

Hanford Tank Waste Operations & Closure
EVENT REPORT FORM

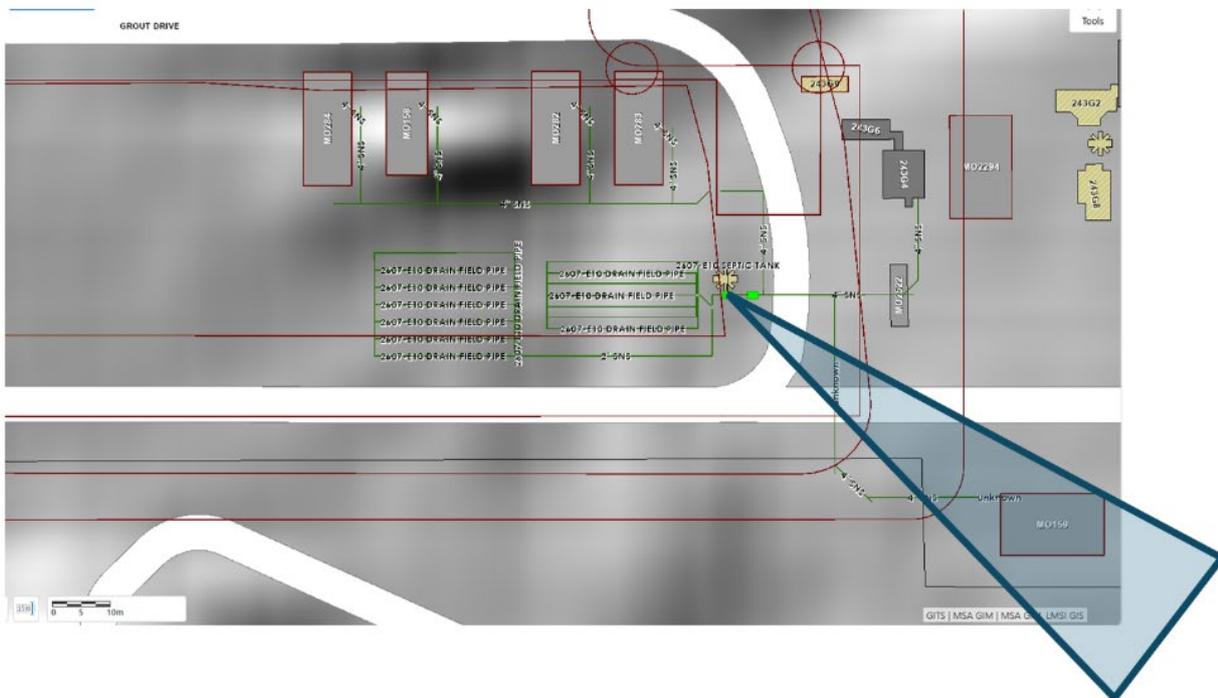
1. Project: Maintenance 2. Report Date: 10/8/2025
3. Investigation Title: TFC-OPS-OPER-C-67 Response to Odors in M0159 Parking Lot
4. Investigation Report Number: EIR-2025-076
5. Responsible Manager: [REDACTED]
6. Event Investigator: [REDACTED]
7. Area / Building / Location: 200 East/M0159 Parking Lot
8. Date and Approximate Time of Event: Date: 9/29/2025 Time (military): 0714 hours
9. Associated Action Request (AR) Number: ITDC-AR-2026-0005
10. Associated Occurrence Report Number (if applicable): _____
11. Event Learning Meeting Held: Yes [] or No [X] Date: _____ Time (military): _____

12. Brief Summary of Event: What Happened?

At approximately 0710 hours on September 29th, 2025, one worker experienced stronger than normal "rotten" and "egg" odors outside of mobile office M0159. The worker reported no symptoms and declined a medical evaluation. The worker was not in an area requiring respiratory protection. At the time the odor was reported, all workers were instructed to leave the area and access to the area was restricted. Industrial Hygiene developed a response plan and Industrial Hygiene Technicians (IHTs) responded to the area and performed a survey utilizing direct-reading instrumentation to determine if tank vapors were a potential source. Continuous DRI monitoring of NH₃, VOCs, and Hydrogen Sulfide (H₂S) provided readings near lower detection limits, far below action levels for tank farm vapor chemicals.

Industrial Hygiene Event Investigation Report number (IHIR-00124 R0) presented Data Fusion and Advisory System (DFAS) and vapor monitoring analysis indicating Tank Farm vapors were not the source. The IHIR established Septic/Sewer chemicals as a potential source.

Septic/Sewer chemicals including H₂S can produce the reported odor at extremely low odor detection thresholds. A sewer system septic tank, lift pump and drain field are located approximately 200 feet away from M0159.



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The most likely cause of this event were gaseous emissions from the sewer lift station or from vehicles that routinely service septic storage tanks. 200 East, 200 West, and 600 Areas have a long history of odors found to be associated with sources other than tank waste chemical vapors such as septic tank gaseous emissions.

In wastewater applications, the biochemical reduction of inorganic sulfur compounds to sulfide by sulfate-reducing bacteria (SRB) under anaerobic or low dissolved oxygen conditions is a primary contributor to production of H₂S. The rate by which H₂S is generated depends upon the concentration of organics, sulfate, and dissolved oxygen in the water and environmental factors such as pH and temperature. Odor control solutions include proprietary non-amine based organic sulfide scavengers and inhibitors for control of odors through reduction of H₂S and mercaptans. Odor controls are applied in water or onto sludge phases to selectively scavenge and/or inhibit these odorants, consequently mitigating their release into the air.

Corrective Actions will be managed through the Condition Report.

13. What Should Have Happened?

Rotten-egg odors should not be encountered by employees.

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

None

15. Problem Statements: (Who, What, Where, When, Consequence/Impact)

N.A.

16. Facts/Timeline:	17. Issues/Gaps	18. Causes (Why?) (Include Cause Code)	19. Safe Stable/Immediate Actions	20. Extent of Condition	21. Short Term Action(s)	22. Corrective Action(s)
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

23. Signatures

Prepared By: *(Event Investigator)*

[Redacted Name]

Name (First, Middle Initial, Last)

[Redacted Signature / Date]

Signature / Date

Responsible Manager Approval:

[Redacted Name]

Name (First, Middle Initial, Last)

[Redacted Signature / Date]

CAS Manager Approval:

[Redacted Name]

Name (First, Middle Initial, Last)

[Redacted Signature / Date]

Signature / Date

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)

Event Title:
TFC-OPS-OPER-C-67 Response at MO159

IHIR Number:
IHIR-00124 R0
IHEI Number:
N/A

Table of Contents

Event Summary and Timeline:.....	2
Event Summary:	2
Field Response Timeline:	2
Sampling/Monitoring Results:.....	4
Additional Information:	5
Review of the Data Fusion & Advisory System (DFAS) application, powered by SmartSite™:.....	5
Vapor Monitoring Detection System (VMDS).....	7
Monitoring Selections Based on Information Provided by Affected Workers:	10
Chemicals associated with Odor Descriptors provided by O/VRCs and Associated Odor Thresholds:	11
Recommendations/Conclusions:	13

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Date: 09/29/2025	Time: 0710	Location: MO159
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Event Summary and Timeline:

Event Summary:

At approximately 0710 on September 29th, 2025, one worker experienced stronger than normal “rotten” and “egg” odors outside of MO159. The worker did not report any symptoms and declined precautionary medical evaluation.

Field Response Timeline:

09/29/2025 Field Response Actions:

- 0724 Production Operations (PO) Industrial Hygienist (IH) arrives at Central Shift Office (CSO) to support development of field response actions. Central Shift Manager (CSM) provides briefing:
- Event occurred at 0714 09/29/2025
 - Odors reported in MO159 parking lot area
 - “Rotten egg” odor
 - 1 affected worker
- 0731 Direct Feed Low Activity Waste (DFLAW) IH, DFLAW IH Manager, and PO Level 3 IH Manager arrive at CSO
- 0731 PO IH contacts PO Industrial Hygiene Technician (IHT) Supervisor to request mobilization of Direct Reading Instrumentation (DRI) support.
- 0731 CSM confirms with affected worker that event occurred at 0714 09/29/2025.
- 0733 PO IH and DFLAW IH check DFAS, powered by Smart Site™, for current mixing height details:
- Mixing Height: 1300 feet above grade
 - PO IH relays mixing height provided to CSM
 - Wind Speed: 2.1 miles per hour (mph)
 - Wind Direction: 307° (from Northwest)
 - Stability Class: F/G (moderately stable / extremely stable)
- 0733 PO IH and DFLAW IH check Vapor Monitoring Detection System (VMDS) exhaust ammonia readings:
- POR518 (241-A): 1.439 ppm
 - POR519 (241-A): 0 ppm
 - 241-AN: 0 ppm
 - 241-AW: 0 ppm
 - POR126 (241-AX): N/A
 - POR127 (241-AX): N/A
 - 702AZ (241-AY/AZ): N/A
 - 241-AP: N/A
 - 241-SY: 13.626 ppm
- 0733 Shift Operations Event Notification (SOEN): “Responding per TFC-OPS-OPER-C-67 for a stronger than normal odor reported in MO159 parking lot. Access is restricted around the parking lot. CSM”
- 0735 DFLAW Area Dayshift Manager (ADM) confirms that caution tape is in place to inform area restriction, employees in MO158 have been notified to remain inside until further notice, Affected worker has declined voluntary precautionary medical evaluation.
- 0738 PO IH contacts Hanford Weather Station On-Duty Forecaster for meteorological conditions at Station 6 (200 E area) at 0715 09/29/2025:
- Temperature: 58 °f
 - Wind Speed: 1.5 mph
 - Wind Direction: From Northwest
 - Barometric Pressure: 29.04 inches of mercury
 - Barometric Pressure Trend: Increasing
 - Relative Humidity: 57%

NOTE: Event Timeline continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Event Timeline continued:

- 0738 DFLAW IHT and PO Shift Support IHT supervisor arrive at CSO to support field response actions.
- 0740 DFLAW IH Manager confirms that Environmental Safety Health & Quality (ESH&Q) Level 1 Manager, ESH&Q Level 1 Manager Deputy, and IH Level 2 Manager have been notified of event.
- 0754 PO IH contacts affected worker to facilitate expedition of Odor/Vapor Response Card (O/VRC) completion and submission.
- 0805 PO IH received O/VRC:
- No symptoms reported.
 - “Rotten” and “egg” odors indicated.
- 0810 DFLAW IH and CSM sign TFC-OPS-OPER-C-67 Attachment A “Response Plan” page 1.
- 0812 DFLAW IH and DFLAW IHT are briefed on field response actions and depart CSO to perform field response actions:
- Approach affected area from upwind and perform continuous DRI monitoring:
 - Ammonia (NH₃) – Action Level (AL): 12 parts per million (ppm)
 - Volatile Organic Compounds (VOC) – AL: 2 ppm
 - Hydrogen Sulfide (H₂S) – AL: 0.5 ppm
 - If readings are below action level then perform sweep of MO159 interior.
- 0813 DFLAW IH Manager provides update to ESH&Q Level 1 Manager, ESH&Q Level 1 Manager Deputy, and IH Level 2 Manager.
- 0823 DFLAW IH returns to CSO after completion for field response actions:
- No odors matching provided description at reported location during field response actions
 - All DRI readings are below respective Action Levels.
 - IHT in-route to perform DRI post-use-function-check.
- 0837 DRI passes post-use-function-check
- 0838 DFLAW IH and CSM sign TFC-OPS-OPER-C-67 Attachment A “Response Plan” page 2.
- 0845 SOEN: “Response TFC-OPS-OPER-C-67 for a stronger than normal odor in MO159 parking lot is complete. IH sample results at or below background levels. Normal access to the MO159 parking lot restored. CSM”

Field Response Timeline Acronyms:

AL	Action Limit
CSM	Central Shift Manager
CSO	Central Shift Office
DFAS	Data Fusion & Advisory System
DFLAW	Direct-Feed Low-Activity Waste
DRI	direct reading instrument
ESH&Q	Environmental, Safety, Health, & Quality
eV	electron-volts
IH	Industrial Hygienist
IHSP	Industrial Hygiene Sample Plan
IHT	Industrial Hygiene Technician
OVRC	Odor/Vapor Response Card
PID	photoionization detector
PO	Production Operations
ppm	parts per million
SOEN	Shift Office Event Notification
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compound

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- DRI readings acquired during initial field response:

Location	NH ₃	VOCs (10.6 eV PID)	H ₂ S
MO159 parking area (North of MO159)	< 1.0 ppm	0.020 ppm	< 0.1 ppm
Exterior perimeter of MO159	< 1.0 ppm	0.020 ppm	< 0.1 ppm
Interior of MO159	< 1.0 ppm	0.020 ppm	< 0.1 ppm

NOTE: Continuous DRI monitoring was performed for the duration of the field response actions. Results provided are associated with identifiable locations for reference purposes.

- Field Response Map:



Sampling Results:

- Grab samples were not collected for analysis during field response actions.

Sampling/Monitoring Results Acronyms:

DRI	Direct Reading Instrumentation
eV	Electron Volts
PID	Photo Ionization Detector
ppm	Parts Per Million
VOCs	Volatile Organic Compounds

SWIHD References:

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

- DRI # 25-06801 "TFC-OPS-OPER-C67 field response at MO159"

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

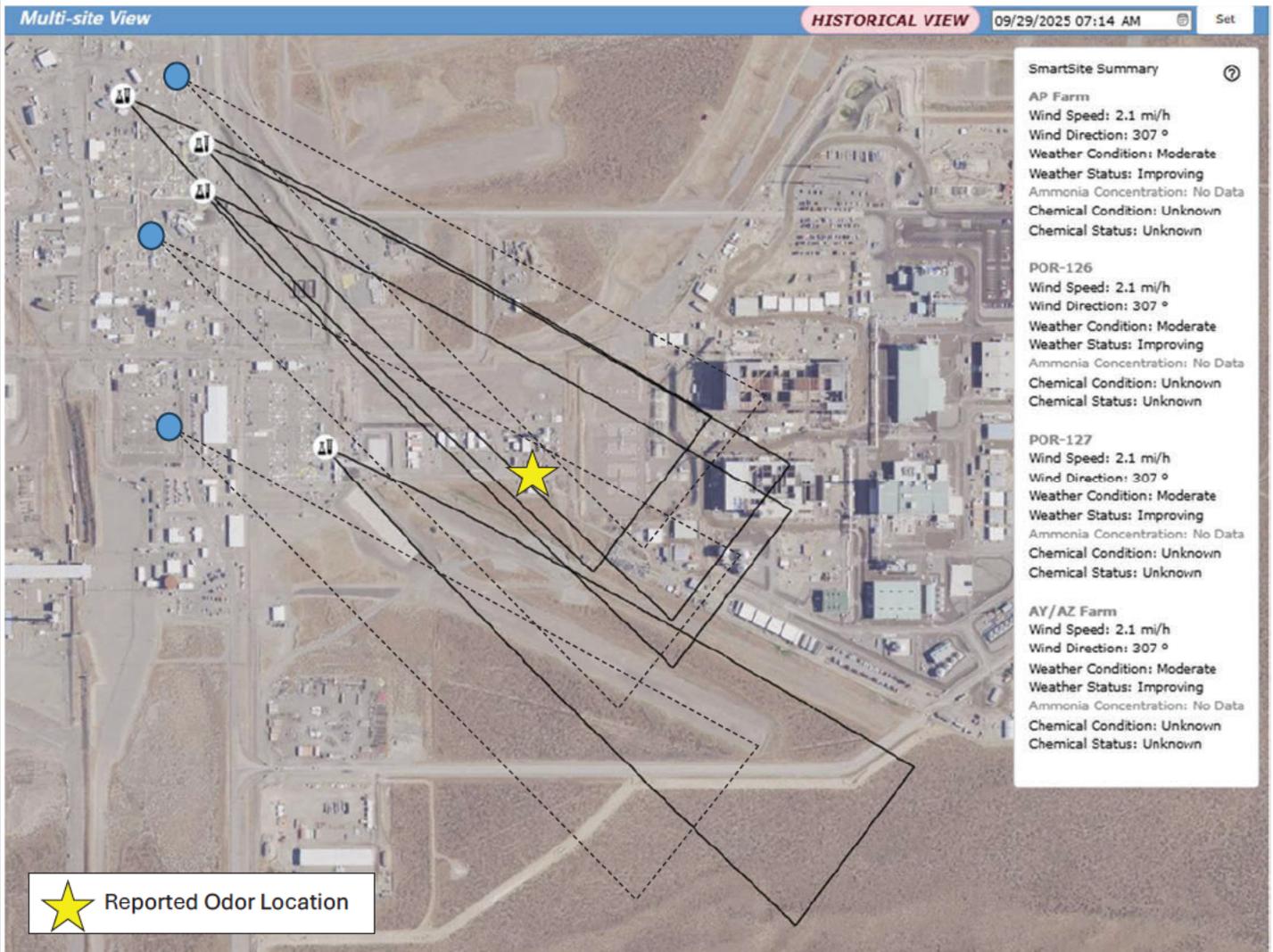
Additional Information:

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.

The odor description is inconsistent with Tank Waste Chemical Vapors. A review of DFAS, VMDS, and O/VRCs provided adequate indication that Tank Waste Chemical Vapors was unlikely to be the cause of reported odors, therefore monitoring for Tank Waste Chemical Vapors was not performed:

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: 09/29/2025 @ 0714 (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.

NOTE: Additional Information continued on next page.

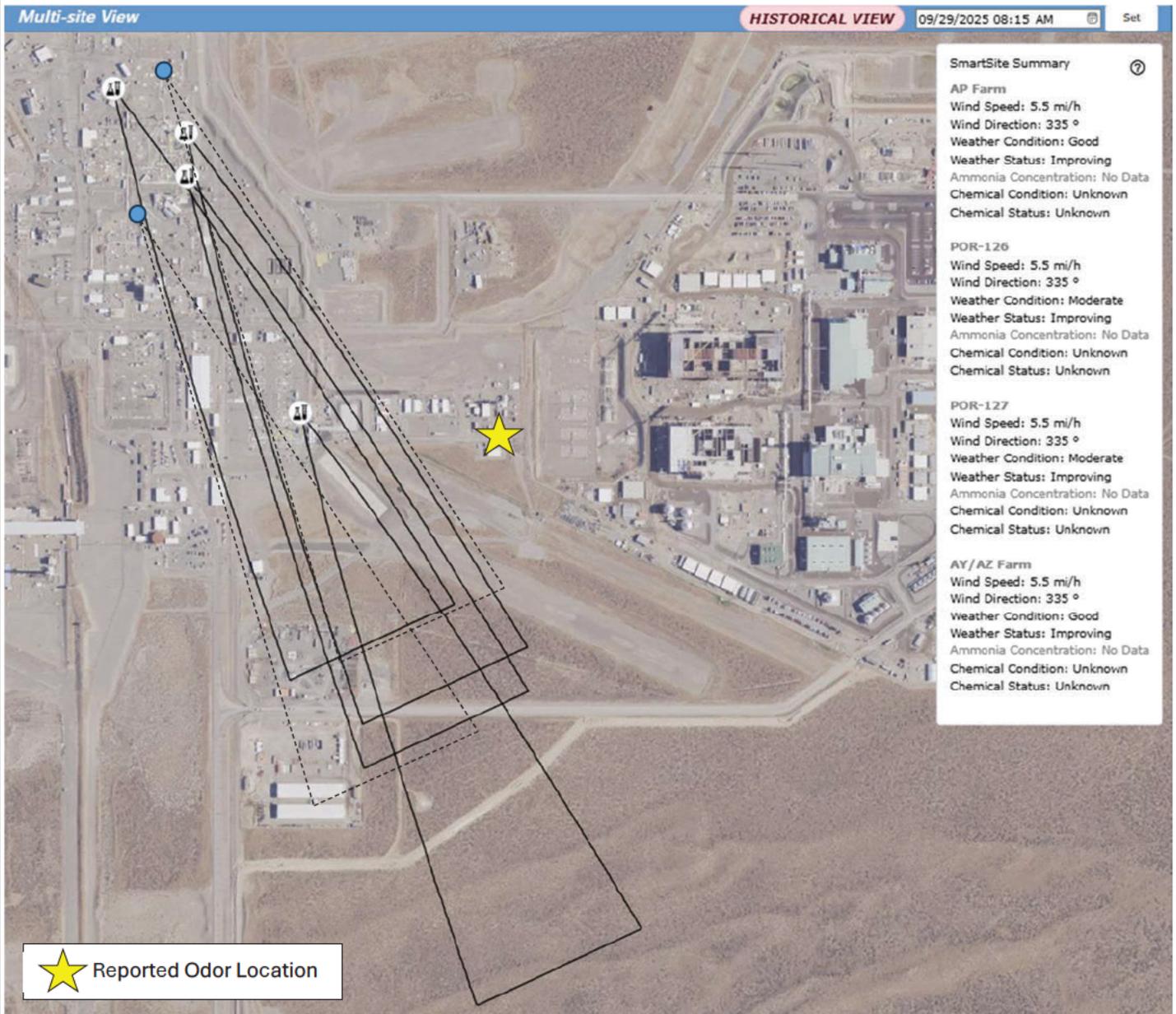
INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Additional Information continued:

DFAS Weather Conditions: 09/29/2025 @ 0714 (approximate time of first indication of odors as provided on O/VRCs):

- Wind Speed: 2.1 mph (15-minute average)
- Wind Direction: 307° (out of Northwest)
- Mixing Height: 1200 feet above grade
- Stability Class: F/G (moderately stable / extremely stable conditions)

DFAS Multi-Farm View Exhauster Plume Model: 09/29/2025 @ 0815 (approximate time of field response actions):



NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Additional Information continued:

DFAS Weather Conditions: 09/29/2025 @ 0815 (approximate time of field response actions):

- Wind Speed: 5.5 mph (15-minute average)
- Wind Direction: 335° (out of North-Northwest)
- Mixing Height: 1200 feet above grade
- Stability Class: F/G (moderately stable / extremely stable conditions)

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 09/29/2025 @ 0714 (approximate time of first indication of odors as provided on O/VRCs):

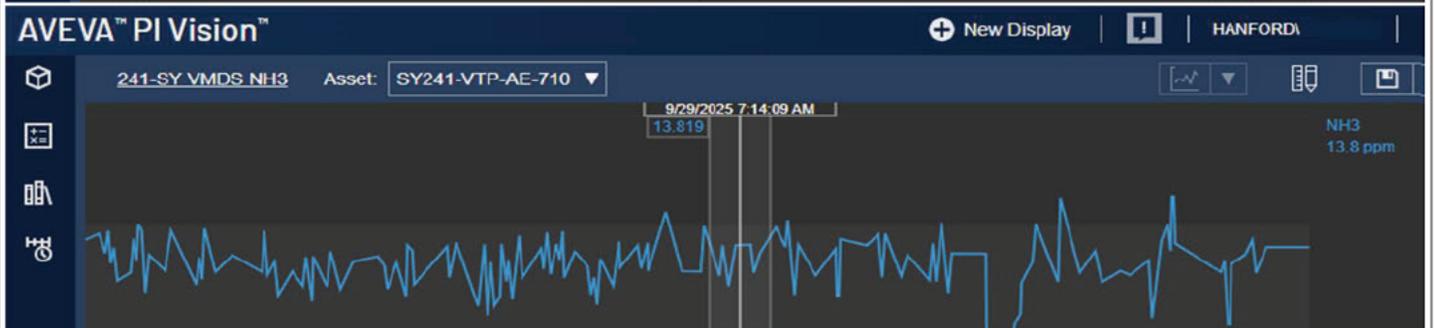
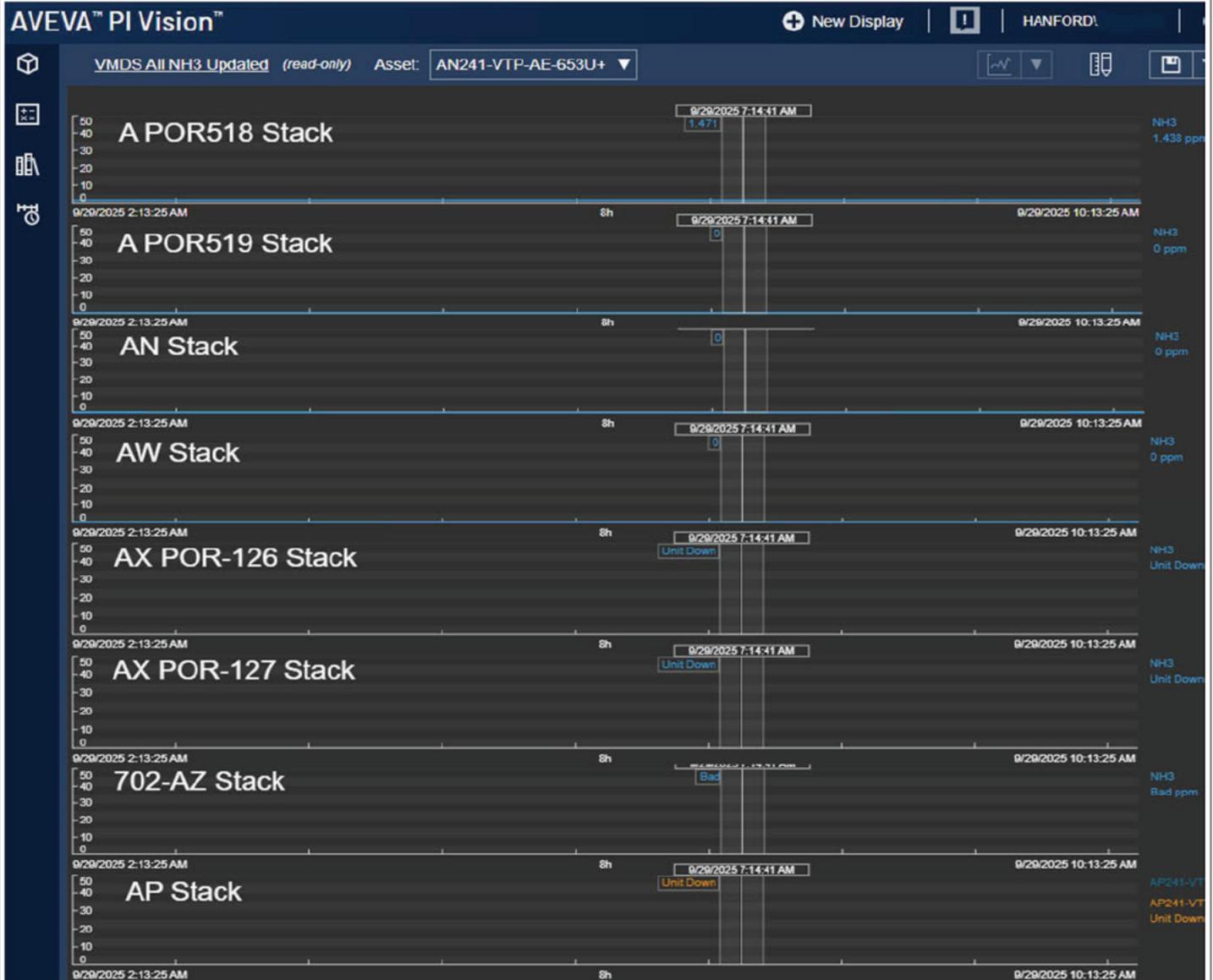
- POR518 (241-A): 1.471 ppm
- POR519 (241-A): 0 ppm
- 241-AN: 0 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): N/A
- POR127 (241-AX): N/A
- 702AZ (241-AY/AZ): N/A
- 241-AP: N/A
- 241-SY: 13.819 ppm

NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Additional Information continued:

AVEVA™ PI Vision™ Exhauster Stack Ammonia Concentrations: 09/29/2025 @ 0714 (approximate time of field response actions):



NOTE: Additional Information continued on next page.

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: 09/22/2025 @ 0714 to 09/29/2025 @ 0714:

Tank Farm	Exhauster	Minimum ^{*A}	Maximum ^{*A}
241-A	POR518/POR519	0 ppm	25.719 ppm
241-AN	Primary	0 ppm	0 ppm
241-AP	Primary	N/A	N/A
241-AW	Primary	0 ppm	0 ppm
241-AX	POR126/POR127	N/A	N/A
241-AY/AZ	702AZ	N/A	11.891 ppm
241-SY	Primary	10.556 ppm	17.395 ppm

^{*A} VMDS Alternate Real Time Monitoring performed 09/22/2025 to 09/29/2025 for 241-AN, 241-AP, 241-AW, and 241-AX (POR126/POR127) 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 #	Title	Date
25-06657	VMDS Alternate Real Time Monitoring	09/22/2025
25-06551	VMDS Alternate Real Time Monitoring	09/23/2025
25-06722	VMDS Alternate Real Time Monitoring	09/24/2025
25-06762	VMDS Alternate Real Time Monitoring	09/25/2025
25-06783	VMDS Alternate Real Time Monitoring	09/26/2025
25-06787	VMDS Alternate Real Time Monitoring	09/27/2025
25-06791	VMDS Alternate Real Time Monitoring	09/28/2025

NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Additional Information continued:

Vapor Monitoring Detection System (VMDS) Alternate Monitoring 09/22/2025 to 09/29/2025:

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR518/POR519	N/A	N/A
241-AN	Primary	7	25
241-AP	Primary	10	15
241-AW	Primary	5	8
241-AX	POR126/POR127	0	1
241-AY/AZ	702AZ	N/A	N/A
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 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 11.7 eV PID), and Hydrogen Sulfide was requested:

Tank Waste Chemical Vapors:

Due to proximity to the tank farms monitoring for Ammonia and Volatile Organic Compounds was performed.

Ammonia is used as an indicator for other Tank Farm chemicals of potential concern (COPC). The Hanford Tank Farms COPC list is chemically and toxicologically diverse. Determining the concentration of some COPCs with sampling/laboratory analysis is difficult and real-time monitoring for those COPCs is currently impossible. Ammonia's concentration can be easily determined by sampling/laboratory analysis, and real-time monitoring is possible; therefore, it is a good candidate to use as an indicator of changing conditions within the Tank Farms.

When monitoring for tank waste chemical vapors, DRI equipped with an ammonia sensor should be utilized at a minimum. Additional COPC monitoring may be conducted concurrently with ammonia DRI monitoring. The COPCs with DRI monitoring capabilities readily available at the Tank Farms include mercury, nitrous oxide, and Total VOCs. The term Total VOC is used in this monitoring strategy to refer to the sum of VOCs detected through monitoring utilizing either a 10.6eV or 11.7 eV photoionization detector (PID).

Septic/Sewer Chemical Vapors:

The 200 East, 200 West, and 600 Areas have a long history of odors that have been found to be associated with sources other than tank waste chemical vapors, such as septic tank gaseous emissions. These odors are known to change odor profile across a gradient when diluted by ambient atmosphere with distance from a point source. Additional sources of septic/sewer chemical vapors include the service vehicles that routinely service the septic storage tanks. The major roadways in the 200 East, 200 West, and 600 Areas are often traveled by septic service vehicles in route to the numerous local septic storage tanks and portable toilets.

The WRPS Chemical Vapor Solutions Team (CVST) chartered a Fugitive Emissions (FE) sub-team. The primary focus of the FE work-scope was to identify odor sources around the Tank Farms work areas, characterizing the type and concentration of the odor constituents. The FE sub-team's investigations included characterizing how septic/sewer odors change odor profile across a gradient when diluted by ambient atmosphere with distance from a point source. The major components of sewer gases can include hydrogen sulfide, carbon dioxide, methane, and ammonia. The FE sub-team's investigations found that close to the septic system (within approximately 20 ft) the odor was described as "sewer". Further away from septic system (within approximately 100 ft) the odor was described as "skunk". Even further away from septic system (within approximately 200 ft) the odor was described as "body odor".

NOTE: Additional Information continued on next page.

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Additional Information continued:

When monitoring for septic/sewer chemical vapors, DRI equipped with a hydrogen sulfide sensor should be utilized at a minimum. Additional septic/sewer chemical vapor monitoring may be conducted concurrently with hydrogen sulfide DRI monitoring.

Monitoring Strategy References:

- Refer to [TOC-IH-58956](#) for more detail on the monitoring strategy for response to odors.

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**.

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Rotten	Diethanolamine	N/A	0.279 ppm	1 mg/m ³ 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	0.000002 ppm	0.000071 ppm	0.5 ppm TWA (ACGIH TLV)
Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Rotten Eggs	Hydrogen Sulfide	0.00007 ppm	0.00046 to 0.00093 ppm	1 ppm TWA (ACGIH TLV)

Odor Threshold 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:

Additional Information Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Limit
ATSDR	Agency for Toxic Substances and Disease Registry
COPC	chemicals of potential concern
DFAS	Data Fusion & Advisory System
DRI	direct reading instrument
eV	electron-volts
FFAPR	Fill-Face Air Purifying Respirator
H ₂ S	Hydrogen Sulfide
NH ₃	Ammonia
NOAA	National Oceanic and Atmospheric Administration
OEL	Occupational Exposure Limit
OSHA	Occupational Safety & Health Administration
OV	Organic Vapor
O/VRC	Odor/Vapor Response Card
PEL	Permissible Exposure Limit
PID	photoionization detector
ppb	parts per Billion
ppm	parts per million
QRA	Quantitative Risk Assessment
REL	Recommended Exposure Limit
RPE	Respiratory Protection Equipment
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weighted Average
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compounds

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. Cincinnati, OH: Signature Publications.
- American Industrial Hygiene Association (2024). Odor Thresholds for Chemicals, 4th Edition. Falls Church, VA: AIHA.
- American Industrial Hygiene Association (2013). Odor Thresholds for Chemicals with Established Health Standards, 2nd Edition. Falls Church, VA: AIHA.
- [ARP-T-041-00002](#). Tank Farm Alarm Response Procedure.
- AVEVA™ PI Vision™. [VMDS Overview](#).
- 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/>
- [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>
- [TF-OPS-IHT-037](#). IHT Ammonia Monitoring on Exhausters.
- [TOC-IH-58956](#). Monitoring Strategy for Response to Odors: Common Odor Sources in the 200 East, 200 West, & 600 Areas.
- [TOC-IH-59014](#). Tank Waste Chemical Vapors: Evaluation and Management Strategy.
- [TOC-IH-RPT-50042](#). Ammonia Monitoring – Rate of Change of Tank Vapor Source Concentration and Monitoring Frequency.
- [WRPS-1904672.1](#). Interoffice Memorandum: Tank Farm Exhaust Stack Concentration Alarm/Action Levels for Ammonia.

Recommendations/Conclusions:

Recommendations:

N/A

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 stable/extremely stable atmospheric stability conditions and the mixing height was 1200 feet above grade.

Other:

N/A

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (continued)

Associated Documents:

iCAS Number: N/A

EIR Number: EIR-2025-076

Industrial Hygienist:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

Industrial Hygiene Level 3 Manager:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

Industrial Hygiene Level 2 Manager:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 9-29-2025 0705
- Check Applicable:
 - Odor
 - Ammonia Alarm (6 ppm)
 - Ammonia Alarm (12 ppm)
 - Alarm (other - describe):

- Your name and the work you were performing:

[Redacted] shop steward duties

- Other Work Underway? Describe:

NONE

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

MO-159

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

NONE

- Was Industrial Hygiene present, who?

NO

- Describe the odor:

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

- Is source known/likely? Describe:

NO

- Your symptoms? None

- Headache
- Dizziness
- Nausea
- Cough
- Fatigue
- Weakness
- Sore Throat
- Difficulty Breathing
- Eye Irritation
- Rash
- Itch
- Tingling
- Numbness
- Taste

- Other (describe): NONE at this time

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.