor response evolutions occurred at 20B-TK-1 on 03/16/2023 (see IHIR-00065) and 09/10/2024 (see IHIR-000106). At the conclusion of both events access restriction was to remain in place until either the VOG was applied to 20B-TK-1 to control emission of odors, the 20B-TK-1 hatch and other penetrations could be sealed to maintain negative ventilation, and additional characterization could be performed. In both circumstances the access restriction was removed by ETF operations without additional actions being completed.

On 12/04/2024 the facility IH, DFLAW IH, and DFLAW Health and Safety Manager performed a walkdown of the 20B-TK-1 area to assess the effectiveness of actions performed by facility management to reduce the occurrence of odors (removing temporary equipment from 20B-TK-1 and sealing the access hatch, and access restriction to the area). At the time of the walkdown the access restriction to remain in place after conclusion of TFC-OPS-OPER-C-67 field response actions had been removed or not initially posted. Temporary equipment was still installed in 20B-TK-1 and the access hatch was not sealed.

Washington River Protection Solutions  
**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)**

Associated Documents:

**iCAS Number:** N/A

**EIR Number:** EIR 2025-017

Industrial Hygienist:

██████████

*Print First and Last Name*

Industrial Hygiene Level 3 Manager (delegated):

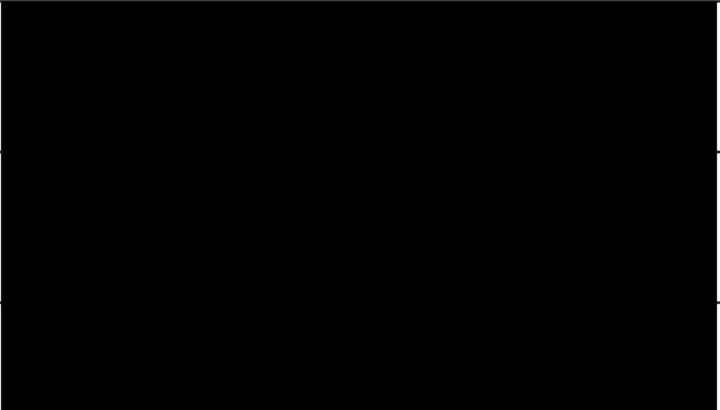
██████████

*Print First and Last Name*

Industrial Hygiene Level 2 Manager (delegated):

██████████

*Print First and Last Name*



*Signature / Date*

## ODOR/VAPOR RESPONSE CARD

### 1. Complete below information and map (Page 1).

• Date and time of event: 11/26/24 2016

• Check Applicable:

Odor     Ammonia Alarm (6 ppm)     Ammonia Alarm (12 ppm)     Alarm (other - describe): \_\_\_\_\_

• Your name and the work you were performing:

[Redacted] | Routines

• Other Work Underway? Describe:

N/A

• Location of event (mark area on map and wind direction):

2025E Process Area (East Side)

• Name(s) of others in or near the affected area:

[Redacted]

• Was Industrial Hygiene present, who?

No

• Describe the odor:

Sweet     Sour     Smoky     Septic/Sewer     Musty     Rotten  
 Metallic     Onion     Earthy     Ammonia     Citrus     Solvent  
 Other (describe): \_\_\_\_\_ musty/stale water

• Is source known/likely? Describe:

Possibly Sump #1

• Your symptoms?  None

Headache     Dizziness     Nausea     Cough     Fatigue  
 Weakness     Sore Throat     Difficulty Breathing     Eye Irritation     Rash  
 Itch     Tingling     Numbness     Taste  
 Other (describe): Warm throat, burning in nose

2. Provide this completed card (Page 1 & 2) to Supervisor, Industrial Hygiene, your Union Safety Representative or the CSM. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

## ODOR/VAPOR RESPONSE CARD

### Instructions:

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM), at (509) 373-2689.
3. Complete both pages of this form and include as many details as possible, including:
  - a. Approximate location, see map at right;
  - b. Wind direction, speed and description, such as stable or gusty wind;
  - c. Environmental conditions, such as hot, cold, windy, rainy;
  - d. Other work or contractors in the area;
  - e. Anything else you think is relevant.
4. Provide the completed card to your Supervisor\*, Industrial Hygiene\*, Union Safety Representative\* or the CSM.

\* If received by Supervisor, IH, or Union Safety Representative, the Supervisor/IH/ Union-SR will ensure card it is provided to the CSM.

## ODOR/VAPOR RESPONSE CARD

### 1. Complete below information and map (Page 1).

• Date and time of event: 11/26/2024

• Check Applicable:

Odor     Ammonia Alarm (6 ppm)     Ammonia Alarm (12 ppm)     Alarm (other - describe): \_\_\_\_\_

• Your name and the work you were performing:

██████████ ETF D Shift SOM.

• Other Work Underway? Describe:

Only work on process floor being conducted was normal rounds

• Location of event (mark area on map and wind direction):

ETF Process Floor Sump #1

• Name(s) of others in or near the affected area:

██████████

• Was Industrial Hygiene present, who?

██████████

• Describe the odor:

Sweet     Sour     Smoky     Septic/Sewer     Musty     Rotten  
 Metallic     Onion     Earthy     Ammonia     Citrus     Solvent  
 Other (describe): \_\_\_\_\_

• Is source known/likely? Describe:

Likely source from sump 1 do to draining sump 1 to a lower level earlier in the day

• Your symptoms?  None

Headache     Dizziness     Nausea     Cough     Fatigue  
 Weakness     Sore Throat     Difficulty Breathing     Eye Irritation     Rash  
 Itch     Tingling     Numbness     Taste  
 Other (describe): \_\_\_\_\_

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  - d. Other work or contractors in the area;
  - e. Anything else you think is relevant.
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\* If received by Supervisor, IH, or Union Safety Representative, the Supervisor/IH/Union-SR will ensure card it is provided to the CSM.

## ODOR/VAPOR RESPONSE CARD

### 1. Complete below information and map (Page 1).

• Date and time of event: 11/26/24 2016

• Check Applicable:

Odor     Ammonia Alarm (6 ppm)     Ammonia Alarm (12 ppm)     Alarm (other - describe): \_\_\_\_\_

• Your name and the work you were performing:

[Redacted]    Rounds and Routines

• Other Work Underway? Describe:

n/A

• Location of event (mark area on map and wind direction):

2025E Process floor East side of Evaporator

• Name(s) of others in or near the affected area:

[Redacted]

• Was Industrial Hygiene present, who?

no

• Describe the odor:

Sweet     Sour     Smoky     Septic/Sewer     Musty     Rotten  
 Metallic     Onion     Earthy     Ammonia     Citrus     Solvent  
 Other (describe): \_\_\_\_\_

• Is source known/likely? Describe:

Possible Sump # 2

• Your symptoms?  None

Headache     Dizziness     Nausea     Cough     Fatigue  
 Weakness     Sore Throat     Difficulty Breathing     Eye Irritation     Rash  
 Itch     Tingling     Numbness     Taste  
 Other (describe): \_\_\_\_\_

2. Provide this completed card (Page 1 & 2) to Supervisor, Industrial Hygiene, your Union Safety Representative or the CSM.  
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  - a. Approximate location, see map at right;
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  - c. Environmental conditions, such as hot, cold, windy, rainy;
  - d. Other work or contractors in the area;
  - e. Anything else you think is relevant.
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