

Hanford Tank Waste Operations & Closure (H2C)
EVENT REPORT FORM

1. Project: ETF Operations 2. Report Date: 10/05/2026
3. Title: C-67 Response at ETF Process Floor
4. Investigation Report Number (if applicable): EIR-2026-057 5. Revision: 0
6. Responsible Manager: [REDACTED]
7. Event Investigator: [REDACTED]
8. Area/Building/Location: 200E/2025E/ ETF Process Floor
9. Date and Approximate Time of Event: Date: 08/31/2026 Time: (military) 0550 hours
10. Associated Action Request (AR) Number: ITDC-CR-2026-2656
11. Occurrence Report Number (if applicable): N/A
12. Event Learning Meeting Held: Yes [] or No [x] Date: N/A Time: (military) N/A

13. Brief Summary of Event: What Happened?

On August 31, 2026, at approximately 0550 hours, four Nuclear Chemical Operators (NCOs) and one ETF Maintenance Supervisor were performing routine operational activities on the ETF Process Floor inside of 2025E when they encountered a stronger than normal odor of "fishy", "burning", "chemical" and "smell of sump 1". At 0559 hours The Central Shift Manager (CSM) was notified and initiated TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*. All the affected workers reported no symptoms and declined a precautionary medical evaluation.

14. What Should Have Happened?

N/A

15. Key Facts from Investigation:

- To summarize the conclusions of Industrial Hygiene Event Investigation Report (IHIR) IHIR #00146, *TFC-OPS-OPER-C-67 at 2025E on 08/31/2026* A Review of the Data Fusion and Advisory System (DFAS), SmartSite™ Weather Details, and Vapor Monitoring and Detection System (VMDS) data show Tank Farm Exhausters Emissions were not the source of the reported odor. The odors were confined within the ETF facility. The investigation identified that Sump Tank 1 (20B-TK-1) is the likely source, with monitoring confirming no exposures above occupational limits.
- Three actions were recommended in the IHIR. One of the actions were to increase communication that odors are normal and expected during water-treatment processes. The second was for ETF Operations and Process Chemical Engineering should perform a trend analysis of 20B-TK-1 conditions and facility configurations to understand what leads to stronger-than-normal odors. The last action is for Performance Assurance to review corrective actions from past and current odor events, determine which are actionable, track completion, and document non-actionable items for future improvement. These actions will be tracked in the Condition Report ITDC-CR-2026-2656.

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

Access was restricted to the ETF Process Floor inside of 2025E until response actions could be completed.

17. Problem Statement (Who, What, Where, When, and Consequence/Impact):

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N/A

18. Event Causal Matrix Summary:

N/A

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26. Signatures

Prepared By: *(Event Investigator)*

Name (First, Middle Initial, Last)

Signature / Date

Responsible Manager Approval:

Name (First, Middle Initial, Last)

Signature / Date

CAS Manager Approval:

Name (First, Middle Initial, Last)

Signature / Date

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)

Event Title: TFC-OPS-OPER-C-67 at 2025E on 08/31/2026	IHIR Number: IHIR-00146
	IHEI Number: N/A

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Date: 08/31/2026	Time: Approximately 0550	Location: 2025E Process Floor
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Event Summary and Response Timeline:

Event Summary:

At approximately 0550 on August 31st, 2026 five (5) employees experienced stronger than normal “fishy”, “burning”, “chemical”, “smell of sump 1” odors while performing routine operational activities. No symptoms were reported. All affected employees declined precautionary medical evaluation.

Response Timeline:

- 0550 Effluent Treatment Facility (ETF) Shift Operations Manager (SOM) notifies Central Shift Manager (CSM) of odors
- 0559 Production Operations (PO) Industrial Hygiene (IH) Manager and Direct Feed Low Activity Waste (DFLAW) IH arrive at Central Shift Office (CSO)
- 0600 DFLAW IH Manager arrives at CSO
- 0606 Data Fusion and Advisory System (DFAS) for current weather condition at time of event:
- Mixing Height: 1100 feet above grade
 - Wind Speed: 4.4 miles per hour
 - Wind Direction: From 243° (West Southwest)
 - Stability Class: F/G (moderately to extremely stable conditions)
 - Exhauster Ammonia Concentration: DFAS does not indicate that displayed stack concentrations are above alarm limits.
- 0608 CSM contacts ETF Shift Manager (SM) to request Odor/Vapor Response Cards (O/VRCs)
- O/VRCs are currently being populated
 - 4 Nuclear Chemical Operators (NCOs) & 1 Shift Supervisor
 - No symptoms reported, precautionary medical evaluation declined
- 0610 Shift Operations Event Notification (SOEN): “Initiate C-67 Response for report of stronger than normal odors on the Process Floor and the Process Floor Mezzanine. Access is Restricted to the ETF Process Floor and the Process Floor Mezzanine. CSM”
- 0611 ETF IH Supervisor arrives at CSO
- 0616 DFLAW IH Manager provides notification and briefing to Environmental, Safety, Health & Quality (ESH&Q) Management
- 0625 DFLAW IH Manager provides notification and briefing to Department of Energy (DOE) IH
- 0629 ETF SM notifies CSM that O/VRCs are complete and in-route to CSO
- 0634 ETF IHT Supervisor contacts ETF SM for clarification on O/VRC odor descriptor selection
- 0636 ETF SM contacts ETF IHT supervisor to determine how long field response actions will take
- 0637 CSM provides notification and briefing to Performance Assurance Manager
- 0640 SOEN: “Initiated EIR-2026-057 “C-67 Response at ETF Process Floor” [REDACTED]
- 0648 DFLAW IH Manager requests Industrial Hygiene Investigation Report (IHIR) number from IH Records administrator
- 0641 ETF SM provides ETF IHT Supervisor clarification on O/VRC odor descriptor selection
- 0707 ETF IHT Supervisor submits request to DFLAW IHTs for preparation of DRI and grab sample supplies
- 0713 CSM requests RadCon support for development of TFC-OPS-OPER-C-67 Attachment A: Response Plan
- 0719 RadCon recommends Radiological Work Permit (RWP) ETF-LE-003 Task 1
- 0733 TFC-OPS-OPER-C-67 Attachment A: Response Plan approved
- 0739 DFLAW IH briefs Field Response Team on planned Field Response Actions:
- Perform general area monitoring of 2025E Process Floor as per IHSP-PO-MULTI-TFCOPSOPERC67:
 - Ammonia (NH₃): Action Level – 12 ppm
 - Hydrogen Sulfide (H₂S): Action Level – 0.5 ppm
 - Volatile Organic Compounds(VOCs) 10.6 eV PID: Action Level – 0.5 ppm
 - Volatile Organic Compounds (VOCs) 11.7 eV PID: Action Level – 0.7 ppm
 - Collect 2 grab samples: 1 of general access area where odor is most apparent, 1 at hatchway of Sump Tank 1

NOTE: Event Response Timeline continued on next page

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Event Response Timeline continued:

- 0741 DFLAW IH Manager notifies Sample Management Office (SMO) that RUSH turn around time (TAT) sample shipping support will be needed
- 0749 ETF SM contacts CSM to request prioritization of routine operations activity before field response actions
- 0750 Field Response Team (DFLAW IH, ETF IHT Supervisor, DFLAW IHT #1, DFLAW IHT #2, DFLAW IHT #3) depart CSO to perform field response actions
- 0800 Field Response Team meets with ETF SM, ETF NCO, and ETF Radiological Control Technician (RCT) to brief escort of routine operations activity:
- Continuous coverage of Direct Reading Instrumentation (DRI) monitoring at all routine operation activity location(s) with action levels as determined for field response actions
 - Field Response Actions (odor investigation) will begin after personnel performing routine operations activity(s) have exited process floor
- 0817 Field Response Team and ETF operations personnel enter process area
- 0837 Field Response Team begins field response actions (odor investigation)
- 0934 Grab sample collection complete, Field Response Team exits process floor
- 0942 DRI post-use-function-test has passed
- 0945 DFLAW IH and ETF IHT Supervisor return to CSO
- 1048 SOEN: "C-67 Odor Response for Stronger than Normal Odors reported on the ETF Process Floor are complete. Normal Access is restored to the ETF Process Floor. CSM"

Response Timeline Acronyms:

CSM	Central Shift Manager
CSO	Central Shift Office
DFAS	Data Fusion and Advisory System
DFLAW	Direct Feed Low Activity Waste
DOE	Department of Energy
DRI	Direct Reading Instrumentation
ESH&Q	Environmental, Safety, Health, & Quality
ETF	Effluent Treatment Facility
H ₂ S	Hydrogen Sulfide
IH	Industrial Hygienist
IHIR	Industrial Hygiene Investigation Report
IHT	Industrial Hygiene Technician
NCO	Nuclear Chemical Operator
NH ₃	Ammonia
O/VRC	Odor/Vapor Response Card
PO	Production Operations
RCT	Radiological Control Technician
SM	Shift Manager
SOEN	Shift Operations Event Notification
SOM	Shift Operations Manager
VOC	Volatile Organic Compounds

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Event Response Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- DRI readings acquired during field response actions:

Location	Ammonia (NH ₃)	Hydrogen Sulfide (H ₂ S)	Volatile Organic Compounds (VOCs) 10.6 eV PID	Volatile Organic Compounds (VOCs) 10.7 eV PID
Evaporator Skid Area (upper and lower level)	< 1 ppm	< 0.1 ppm	< 0.010 ppm	< 0.10 ppm
2025E Process Floor - General Area	< 1 ppm	< 0.1 ppm	< 0.010 ppm	< 0.10 ppm
2025E Process Floor Mezzanine – General Area	< 1 ppm	< 0.1 ppm	< 0.010 ppm	< 0.10 ppm
Sump 1 (20B-TK-1) – General Area	< 1 ppm	< 0.1 ppm	< 0.010 ppm	< 0.10 ppm

Sampling Results:

- Grab samples were collected from the opening of 20B-TK-1 access hatch and in the general area around 20B-TK-1 where odors were most apparent during field response actions. Grab samples were transferred to Carbotrap 300 TDU media for VOC analysis by Gas Chromatography/Mass Spectrometry (GC-MS) by method TO-17A, SKC-226-96 XAD-7 media for amines analysis by High Performance Liquid Chromatography (HPLC) by methods OSHA 34, OSHA 36, and OSHA 40, and SKC-226-119-7 media for Aldehyde analysis by HPLC as per EPA method TO-11A:

Source grab sample VOC results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
At 20B-TK-1 Hatch				
Chloroethane	< 0.0013	100	TWA	ACGIH TLV
Acetonitrile	0.0062 ¹	20	TWA	ACGIH TLV
Ethanol	0.0156	1000	STEL	ACGIH TLV
Acetone	0.0228 ¹	250	TWA	ACGIH TLV
Trichloroflouromethane	< 0.0006	1000	STEL	ACGIH TLV
Acrylonitrile	< 0.0015	2	TWA	ACGIH TLV
1,1-Dichloroethene	< 0.0009	100	TWA	ACGIH TLV
Methylene Chloride	< 0.0010	25	TWA	OSHA PEL
Allyl Chloride	< 0.0011	1	TWA	ACGIH TLV
1-Propanol	0.0018 ¹	100	TWA	ACGIH TLV
Propanenitrile	< 0.0015	6	TWA	NIOSH REL
Methyl Vinyl Ketone	< 0.0012	0.2	STEL	ACGIH TLV
1,1-Dichloroethane	< 0.0008	100	TWA	ACGIH TLV
Methyl Acrylonitrile	< 0.0012	1	TWA	ACGIH TLV
2-Butanone	< 0.0011	200	TWA	ACGIH TLV
2-Methylfuran	0.0005	0.002	TWA	OEL _{HTF}
Ethyl Acetate	< 0.0009	400	TWA	ACGIH TLV
n-Hexane	< 0.0010	50	TWA	ACGIH TLV
2,5-Dihydrofuran	< 0.0006	0.002	TWA	OEL _{HTF}
Chloroform	< 0.0007	10	TWA	ACGIH TLV
1,2-Dichloroethane	< 0.0008	1	TWA	NIOSH REL
Butanenitrile	< 0.0012	8	TWA	NIOSH REL
Benzene	< 0.0011	0.5	TWA	ACGIH TLV
Carbon Tetrachloride	< 0.0005	5	TWA	ACGIH TLV
Cyclohexane	< 0.0010	100	TWA	ACGIH TLV

NOTE: Sampling/Monitoring Results continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Sample/Monitoring Results continued:

1,4-Dioxane	< 0.0009	20	TWA	ACGIH TLV
Trichloroethylene	< 0.0006	10	TWA	ACGIH TLV
n-Heptane	< 0.0008	400	TWA	ACGIH TLV
cis-1,3-Dichloropropene	< 0.0007	1	TWA	ACGIH TLV
Methyl Isobutyl Ketone	< 0.0008	20	TWA	ACGIH TLV
Pentanenitrile	< 0.0010	5	TWA	NIOSH REL
trans-1,3-Dichloropropene	< 0.0007	1	TWA	ACGIH TLV
1,1,2-Trichloroethane	< 0.0006	10	TWA	ACGIH TLV
Toluene	< 0.0009	20	TWA	ACGIH TLV
2-Hexanone	< 0.0008	1	TWA	NIOSH REL
Butyl Acetate	< 0.0007	50	TWA	ACGIH TLV
Tetrachloroethylene	< 0.0005	25	TWA	ACGIH TLV
Chlorobenzene	< 0.0007	10	TWA	ACGIH TLV
Hexanenitrile	< 0.0009	6	TWA	NIOSH REL
Ethyl Benzene	< 0.0008	20	TWA	ACGIH TLV
3-Heptanone	< 0.0007	50	TWA	ACGIH TLV
2-Heptanone	< 0.0007	50	TWA	ACGIH TLV
Styrene	< 0.0008	20	TWA	ACGIH TLV
1,1,2,2-Tetrachloroethane	< 0.0005	1	TWA	ACGIH TLV
Benzonitrile	< 0.0008	-	-	-
3-Octanone	< 0.0006	-	-	-
Decane	< 0.0006	200	TWA	OSHA PEL
1,4-Dichlorobenzene	< 0.0006	10	TWA	ACGIH TLV
Acetophenone	< 0.0007	10	TWA	ACGIH TLV
Nitrobenzene	< 0.0007	1	TWA	ACGIH TLV
Naphthalene	< 0.0006	10	TWA	ACGIH TLV

Tentatively Identified Compounds ²:

Nonanal	0.0015	-	-	-
n,n-Dimethylmethylanine	0.0028	-	-	-

Source grab sample amines analysis results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
At 20B-TK-1 Hatch				
Dimethylamine	< 0.12	5	TWA	ACGIH TLV
Ethylamine	< 0.03	5	TWA	ACGIH TLV
Methylamine	< 0.04	5	TWA	ACGIH TLV

NOTE: Sampling/Monitoring Results continued on next page.

¹ Reporting Limit Verification failed with high bias (recovery > 150 %) indicating high bias of results.

² 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.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Sample/Monitoring Results continued:

Source grab sample aldehyde analysis results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
At 20B-TK-1 Hatch				
Formaldehyde	0.005	0.3	Ceiling	ACGIH TLV
Acetaldehyde	0.011	25	TWA	ACGIH TLV
Acrolein	< 0.001 ³	0.1	TWA	ACGIH TLV
Propionaldehyde	< 0.002	20	TWA	ACGIH TLV
Butyraldehyde (Butanal)	0.001 ⁴	25	TWA	ACGIH TLV
Valeraldehyde	< 0.001	50	TWA	ACGIH TLV
Hexanal	< 0.001	–	–	–

General Area grab sample VOC analysis results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
General Area near 20B-TK-1				
Chloroethane	< 0.0013	100	TWA	ACGIH TLV
Acetonitrile	0.0198 ⁵	20	TWA	ACGIH TLV
Ethanol	0.0706	1000	STEL	ACGIH TLV
Acetone	0.0168 ⁵	250	TWA	ACGIH TLV
Trichloroflouromethane	< 0.0006	1000	STEL	ACGIH TLV
Acrylonitrile	< 0.0015	2	TWA	ACGIH TLV
1,1-Dichloroethene	< 0.0008	100	TWA	ACGIH TLV
Methylene Chloride	< 0.0010	25	TWA	OSHA PEL
Allyl Chloride	< 0.0011	1	TWA	ACGIH TLV
1-Propanol	0.0042 ⁵	100	TWA	ACGIH TLV
Propanenitrile	< 0.0015	6	TWA	NIOSH REL
Methyl Vinyl Ketone	< 0.0012	0.2	STEL	ACGIH TLV
1,1-Dichloroethane	< 0.0008	100	TWA	ACGIH TLV
Methyl Acrylonitrile	< 0.0012	1	TWA	ACGIH TLV
2-Butanone	< 0.0011	200	TWA	ACGIH TLV
2-Methylfuran	< 0.0005	0.002	TWA	OEL _{HTF}
Ethyl Acetate	< 0.0009	400	TWA	ACGIH TLV
n-Hexane	< 0.0009	50	TWA	ACGIH TLV
2,5-Dihydrofuran	< 0.0006	0.002	TWA	OEL _{HTF}
Chloroform	< 0.0007	10	TWA	ACGIH TLV
1,2-Dichloroethane	< 0.0008	1	TWA	NIOSH REL
Butanenitrile	< 0.0012	8	TWA	NIOSH REL
Benzene	< 0.0010	0.5	TWA	ACGIH TLV
Carbon Tetrachloride	< 0.0005	5	TWA	ACGIH TLV

NOTE: Sampling/Monitoring Results continued on next page.

³ Analyte retention on selected media is not reliable. Result should be treated as qualitative, but biased low.

⁴ Method Blank Sample failed with high bias (530 % of reporting limit) and the Reporting Limit Verification Sample failed with low bias (23% recovery at < Method Detection Limit). Result should be disregarded.

⁵ Reporting Limit Verification failed with high bias (recovery > 150 %) indicating high bias of results.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Sample/Monitoring Results continued:

Cyclohexane	< 0.0010	100	TWA	ACGIH TLV
1,4-Dioxane	< 0.0009	20	TWA	ACGIH TLV
Trichloroethylene	< 0.0006	10	TWA	ACGIH TLV
n-Heptane	< 0.0008	400	TWA	ACGIH TLV
cis-1,3-Dichloropropene	< 0.0007	1	TWA	ACGIH TLV
Methyl Isobutyl Ketone	< 0.0008	20	TWA	ACGIH TLV
Pentanenitrile	< 0.0010	5	TWA	NIOSH REL
trans-1,3-Dichloropropene	< 0.0007	1	TWA	ACGIH TLV
1,1,2-Trichloroethane	< 0.0006	10	TWA	ACGIH TLV
Toluene	< 0.0009	20	TWA	ACGIH TLV
2-Hexanone	< 0.0008	1	TWA	NIOSH REL
Butyl Acetate	< 0.0007	50	TWA	ACGIH TLV
Tetrachloroethylene	< 0.0005	25	TWA	ACGIH TLV
Chlorobenzene	< 0.0007	10	TWA	ACGIH TLV
Hexanenitrile	< 0.0008	6	TWA	NIOSH REL
Ethyl Benzene	< 0.0008	20	TWA	ACGIH TLV
3-Heptanone	< 0.0007	50	TWA	ACGIH TLV
2-Heptanone	< 0.0007	50	TWA	ACGIH TLV
Styrene	< 0.0008	20	TWA	ACGIH TLV
1,1,2,2-Tetrachloroethane	< 0.0005	1	TWA	ACGIH TLV
Benzonitrile	< 0.0008	-	-	-
3-Octanone	< 0.0006	-	-	-
Decane	< 0.0006	200	TWA	OSHA PEL
1,4-Dichlorobenzene	< 0.0006	10	TWA	ACGIH TLV
Acetophenone	< 0.0007	10	TWA	ACGIH TLV
Nitrobenzene	< 0.0007	1	TWA	ACGIH TLV
Naphthalene	< 0.0006	10	TWA	ACGIH TLV

Tentatively Identified Compounds ⁶:

Cyclopentane	0.0190	600	TWA	ACGIH TLV
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General Area grab sample amines analysis results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
General Area near 20B-TK-1				
Dimethylamine	< 0.12	5	TWA	ACGIH TLV
Ethylamine	< 0.03	5	TWA	ACGIH TLV
Methylamine	< 0.04	5	TWA	ACGIH TLV

NOTE: Sampling/Monitoring Results continued on next page.

⁶ 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.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Sample/Monitoring Results continued:

General Area grab sample aldehyde analysis results:

Analytes	Results (ppm)	Applicable OEL (ppm)		
General Area near 20B-TK-1				
Formaldehyde	0.005	0.3	Ceiling	ACGIH TLV
Acetaldehyde	0.005	25	TWA	ACGIH TLV
Acrolein	< 0.001 ⁷	0.1	TWA	ACGIH TLV
Propionaldehyde	< 0.002	20	TWA	ACGIH TLV
Butyraldehyde (Butanal)	0.002 ⁸	25	TWA	ACGIH TLV
Valeraldehyde	< 0.001	50	TWA	ACGIH TLV
Hexanal	< 0.001	N/A	–	–

Analytical results indicate that all sample results in the source and general area were below 10% of applicable OELs with the exception of 2-Methylfuran (26.7 % of the OEL source and < 24.8 % of the OEL general area) and 2,5-Dihydrofuran (< 29.5 % of the OEL source and < 29.0 % of the OEL general area). Generally higher concentrations were detected in the general area relative to source, potentially indicating that the contents of 20B-TK-2 which originally contributed to odor emissions had been cycled through the sump to the Surge Tank prior to field response actions. The odorous sump contents were likely no longer present or significantly diluted during field response actions with odorous chemical vapor concentrations still present in the general area.

Sump Tank 1 (20B-TK-1) Level activity between event initiation (0550) and initiation of field response actions (0817):



SWIHD References:

26-05960: "TFC-OPS-OPER-C-67 field response 2025E"

26-05971: "TFC-OPS-OPER-C-67 field response 2025E"

⁷ Analyte retention on selected media is not reliable. Result should be treated as qualitative, but biased low.

⁸ Method Blank Sample failed with high bias (530 % of reporting limit) and the Reporting Limit Verification Sample failed with low bias (23% recovery at < Method Detection Limit). Result should be disregarded.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information:

Event Specific Plant Operations Information:

At the time of the event the ETF was performing both regeneration of the polisher columns simultaneously with evaporator/concentrator operations. 20B-TK-1 was receiving both effluent from the polisher system (dilute acid and caustic solutions), hot liquid and steam discharge from the evaporator and associated boiler system, and recirculation of Secondary Treatment Train concentrate (concentrated contaminants removed during primary treatment train processing). Beginning at approximately 0143 08/31/2026 20B-TK-1 began cyclic rapid receipt and then transfer to surge. Beginning at approximately 01:43 AM, until the time of the event 20B-TK-1 emitted (through displacement) approximately 51.83 m³ of headspace at an average rate of 0.26 m³/minute. Additional headspace displacement to the process floor may have occurred due to vapor phase (water vapor) contribution to the 20B-TK-1 headspace from the evaporator/concentrator system. This is evidenced by water vapor emission and condensation visible at the 20B-TK-1 hatchway during the field response actions (see: [Figure 1](#)). During the event the Vessel Off-Gas System (VOG) was in operation. The VOG nominally provides ventilation of the 20B-TK-1 headspace, however the actualized flow rate is significantly less than nominal receipt or transfer flow rate, and the VOG leg (1.5 inch diameter piping leg 45D-017-155) from 20B-TK-2 is not instrumented, therefore flow and/or flow rate cannot be monitored.

Sump Tank 1 (20B-TK-1) level activity preceding the initiating event:



Time	20B-TK-1 level (%)	Δ Level %	20B-TK-1 volume (m ³)	Displacement Volume (m ³)	Emission Rate (m ³ /minute)
1:43:40	67.235	-	22.653	-	-
2:03:15	90.865	23.630	22.653	5.353	0.273
2:18:30	18.768	-72.097	22.653	-16.332	-1.071
3:18:54	90.663	71.895	22.653	16.287	0.270
3:34:08	18.307	-72.356	22.653	-16.391	-1.076
4:37:16	88.767	70.460	22.653	15.962	0.253
4:52:31	18.548	-70.219	22.653	-15.907	-1.043
5:50:00	81.355	62.807	22.653	14.228	0.248

NOTE: Additional Information (Event Specific Plant Operations Information) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (Event Specific Plant Operations Information) continued:

Comparison with other 20B-TK-1 related odor events:

During H2Cs tenure of ETF operations numerous odor events related to 20B-TK-1 have occurred. Odor descriptors have varied dependent on plant operational mode, tank contents, and ventilation status, as changes in process chemistry (e.g., pH modulation, influent contaminant chemical species, process chemical addition for cleaning/treatment) and associated volumetric relationships to 20B-TK-1 contents will logically be the driver of variation in odorous chemical emission. For example, an unanticipated change in the pH of tank contents (e.g., secondary waste, STT concentrate) from addition of effluent from another source (e.g., acid and/or caustic solutions from polisher regeneration, cleaning agents) can cause the release of gas phase odorous ionic compounds usually kept in solution (e.g., ammonia, cyanides, organic acids, amines, aldehydes) when pH of the tank contents is sufficiently different from the pKa of the chemical species. This is additionally supported by the expectation that concentrated contaminants within the STT are likely oxides or hydroxides to facilitate removal from the treated fraction of the effluent.

IHIR #	Odor Descriptor:										VOG Status	20B-TK-2 Operations Summary		
	"sweet"	"ammonia"	"fishy"	"septic/sewer"	"musty"	"peanuts"	"rotten"	"stale water"	"earthy"	"burning"			"chemical"	"Sump 1 smell"
IHIR-00065	X												Off	Prolonged sump inactivity (15% sump volume)
IHIR-00106		X	X	X	X	X	X						Off	Approximately 2 days post SWRT transfer through 20B-TK-2 (27% sump volume), Polisher regeneration cycle in progress.
IHIR-00109		X			X		X	X	X				On	Normal sump operations (20% sump volume)
IHIR-00146		X								X	X	X	On	Accelerated sump operations (19% - 91% sump volume)

What has remained consistent throughout the operational history of ETF is that 20B-TK-1 is a consistent source of odors on the ETF process floor regardless of operational mode or ventilation status. Whenever 20B-TK-1 contains liquids with odors chemical constituents vapor emission to the process floor occurs. Although 20B-TK-1 is nominally ventilated by the VOG the negative pressure provided does not prevent emission, as illustrated by odor events occurring during both VOG operation and non-operation periods. Due to the frequency of occurrence odors from 20B-TK-1 should be expected. The frequency of odor emissions seems to increase during periods where "plant clean-out" is occurring signifying additional process chemical addition (e.g., cleaning agents, process component treatments), periods of ventilation outage leading to decreased general area dilution ventilation and passive breathing of the 20B-TK-2 headspace, and accelerated 20B-TK-1 operations typically associated with completion of an effluent treatment campaign or preparation for imminent campaign initiation. Basically, any time period where "steady-state" plant operations is not occurring.

For this event specifically, sufficient operational experience has been gained previously to have at least anecdotally expected odors during the operational activity(s) being performed when the event occurred. Members of the plant workforce are at least anecdotally aware of the commonality of the odor source as indicated by "sump 1 smell" being provided as an odor descriptor on an O/VRC submitted during this event. This is further exemplified by previous corrective action recommendations provided for previous event investigations associated with 20B-TK-1 odors.

Summary of previous 20B-TK-1 related odor event corrective action recommendations:

- IHIR-0065
 - Maintain 3 foot restricted access boundary [around 20B-TK-1] until an engineering control can be put in place and can be validated. This may include :
 - Operating the VOG
 - Closing sump hatch
- IHIR-00106
 - Communication that odors are expected during VOG and/or RCA ventilation outages should be increased ahead of implementation. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.

NOTE: Additional Information (Event Specific Plant Operations Information) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (Event Specific Plant Operations Information) continued:

- IHIR-00109
- 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.
 - 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.

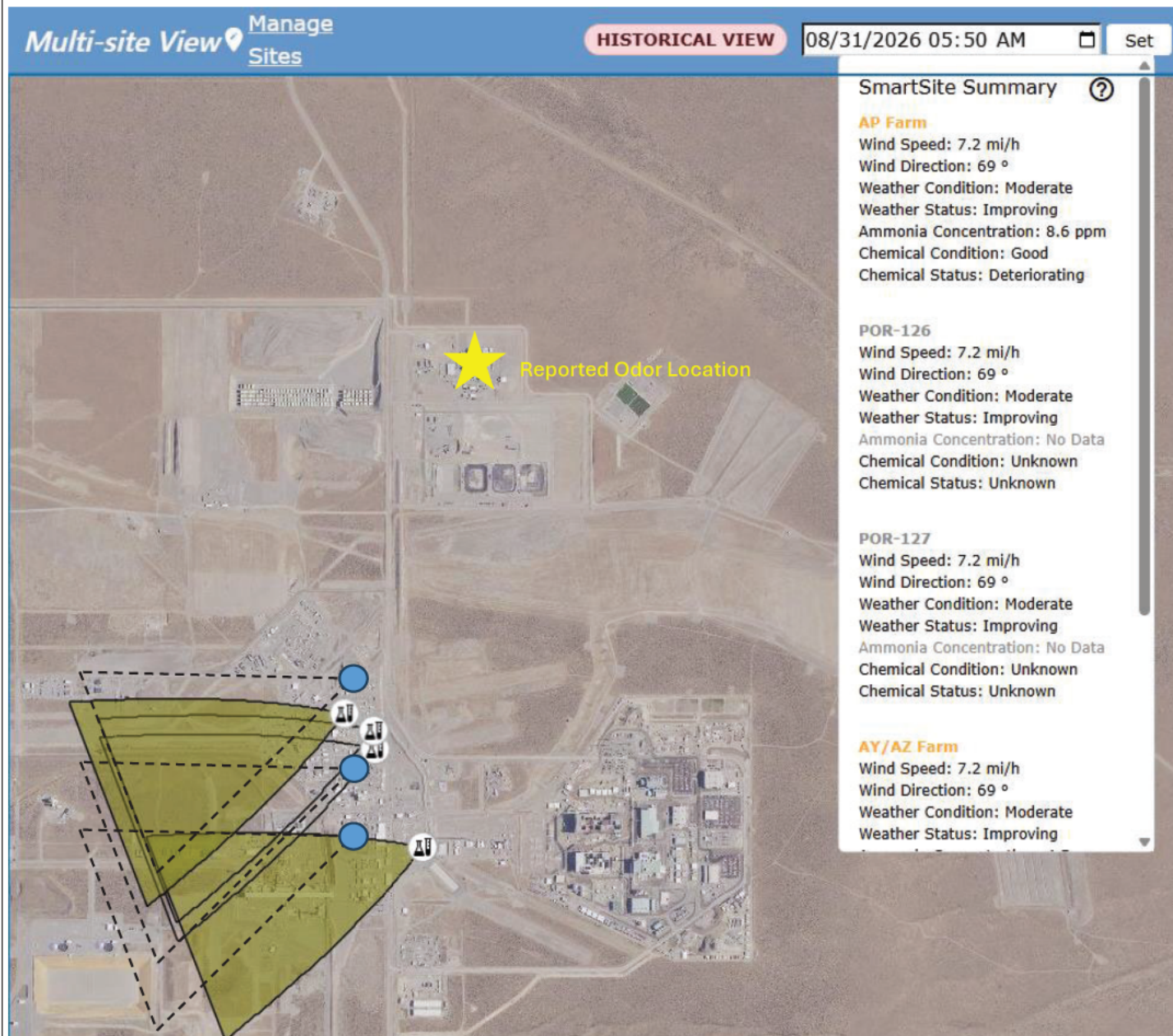
NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information continued:

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

DFAS Multi-Farm View Exhauster Plume Model: 08/31/2026 @ 1550 (approximate time of event):



NOTE: 241-AN Farm, 241-AW Farm, and A Farm (POR-518/519) Exhausters are not connected to the DFAS; however, approximate exhauster plumes were added based on other modeled plumes. The AX-Farm Exhausters (POR-126 and POR-127) have been placed out of service, therefore POR-126 and POR-127 data should be disregarded.

NOTE: Additional Information (DFAS Review) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (DFAS Review) continued:

DFAS Weather Conditions: 08/31/2026 @ 0550 (approximate time of event):

Weather

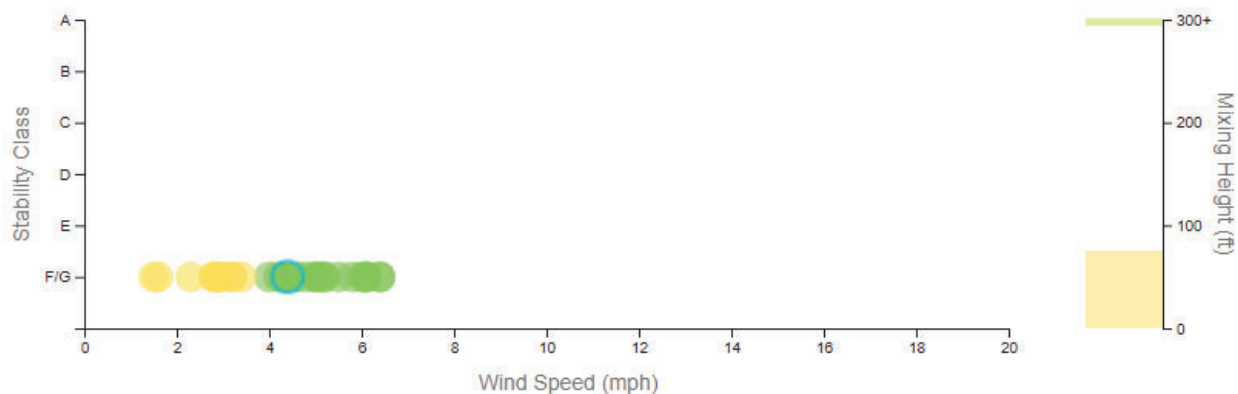


Stability Class: **F/G**

Wind Speed: 4.4 mph

Wind Direction: 243 °

Mixing Height: 1100 ft



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>

NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information continued:

Review of Vapor Monitoring and Detection System (VMDS) data:

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 08/31/2026 @ 0550 (approximate time of event):

Farm	Exhauster	Ammonia Concentration
241-A	POR 518	0.0 ppm
	POR 519	N/A ^{*A}
241-AN	Primary	N/A ^{*A}
241-AW	Primary	N/A ^{*A}
241-AY/AZ	702AZ	4.4 ppm
241-AP	Primary	N/A ^{*A}
241-SY	Primary	13.8 ppm

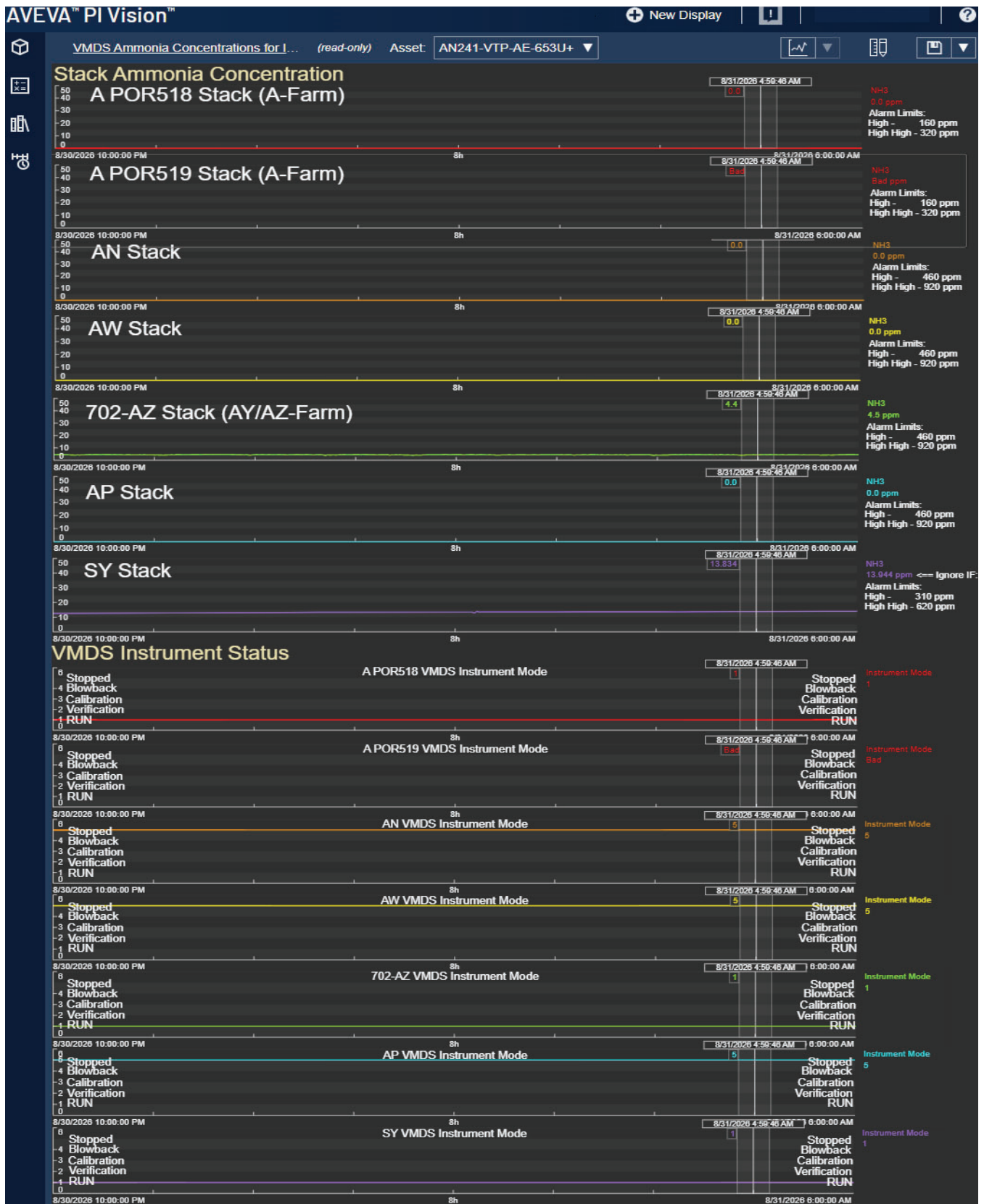
^{*A} Null data is provided, however stack monitoring instrumentation is out of service.

NOTE: Additional Information (VMDS Review) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (VMDS Review) continued:

AVEVA™ PI Vision™ Exhauster Stack Ammonia Concentrations @ 08/31/2026 @ 0550 (approximate time of event)



NOTE: Additional Information (VMDS Review) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (VMDS Review) 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	460 ppm	920 ppm
241-AP	Primary		
241-AW	Primary		
241-AY/AZ	702AZ		
241-SY	Primary	310 ppm	620 ppm

Vapor Monitoring Detection System (VMDS) summary: 08/24/2026 @ 0550 to 08/31/2026 @ 0550:

Tank Farm	Exhauster	Minimum ^{*B}	Maximum ^{*B}
241-A	POR518/POR519	0 ppm	2.4 ppm
241-AN	Primary	0 ppm	40.8 ppm
241-AP	Primary	0 ppm	0 ppm
241-AW	Primary	0 ppm	29.7 ppm
241-AY/AZ	702AZ	6.9 ppm	15.7 ppm
241-SY	Primary	0.8 ppm	124.7 ppm

^{*B} VMDS Alternate Real Time Monitoring performed 08/24/2026 to 08/31/2026 for 241-AN, 241-AP and 241-AW primary exhausters.

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.

Applicable SWIHD surveys:

Survey Number	Title	Date
26-05800	VMDS Alternative Real Time Monitoring	08/24/2026
26-05854	VMDS Alternative Real Time Monitoring	08/25/2026
26-05873	VMDS Alternative Real Time Monitoring	08/26/2026
26-05918	VMDS Alternative Real Time Monitoring	08/27/2026
26-05935	VMDS Alternative Real Time Monitoring	08/28/2026
26-05943	VMDS Alternative Real Time Monitoring	08/29/2026
26-05947	VMDS Alternative Real Time Monitoring	08/30/2026
26-05967	VMDS Alternative Real Time Monitoring	08/31/2026

NOTE: Additional Information (VMDS Review) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (VMDS Review) continued:

Vapor Monitoring Detection System (VMDS) Alternate Monitoring 08/24/2026 to 08/31/2026:

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR518/POR519	N/A	N/A
241-AN	Primary	19 ppm	31 ppm
241-AP	Primary	3 ppm	9 ppm
241-AW	Primary	1 ppm	15 ppm
241-AY/AZ	702AZ	N/A	N/A
241-SY	Primary	N/A	N/A

A 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 PAM alarm 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 presented low likelihood for ground-plume interaction.

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 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 (H₂S) gas, Ammonia (NH₃), 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 (H₂S) 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 H₂S 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. H₂S 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 H₂S 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 H₂S sensor is insufficient to detect H₂S at the lower range of odor threshold values, it is sufficient to detect H₂S 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

Low levels of NH₃ 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 (H₂S, sulfur dioxide [SO₂], ammonia, methane [CH₄]) (Silva, 2002; Texas A&M, 2009). NH₃ 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 H₂S as 43 ppb (or 0.043 ppm). While odors may be readily perceived, concentrations are still well below levels of worker exposure concern.

NOTE: Additional Information (Monitoring Selections Information) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (Monitoring Selections Information) continued:

The resolution of direct reading instrument (DRI) equipped with a NH₃ 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 NH₃ sensor is insufficient to detect NH₃ at the lower range of odor threshold values, it is sufficient to detect NH₃ 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 (H₂S, SO₂, NH₃, CH₄) (Silva, 2002; Texas A&M, 2009). DRI monitoring for VOCs at ETF is utilized for indication purposes only.

Determination of additional Action Levels for Field Response Actions based on provided odor descriptors:

Additional DRI and associated action levels were selected for chemicals identified through a review of chemicals with odor characteristics similar to odor descriptors provided on O/VRCs submitted. A list of possible odorant chemicals was compiled from Odor Threshold for Chemicals, 2nd Edition (AIHA, 2024) Table 6.4: "Odor Character List". For all chemicals listed the corresponding OEL (TWA or Ceiling, as applicable) was determined and availability for monitoring capacity as possessed to H2C inventory was assessed. Correction factors for Photoionization Detectors as provided by TN-106: A Guideline for Instrument Response (RAE Systems by Honeywell). If a PID correction factor is available then the action level ($[AL] = 1/2 \times [OEL]$) was corrected for displayed action level ($AL_{displayed} = [AL]/CF_{PID}$). Chemicals with $AL_{displayed}$ values less than the resolution of the instrument or within (approximately) 1/2 of an order of magnitude of the instrument Limit of Detection (LOD) were down-selected, as wouldn't provide functionality for indication.

O/VRC Descriptor	Odor Character	CF _{PID} 10.6 eV	CF _{PID} 11.7 eV	[OEL] (ppm)	[AL] (ppm)	AL _{Displayed} 10.6 eV PID	AL _{Displayed} 11.7 eV PID
"Fishy"	Fishy					Resolution = 0.01	Resolution = 0.1
		1.1	0.7	5	2.5	2.27	3.6
		–	–	–	–	–	–
		2.2		10	5	2.27	–
		–	–	–	–	–	–
		1.6	–	5	2.5	1.56	–
		0.74	0.5	5	2.5	3.38	5.0
		0.8	0.8	10	5	6.25	6.3
		0.7	0.8	10	5	7.14	6.3
		0.8	0.8	0.01	0.005	0.01	0.0
		0.8	–	5	2.5	3.13	–
		–	–	–	–	–	–
		–	–	5	2.5	–	–
		1.2	–	5	2.5	2.08	–
		–	–	20	10	–	–
		1.98	–	0.076	0.038	0.02	–
		3.9	1.1	0.3	0.15	0.04	0.1
		0.7	0.7	1	0.5	0.71	0.7

NOTE: Additional Information (Monitoring Selections Information) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (Monitoring Selections Information) continued:

Triethylamine	0.97	–	0.5	0.25	0.26	–
Trimethylamine	0.97	–	5	2.5	2.58	–
Dimethyl Ethanolamine	–	–	–	–	–	–
Methyl Ethanolamine	–	–	–	–	–	–
Fish Sauce						
2,4-Dichlorophenol	–	–	–	–	–	–
“Burn Smell”						
Burnt						
Furfuryl Alcohol	0.8	–	10	5	6.25	–
Hexyl Mercaptan	–	–	–	–	–	–
1-Octanol	–	–	–	–	–	–
2,3-Pentanedione	–	–	25	12.5	–	–
n-Butyric Acid	–	–	–	–	–	–
Ethyl Lactate	3.2	1.6	–	–	–	–
Isobutyric Acid	–	–	–	–	–	–
Burnt Sugar						
Benzaldehyde	–	1	–	–	–	–
Burnt Plastic						
m-Cresol	0.5	0.57	4.522	2.261	4.52	4.0
o-Cresol	1	–	4.522	2.261	2.26	–
p-Cresol	1.4	–	4.522	2.261	1.62	–
“Chemical”						
Chemical						
Acetone	0.9	1.4	250	125	138.89	89.3
Furfuryl Alcohol	0.8	–	10	5	6.25	–
Iodoform	–	–	0.6	0.3	–	–
Isopropyl Acetate	2.6	–	100	50	19.23	–
Endrin	–	–	0.006	0.003	–	–

The Total VOCs Action limits were conservatively established at 0.26 ppm and 0.7 ppm for Triethylamine (10.6 eV PID) and Pyradine (11.7 eV PID), respectively.

Monitoring Strategy References:

- Refer to [TOC-IH-58956](#) for more detail on the monitoring strategy for response to odors.
- Refer to [SIHEA-DELAWARE-ETF-001](#) Attachment F for more detail on the monitoring strategy utilized for routine work at ETF.
- Refer to [TN-106](#) “A Guideline for PID Instrument Response” for more detail on application of Correction Factors

Note: Additional Information continued on next page.

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” (2nd Edition) and the American Industrial Hygiene Association “Odor Thresholds for Chemicals” (4th 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.

Fishy:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Fish, Fishy	n-Butylamine	0.08 ppm	0.24 ppm	5 ppm Ceiling (ACGIH TLV)
	Sec-Butylamine	0.17 ppm	–	N/A
	Cyclohexylamine	2.42 ppm	–	10 ppm TWA (ACGIH TLV)
	Dibutylamine	0.079 ppm	0.265 ppm	N/A
	Diethylamine	0.0033 ppm	0.06 ppm	5 ppm TWA (ACGIH TLV)
	Diisopropylamine	0.14 ppm	0.39 ppm	5 ppm TWA (ACGIH TLV)
	n,n-Dimethylacetamide	3.199 ppm	48 ppm	10 ppm TWA (ACGIH TLV)
	Dimethyl Formamide	–	100 ppm	10 ppm TWA (ACGIH TLV)
	1,1-Dimethylhydrazine	6.1 ppm	–	0.01 ppm TWA (ACGIH TLV)
	Ethylamine	0.045 ppm	0.81 ppm	5 ppm TWA (ACGIH TLV)
	Isobutylamine	0.0015 ppm	–	N/A
	Isopropylamine	0.025 ppm	0.7 ppm	5 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)
	Nicotine	–	–	0.5 mg/m ³ TWA (ACGIH TLV)
	Phosphine	5 ppm	0.12 ppm	0.3 ppm TWA (ACGIH TLV)
	Pyradine	0.007 ppm	0.05 ppm	1 ppm 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)
	Dimethyl Ethanolamine	0.015 ppm	0.045 ppm	N/A
	Methyl Ethanolamine	1.0 ppm	3.4 ppm	N/A

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Fish Sauce	2,4-Dichlorophenol	0.000041 ppm	–	N/A

Burn Smell:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Burnt	Furfuryl Alcohol	8.0 ppm	–	10 ppm TWA (ACGIH TLV)
	Hexyl Mercaptan	0.0000041 ppm	–	N/A
	1-Octanol	0.00274 ppm	0.0009 ppm	N/A
	2,3-Pentanedione	0.0154 ppm	–	N/A
	Pyridine	0.007 ppm	0.05 ppm	1 ppm TWA (ACGIH TLV)
	Toluene	0.032 ppm	0.93 ppm	20 ppm TWA (ACGIH TLV)

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Burnt Plastic	Cresol	0.000003980 ppm	0.00016 ppm	20 mg/m ³ TWA (ACGIH TLV)

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Burnt Sugar	Benzaldehyde	0.002 ppm	0.01 ppm	N/A

NOTE: Additional Information (Chemicals Associated with Odor Descriptors) continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information (Chemicals Associated with Odor Descriptors) continued:

Chemical Odor/Chemical Type Odor:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Chemical	Acetone	0.42 ppm	1.7 ppm	250 ppm TWA (ACGIH TLV)
	Furfuryl Alcohol	8.0 ppm	–	10 ppm TWA (ACGIH TLV)
	Iodoform	0.0037 ppm	0.0059 ppm	0.6 ppm TWA (ACGIH TLV)
	Isopropyl Acetate	0.16 ppm	0.45 ppm	100 ppm TWA (ACGIH TLV)
	Endrin	0.02 ppm	–	0.1 mg/m ³ TWA (ACGIH TLV)

Smell of Sump 1:

The American Industrial Hygiene Association “Odor Thresholds for Chemicals with Established Health Standards” (2nd Edition) and the American Industrial Hygiene Association “Odor Thresholds for Chemicals” (4th Edition) does not reference the odor descriptor “smell of sump 1”. The associated odor descriptor was confirmed by the ETF SM to be adequately described by the other odor descriptors provided on submitted Odor/Vapor Response Cards (i.e., “fishy”, “burn smell”, “chemical odor”).

References:

- American Industrial Hygiene Association (2013). Odor Thresholds for Chemicals with Established Health Standards, 2nd Edition.
- American Industrial Hygiene Association (2024). Odor Thresholds for Chemicals, 4th 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.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information continued:

Event Response Pictures:

Figure 1: Condensation at threshold of 20B-TK-1 hatchway opening observed during field response actions:



NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information continued:

Additional Information Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Limit
CF	Correction Factor
CH ₄	Methane
COPC	chemicals of potential concern
DFAS	Data Fusion & Advisory System
DRI	direct reading instrument
EPA	Environmental Protection Administration
ETF	Effluent Treatment Plant
eV	electron-volts
GC-MS	Gas Chromatograph – Mass Spectrometry
GHS-SDS	Globally Harmonized System Safety Data Sheet
HPLC	High Performance Liquid Chromatography
H2C	Hanford Tank Operations & Closure
H ₂ S	Hydrogen Sulfide
IH	Industrial Hygienist
MTT	Main Treatment Train
NH ₃	Ammonia
NIOSH	National Institute of Occupational Safety and Health
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
PID	photoionization detector
pH	(negative decimal logarithm) hydrogen
pKa	negative logarithmic acid dissociation constant
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
RLV	Reporting Limit Verification
RPE	Respiratory Protection Equipment
STEL	Short Term Exposure Limit
STT	Secondary Treatment Train
TDU	Thermal Desorb Unit
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.

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, 4th Edition.
- American Industrial Hygiene Association (2013). Odor Thresholds for Chemicals with Established Health Standards, 2nd 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
- 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-DFLAW-ETF-001](#) “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>

Conclusions & Recommendations:

Conclusions:

- A review of the DFAS application, powered by SmartSite™, Weather Details dashboard and VMDS exhaust ammonia readings for the approximate time of the event indicate the cause of the odor event is unlikely to be from Tank Farm Exhauster emissions. Ammonia concentrations at engineered emission points were insufficient to allow for the possibility of notable concentrations at the ground receptor. And weather conditions presented low likelihood for ground-plume interaction. Additionally, the distance of the event location from Tank Farm emission sources, and the localization of the reported odors within the ETF process facility make the Tank Farm exhausters a very unlikely source.
- Based on provided odor descriptors, facility operational configuration, and location/apparent strength of odors encountered during field response actions Sump Tank 1 (20B-TK-1) is the likely source of the odors. Results of DRI monitoring and analysis of grab samples indicate that exposure to chemicals above any applicable Occupational Exposure Limits is not likely.

Recommendations:

- Odors are common and expected in water-treatment-plants. Communication that odors are common and expected for water treatment plant processes should be increased. Pertinent Information about potentially odorous activities and materials that have been found to be odorous should be communicated to the general plant workforce when pertinent, especially when emergent odor sources are likely to impact facility operations. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.
- The ETF Operations and ETF Process Chemical Engineering should perform a trend analysis of facility operational configuration and 20B-TK-1 contents during all facility operational configurations to determine what chemical processes (e.g., concentration of chemicals from treated effluent, chemical additions, chemical interactions/reactions) result in “stronger than normal” odor emissions from 20B-TK-1. This trend analysis should also include anecdotal evidence from workers (e.g., current workers, former workers). The factors that result in “stronger than normal” odors on the process floor should be presented to workers (e.g., ETF facility assigned workers, temporary/borrowed workers) to promote familiarity with circumstances that may result in odors. Additionally, when odors are expected (based on trend analysis or other factors) it should be communicated to reduce uncertainty and limit impacts to facility operations resulting from odor-response related access restriction or other factors.
- Performance Assurance should perform a review of recommended corrective actions for this and previous odor events at ETF to determine trend and to document which recommended corrective actions are actionable. Actionable corrective actions should be tracked to completion. Non-actionable recommended corrective actions should be trended to provide record for future improvement potential.

Other:

N/A

Associated Documents:

iCAS Number: N/A

EIR Number: EIR-2026-057

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Industrial Hygienist:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

[Redacted]

Industrial Hygiene Level 3 Manager

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

[Redacted]

Industrial Hygiene Level 2 Manager:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

[Redacted]

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 8/31/2026 05:30
- Check Applicable:
 - ☒ Odor
 - ☐ Ammonia Alarm (6 ppm)
 - ☐ Ammonia Alarm (12 ppm)
 - ☐ Alarm (other - describe): _____
- Your name and the work you were performing:
[REDACTED] / walkdown
- Other Work Underway? Describe:
N/A
- Location of event (mark area on map and wind direction):
Process floor
- Name(s) of others in or near the affected area:
Not aware of any.
- Was Industrial Hygiene present, who?
No
- Describe the odor:
 - ☐ Sweet
 - ☐ Sour
 - ☐ Smoky
 - ☐ Septic/Sewer
 - ☐ Musty
 - ☐ Rotten
 - ☐ Metallic
 - ☐ Onion
 - ☐ Earthy
 - ☐ Ammonia
 - ☐ Citrus
 - ☐ Solvent
 - ☒ Other (describe): fishy burn smell.
- Is source known/likely? Describe:
N/A
- 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.
If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 8-31-26 0545
- Check Applicable:
 - ☒ Odor
 - ☐ Ammonia Alarm (6 ppm)
 - ☐ Ammonia Alarm (12 ppm)
 - ☐ Alarm (other - describe):
- Your name and the work you were performing: [REDACTED]
- Other Work Underway? Describe: MTT Polisher Regen
- Location of event (mark area on map and wind direction): RM. 131
- Name(s) of others in or near the affected area: [REDACTED] [REDACTED] [REDACTED] [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): fishy/chemical odor
- Is source known/likely? Describe: N/A / Sump one
- 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. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 8-31-26 5:45 AM
- Check Applicable:
 - ☒ Odor
 - ☐ Ammonia Alarm (6 ppm)
 - ☐ Ammonia Alarm (12 ppm)
 - ☐ Alarm (other - describe): _____
- Your name and the work you were performing:
[REDACTED] MTT - Polisher Regen, Draining SURT tank A.
- Other Work Underway? Describe:
Evap Running.
- Location of event (mark area on map and wind direction):
On process floor inside IET Room 131.
- 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): FISHY, Chemical type odor.
- Is source known/likely? Describe: N/A
- 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. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 8-31-2026 0545
- Check Applicable:
 - ☒ Odor
 - ☐ Ammonia Alarm (6 ppm)
 - ☐ Ammonia Alarm (12 ppm)
 - ☐ Alarm (other - describe): _____
- Your name and the work you were performing:
[REDACTED] - POLISHER REGEN
- Other Work Underway? Describe:
EVAPORATOR BLOWDOWNS
- Location of event (mark area on map and wind direction):
PROCESS FLOOR
- 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:
EVAPORATOR / SUMP 1 STEAM
- 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. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 08-31-26 0545
- Check Applicable:
 - ☒ Odor
 - ☐ Ammonia Alarm (6 ppm)
 - ☐ Ammonia Alarm (12 ppm)
 - ☐ Alarm (other - describe): _____
- Your name and the work you were performing:
[REDACTED]
- Other Work Underway? Describe:
Polisher Regen, SWRTA Drain to Sump 1 then Sent to SWRT B
- Location of event (mark area on map and wind direction):
Process floor 2025 E
- 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): Fishy
- Is source known/likely? Describe: _____
- 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. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.