Hanford Tank Waste Operations & Closure

EVENT SUMMARY

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

1. Project: Production Operations **2. Report Date:** 05/08/2025

3. Investigation Title: C-67 Response for Tank Farms in 200E

4. Investigation Report Number: EIR-2025-042

5. Responsible Manager: [redacted]

6. Event Investigator: [redacted]

7. Area / Building / Location: 200 East Area/Multiple Locations

8. Date and Approximate Time of Event: **Date:** 04/26/2025 **Time *(military)*:** 0800 hours

9. Associated Action Request (AR) Number: ITDC-AR-2025-1772

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

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

12. Activity in Progress: *(What activity was under way, include procedures and work order numbers, as applicable)*
Multiple workers in the 200 East area of the Hanford Site reported smelling stronger than normal odors from Canton Ave and WTP Loop Road to Canton Ave and 4th St, west to Buffalo Ave and east to 4th St Loop. Work Order numbers 1180113, *A-106 Wire Pulls, Labelling, Testing, and Terminations for Retrieval*, and 180112, *A-106 Slurry Pump Pit Electrical*, were in process within 241-A-Farm at the time of the event.

13. Personnel Involved: *(Job positions, number of personnel, identify any support organizations or subcontractors)*
A total of 83 H2C and American Electric (AEI) workers in the 200E area reported smelling the odor.

14. What Happened: *(Provide a short discussion of what happened)*
On 04/26/2025, at approximately 0800 hours, 83 workers reported smelling stronger than normal "sour," "onion," "sweet," "earthy," "rotten," "rotten eggs," and "septic/sewer" odors while performing work at multiple locations in the 200 East area.

At 0818 hours, the Central Shift Manager (CSM) initiated response per TF-OPS-OPER-C-67, *Response to Stronger than Normal Odors,* for odors from Canton Avenue and WTP Loop Road to Canton Avenue and 4th Street, west to Buffalo Avenue and east to 4th Street Loop. Personnel were directed by the CSM to secure work and vacate the area or shelter in an adequate facility. At 0901 hours, the CSM updated the odor response boundary to include 4th Street at mobile office MO-2253, 7th and 8th Street, Canton Avenue and WTP Loop Road, and Canton Avenue and Effluent Way.

Approved for Public Release;
Further Dissemination Unlimited

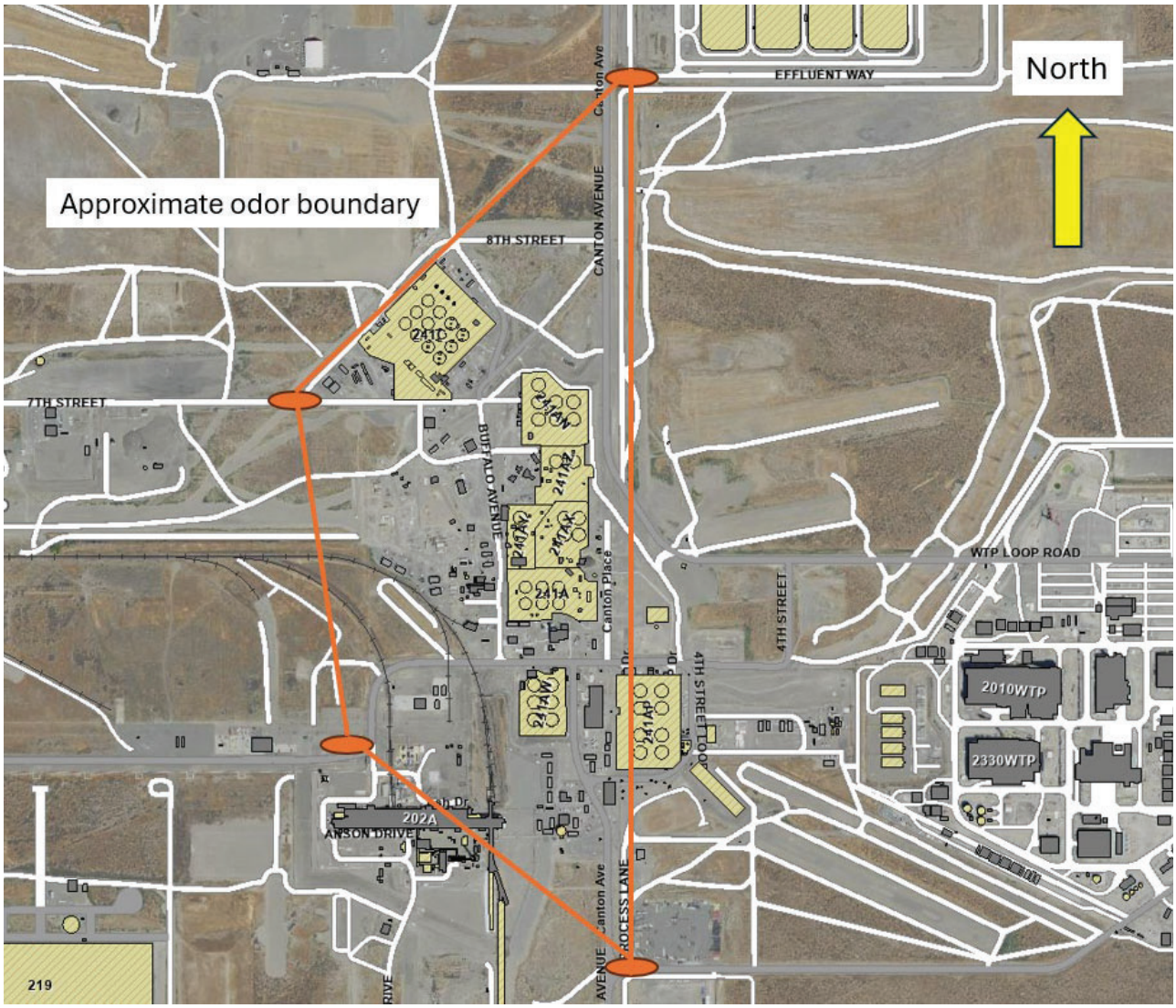

Figure 1: Approximate Odor Location

At approximately 0950 hours, Industrial Hygiene Technicians (IHTs) performed Direct Reading Instrument (DRI) monitoring in the affected area per Industrial Hygiene Sample Plan (IHSP), IHSP-POE-MULTI-TFCOPSOPERC67, *Industrial Hygiene Odor Evaluation*.

At 1119 hours, IHT monitoring results were reported to be at or less than background. TF-OPS-OPER-C-67 was completed for odors in the 200 East Tank Farms area. Access was restored to the 200 East Tank Farms area by the CSM.

At 1137 hours, the CSM sent Shift Office Event Notification (SOEN) message, "Waste Treatment Plant (WTP) was performing pumping of sewage vaults (Approximately 75,000 gallons total) on 04/26/2025 and 04/27/2025. Depending on wind conditions sewage related odors may be noticed in the greater 200E area."

During the event, one H2C employee reported symptoms and was evaluated by the Hanford Fire Department (HFD) at their work location. The employee was later evaluated by the Occupational Medical Provider Inomedic Health Application (IHA). In total three H2C employees were evaluated at IHA and released to

return to work without restriction. All other personnel declined medical evaluation.

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

- The odor event occurred at Canton Avenue and WTP Loop Road to Canton Avenue and 4th Street, west to Buffalo Avenue and east to 4th Street Loop in the 200 East Area of the Hanford site.
- At the time of the event, workers at the 241-A-Farm were wearing Respiratory Protection Equipment (RPE) in accordance with Respiratory Protection Form MDRPF-PLN-173.
- The Hanford Site Meteorological Station #6 in the 200 East area and Data Fusion and Advisory System (DFAS) application, powered by SmartSite, were utilized for outdoor weather details at the time odors were reported. The Hanford Site Meteorological Station #6 and DFAS dashboard indicated the following weather conditions at 0800 hours on 04/26/2025:
  - Temperature: 62°F
  - Relative Humidity: 35%
  - Wind Speed: 8.5 mph
  - Wind Direction: 288 degrees out of West
  - Barometric Pressure: 29.00 inches Hg and steady

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

All workers were instructed to leave the area and shelter in place for precautionary measures. Access to the area was restricted until TF-OPS-OPER-C-67 was completed.

In-process work was delayed until TFC-OPS-OPER-C-67 response actions were completed and access to the area was restored.

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

- CSM instructed all workers to leave the area/shelter in place.
- IHTs took readings in affected areas in the 200 East area per survey plan IHSP-POE-MULTI-TFCOOPSOPERC67.
- Workers were offered precautionary medical evaluation.
- CSM initiated TFC-OPS-OPER-C-67 response actions.
- DOE Facility Representative was notified of the event.
- CSM made required TFC-OPS-OPER-C-67 notifications.
- Event Investigation EIR-2025-042, *C-67 Response for Tank Farms in 200E*, was initiated.

18. Compensatory Actions Taken:

None.

19. Remedial Actions Taken:

None.

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

Per TFC-PLN-120, *Industrial Hygiene Investigative Response Plan*, Industrial Hygiene (IH) documented the event investigation within Industrial Hygiene Event Investigation Report (IHIR) number IHIR-00116 R1. To summarize the conclusions per IHIR IHIR-00116, monitoring results did not exceed

occupational exposure limits. IHTs performed DRI monitoring at multiple locations within the 200 East area of the Hanford site per IHSP-POE-MULTI-TFCOPSOPERC67. Based on the odor descriptors provided upon submission of the Odor/Vapor Response Cards, DRI monitoring for Ammonia and Hydrogen Sulfide was requested.

DRI readings acquired during field response:

Location	NH_3	VOCs (10.6 eV PID)	H_2S
Buffalo Avenue Area	< 1.0 ppm	0.010 ppm	< 0.1 ppm
702AZ Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
AY-2 Change Trailer (MO193) Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
AN Farm Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
4th Street Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
242A Parking Lot Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
MO2259 Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
MO815 Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
4th Street Loop	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
274AW Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
Grout Loop (MO284, MO158, MO282, MO283) Area	< 1.0 ppm	0.040 ppm	< 0.1 ppm
MO159 Area	< 1.0 ppm	0.040 ppm	< 0.1 ppm
272AW	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
Canton Avenue and WTP Loop Road Intersection	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm

Figure 2: DRI Readings

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

**Key Elements Continued on Next Page.*

IH Field Response Map:

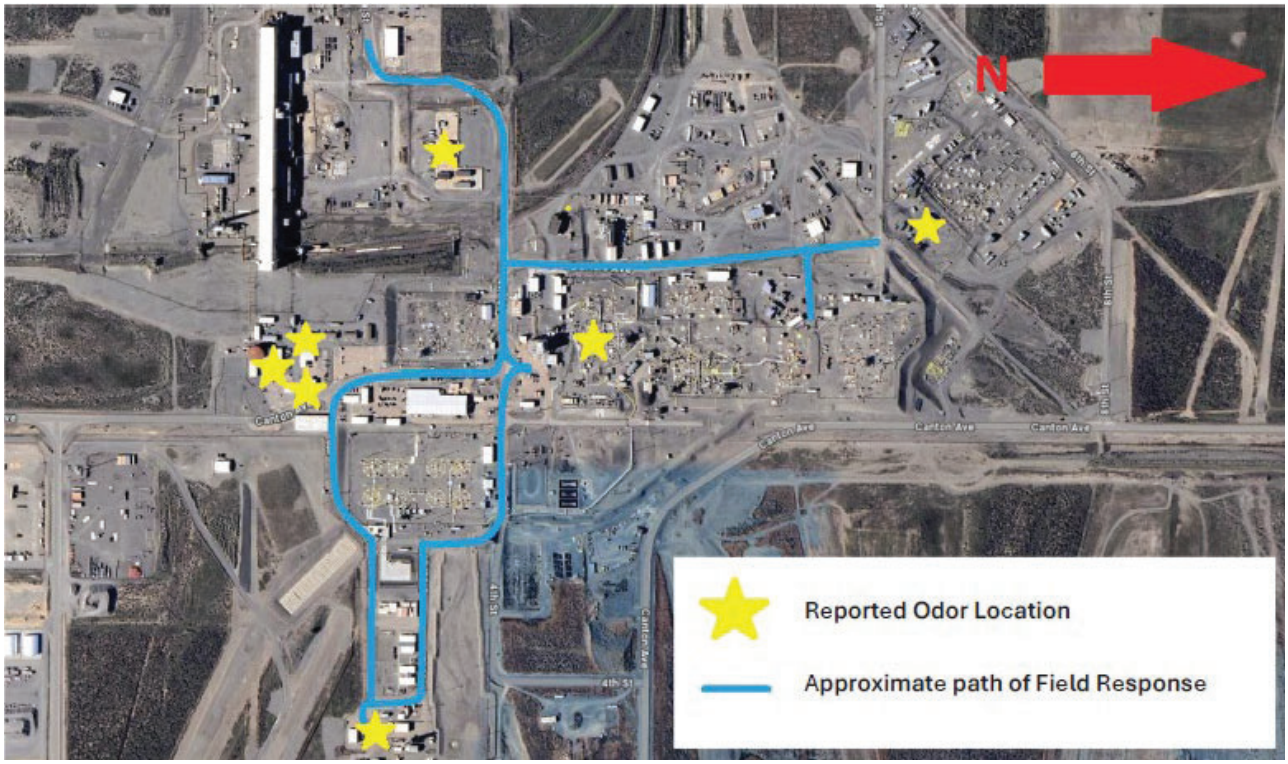

Figure 3: IH Field Response Map

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

- Ammonia is used as a sentinel Tank Waste Chemical Vapor for chemicals of potential concern (COPC). Each Hanford production process had different feedstock chemicals and generated different waste streams. Hanford production processes were also separated temporally, with different processes being performed at different times in the history of Hanford production (1943 – 1986). Some chemicals are common to all processes/waste streams (e.g., nitric acid), while others are specific to particular processes/waste streams. Some in-tank waste treatment processes (e.g., neutralization and de-nitrification) used the same chemical feed stocks (e.g., sodium hydroxide solution) in most, if not all Tank Farms. The chemistry and radiochemistry of these compounds result in waste stream similarities across all tank farms. Because nitric acid was common to nearly all processes that generated tank waste, and the most common result of those processes was reduction of nitrate ion to ammonia during the dissolution (oxidation) of irradiated fuel, ammonia is the most common COPC and is found in all tanks. It is logical to choose ammonia for the sentinel as it is a byproduct of all production processes and found in all tanks.
- Therefore, when monitoring for Tank Waste Chemical Vapors/COPCs, DRI equipped with an ammonia sensor is utilized at a minimum. Additional COPC monitoring was conducted concurrently with ammonia during the event response. The COPC with DRI monitoring capabilities readily available at the Tank Farms includes VOCs. As individual agents are not identified when monitoring for VOCs, an Action Limit was developed as an indicator of Tank Farm emissions (mixture of organic vapors) that

could impact workers' health and conservatively set at 2 ppm. When monitoring for Tank Waste VOC vapors, DRI equipped with a 10.6 eV PID is utilized to detect multiple VOC COPCs simultaneously.

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

DFAS Multi-Farm View Exhauster Plume Model: 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

Figure 4: DFAS Multi-Farm View Exhauster Plume Model at 0800 Hours

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 modelled plumes.

DFAS Weather Conditions: 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

- Wind Speed: 8.5 mph (15-minute average)
- Wind Direction: 288° (out of West)
- Mixing Height: 500 feet above grade
- Stability Class: D (neutral conditions)

**Key Elements Continued on Next Page.*

DFAS Multi-Farm View Exhauster Plume Model: 04/26/2025 @ 1000 hours (approximate time of field response actions):

Figure 5: DFAS Multi-Farm View Exhauster Plume Model at 1000 Hours

DFAS Weather Conditions: 04/26/2025 @ 1000 hours (approximate time of field response actions):

- Wind Speed: 7.1 mph (15-minute average)
- Wind Direction: 280° (out of West)
- Mixing Height: 1000 feet above grade
- Stability Class: C (slightly unstable conditions)

Vapor Monitoring Detections 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 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

- POR518 (241-A): 0 ppm
- POR519 (241-A): 0.534 ppm
- 241-AN: 16.222 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 0 ppm
- POR127 (241-AX): N/A
- 702AZ (241-AY/AZ): N/A
- 241-AP: 31.460 ppm
- 241-SY: 9.8317 ppm

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

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.

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.

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."

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.

WTP Operational Configuration Timeline:

At the time of the initiating event the WTP was in the process of pumping approximately 75,000 gallons (75 Kgal) of sewage to tanker trucks. Transport of sewage via trucks to the 200 West (200W) Area of the Hanford site sewage treatment plant (6608) was along the West and North of 200E area Tank Farms "A-Complex" along WTP Loop Road and Canton Avenue.

Respiratory Protection Equipment and Odors:

It was noted that some workers experienced odors despite utilization of RPE for tank waste chemical vapors. The RPE typically prescribed at Hanford Tank Farms for tank waste chemical vapors is Full Face Air Purifying Respirators (FFAPR) with Organic Vapor (OV) or Particulate Combination (OV/P100) cartridges. The charcoal based filtration in OV cartridges is sufficient for adsorption of organic compounds but poorly suited for adsorption of reduced sulfur compounds associated with sewage odors (e.g. H2S, mercaptans, thiols, dimethyl sulfides). Additionally, these compounds typically have extremely low odor detection thresholds (typically sub-parts per billion concentrations). Therefore, it is expected that the odorous compounds would not be eliminated by the use of RPE utilized within the tank farms.

IHIR 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 neutral atmospheric stability conditions and the mixing height was 500 feet above grade.

The CSM concluded that WTP sewage operations was the source of the odors. DRI instrumentation results indicated that further actions were not necessary to protect worker safety and health, therefore access restriction was discontinued and work was resumed.

IHIR Recommendations:

Communication that odors are common and expected for operational activities such as sewage pumping and transport operations should be increased. Although the expected time and date of this specific instance was known to WTC management, this information was not sufficiently communicated to H2C. Pertinent information about potentially odorous activities should be provided so that pre-job briefings can include co-located activities that may produce odors in a work area not related to the specific tasks, especially during back-shift and overtime work evolutions when atypical operations such as sewage operations are intentionally scheduled to reduce the potential for facility impact. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.

21. Positive Aspects Identified:

Personnel responded promptly to the event, implementing the applicable TFC-OPS-OPER-C-67 procedure and response actions.

22. Key Take Aways / Learning Opportunities:

Communication of cross site operational activities that could potentially impact other Hanford Site contractors needs to be communicated to those OHC in advance to minimize potential negative impacts to work activities.

23. Event Investigation:

[ ] An Event Investigation will be completed per TFC-OPS-OPER-C-14.

[ ] This event will be managed by another process, i.e., Operability Evaluation, Engineering Technical Evaluation, etc.

[X] This event does not require continuation of the Event Investigation process.

Responsible Manager Approval:

[redacted]
Name (First, Middle Initial, Last)

[redacted]
Signature / Date

CAS Manager Approval:

[redacted]
Name (First, Middle Initial, Last)

[redacted]
Signature / Date

Event Title:	IHIR Number:
TFC-OPS-OPER-C-67 Response at 200E Area.	**IHIR-00116 R1**
	IHEI Number: N/A

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Date:	Time:	Location:
04/26/2025	0800	200E Area

Event Summary and Timeline:

Event Summary:

At approximately 0800 on April 26th, 2025, eighty three (83) employees reported stronger than normal “sour”, “onion”, “sweet”, “earthy”, “rotten”, “rotten eggs” and “septic/sewer” odors when performing work at multiple locations in 200E Area. Symptoms of “headache”, “nausea”, and “light-headed” were reported. Two personnel with symptoms and one additional employee were transported to the occupational medical provider for precautionary medical evaluation.

Field Response Timeline:

April 26th 2025:

0818 Shift Office Event Notification (SOEN): “Initiating TF-OPS-OPER-C-67 "Response to Stronger than Normal Odors" for odors from Canton Ave and WTP Loop Road to Canton Ave and 4th St west to Buffalo Ave and east to 4th St Loop. Personnel secure work and vacate the area/house in and adequate facility. CSM”

0831 Production Operations (PO) Industrial Hygiene Technician (IHT) Supervisor notifies Direct Feed Low Activity Waste (DFLAW) Industrial Hygiene (IH) Manager and PO IH Manager that Shift IHT reports “Onion” odors is 200 East (200E) Area and is going to contact PO and DFLAW IHs for support of field response actions.

0844 DFLAW IH Manager contacts PO IHT Supervisor to recommend Direct Reading Instrumentation (DRI) support for detection of Hydrogen Sulfide (H_2S), Volatile Organic Compounds (VOCs), and Ammonia (NH_3).

0846 PO IHT Supervisor contacts DFLAW IH to request support for field response actions.

0856 Central Shift Manager (CSM) briefs DFLAW IH Manager with event details:

- “Onion”, “Sewer” odors reported
- Multiple Individuals throughout 200E Area
- Multiple locations throughout 200E Area
- Preliminary Response Plan drafted

0901 DFLAW IH Manager briefs Environmental, Safety, Health, and Quality (ESH&Q) Level 1 Manager on event and response plan draft actions.

0901 SOEN: “Update to TF-OPS-OPER-C-67 "Response to Stronger than Normal Odors" boundary is now on 4th St at MO-2253, 7th and 8th St, Canton Ave and WTP Loop Road, and Canton Ave and Effluent Way. CSM”

0902 DFLAW IH confirms DRI sensor selections for support of field response actions, determines that analytical support for grab air samples is not likely with current laboratory support contracts.

0904 PO IHT Supervisor notifies DFLAW IH Manager that Shift IHTs are preparing requested DRI instrumentation for support of field response actions.

0918 DFLAW IH Manager contacts PO IH 1 to provide briefing on event and request input on DRI monitoring sensor selections and information about Respiratory Protection Equipment (RPE) selections worn by some affected personnel.

0927 DFLAW IH Manager briefs PO Operations Level 2 Manager on event and proposed response plan actions.

0929 PO IHT Supervisor notifies DFLAW IH Manager that CSM has been notified of Waste Treatment Plant (WTP) sewage pumping operations currently ongoing.

0942 DFLAW IH Manager contacts PO IH 2 for input on field response actions.

0950 (approximately) CSM provides briefing to PO IHTs on request field response actions:

- Perform DRI survey of affected area as per IHSP-POE-MULTI-TFCOPSOPERC67:
  - Ammonia (NH_3) – Action Limit 12 parts per million (ppm)
  - Volatile Organic Compounds (VOCs) (10.6 eV PID) – Action Limit 2 parts per million (ppm)
  - Hydrogen Sulfide (H_2S) – Action Limit 0.5 ppm
  - Survey provided locations around 200E Area for potential odor sources, ensure atmospheric concentration is below Action Limits.

1000 DFLAW IH Manager arrives at Administrative Access Restriction Boundary, contacts CSM and is granted entry.

1000 PO IHTs begin field response actions in area near MO2253.

Note: Field Response Timeline continued on next page.

Field Response Timeline continued:

1005 DFLAW IH Manager arrives at Central Shift Office (CSO) to support field response actions.
1024 DFLAW IH Manager updates ESH&Q Level 1 Manager:

- One employee reported symptoms and was evaluated by Hanford Fire Department (HFD) at work location. Employee refused transport to on-site Occupational Medical Provider.
- One employee reported no symptoms, but requested precautionary medical evaluation at on-site Occupational Medical Provider.
- Workers have been directed to shelter in-place.
- WTP sewage pumping ongoing.

1031 DFLAW IH Manager updates ESH&Q Level 1 Manager:

- Approximately 75,000 gallons of sewage in storage vaults, 37,000 gallons pumped on Friday (04/25/2025), completion of remainder expected to occur during Saturday 04/26/2025.

1050 PO IHTs conclude field response actions at 272AW (CSO) and brief CSM and DFLAW IH Manager on DRI readings acquired.
1055 DFLAW IH Manager notifies Industrial Safety (IS) Level 2 Manager, IS Level 3 Manager, and IS Supervisor that multiple affected personnel are being transported to on-site Occupational Medical Provider for precautionary medical evaluation.
1057 DRI passes post-use-function test.
1119 SOEN: “Completed TF-OPS-OPER-C-67 "Response to Stronger than Normal Odors" for odors in the 200E Tank Farms area. IHT monitoring was at or less than background. Access has been restored to the 200E Tank Farms area. CSM”
1127 SOEN: “Correction: Completed TF-OPS-OPER-C-67 "Response to Stronger than Normal Odors" for odors in the 200E Tank Farms area. IHT monitoring was at or less than background. Access has been restored to the 200E Tank Farms area. CSM “
1137 SOEN: “WTP is performing pumping of sewage vaults (~75,000 gallons total) today (4/26/25) and tomorrow (4/27/25). Depending on wind conditions sewage related odors may be noticed in the greater 200E area. CSM”
1141 DFLAW IH Manager is provided update on employees being evaluated at on-site Occupational Medical Provider.
1145 DFLAW IH Manager and CSM provide event briefing to Issues Management (IM) Event Investigator.
1206 DFLAW IH Manager updates ESH&Q Level 1 Manager:

- 2nd affected employee reports symptoms and is in-route to on-site Occupational Medical Provider for precautionary medical evaluation.

1340 DFLAW IH Manager updates ESH&Q Level 1 Manager:

- 3 employees total have been evaluated at on-site Occupational Medical Provider.
- 2 employees total have reported symptoms.

Field Response Timeline Acronyms:

CSM	Central Shift Manager
CSO	Central Shift Office
DFLAW	Direct Feed Low Activity Waste
DOE	Department of Energy
DRI	direct reading instrument
ESH&Q	Environmental, Safety, Health, & Quality
eV	electron-volts
H_2S	Hydrogen Sulfide
IH	Industrial Hygienist
IHT	Industrial Hygiene Technician
IS	Industrial Safety
NH_3	Ammonia
PID	photoionization detector
PO	Production Operations
ppm	parts per million
SOEN	Shift Office Event Notification
VOC	Volatile Organic Compound

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- DRI readings acquired during field response:

Location	NH_3	VOCs (10.6 eV PID)	H_2S
Buffalo Avenue Area	< 1.0 ppm	0.010 ppm	< 0.1 ppm
702AZ Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
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4th Street Loop	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
274AW Area	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
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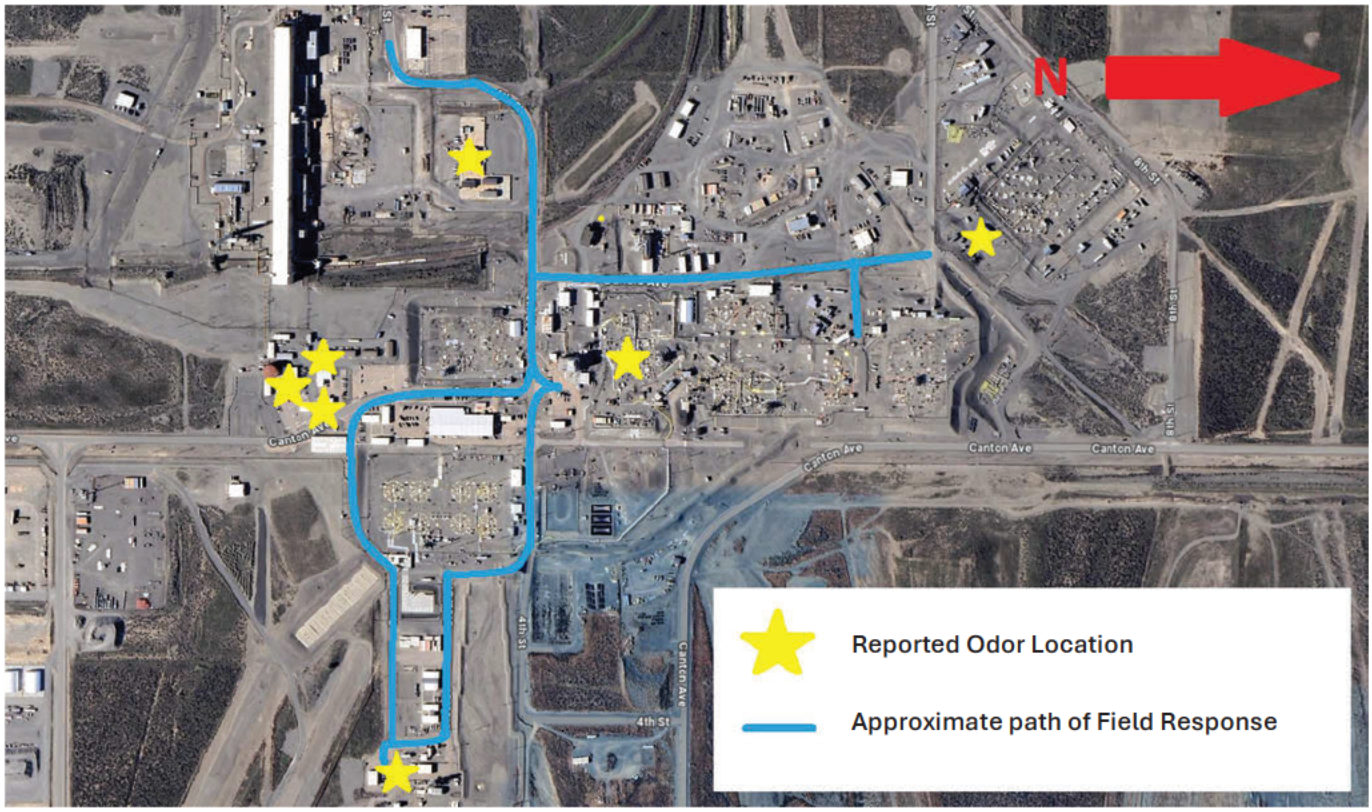
272AW	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm
Canton Avenue and WTP Loop Road Intersection	< 1.0 ppm	< 0.010 ppm	< 0.1 ppm

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
H_2S	Hydrogen Sulfide
NH_3	Ammonia
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 # 25-02900 "C67 Response Around A Complex"

Additional Information:

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

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

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

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

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

NOTE: Additional Information continued on next page.

Additional Information continued:

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

DFAS Multi-Farm View Exhauster Plume Model: 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

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

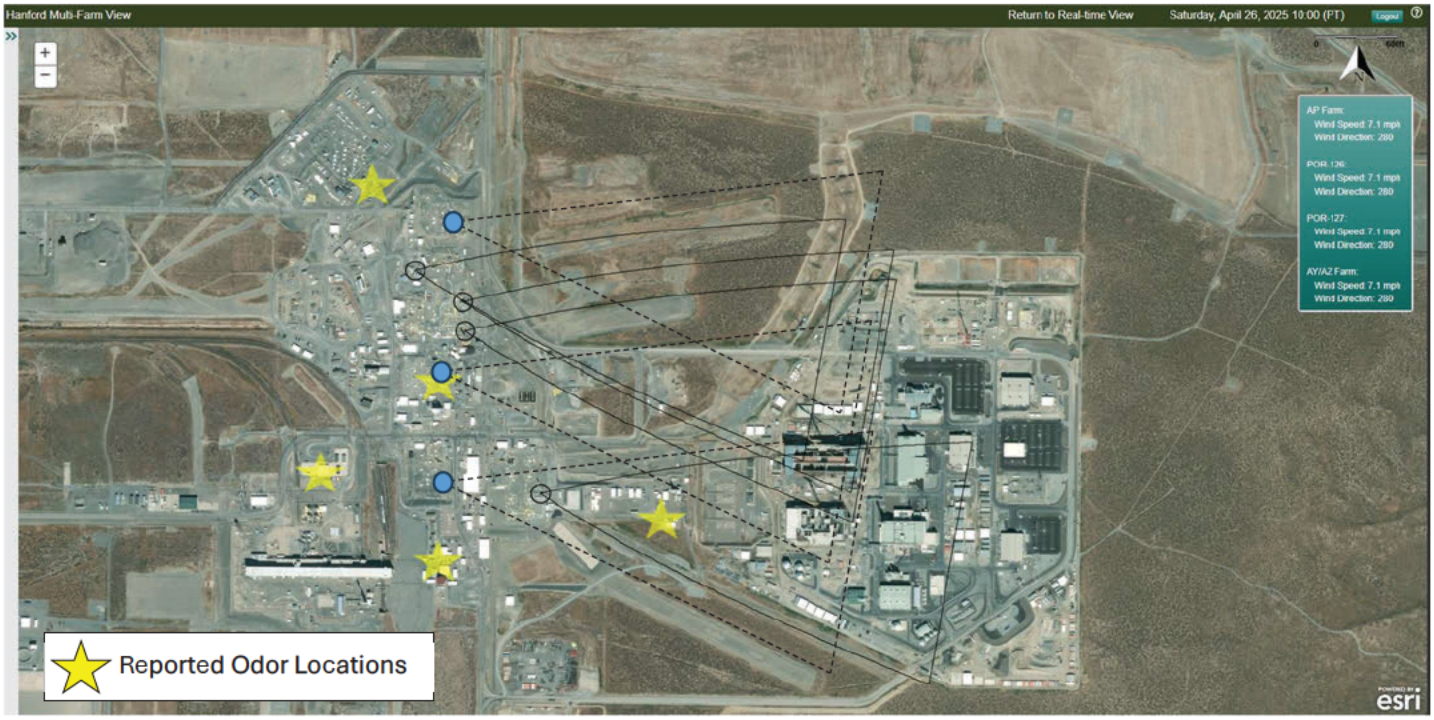
DFAS Weather Conditions: 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

- Wind Speed: 8.5 mph (15-minute average)
- Wind Direction: 288° (out of West)
- Mixing Height: 500 feet above grade
- Stability Class: D (neutral conditions)

NOTE: Additional Information continued on next page.

Additional Information continued:

DFAS Multi-Farm View Exhauster Plume Model: 04/26/2025 @ 1000 (approximate time of field response actions):



DFAS Weather Conditions: 04/26/2025 @ 1000 (approximate time of field response actions):

- Wind Speed: 7.1 mph (15-minute average)
- Wind Direction: 280° (out of West)
- Mixing Height: 1000 feet above grade
- Stability Class: C (slightly unstable 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.

NOTE: Additional Information continued on next page.

Additional Information continued:

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
- 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 04/26/2025 @ 0800 (approximate time of first indication of odors as provided on O/VRCs):

- POR518 (241-A): 0 ppm
- POR519 (241-A): 0.534 ppm
- 241-AN: 16.222 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 0 ppm
- POR127 (241-AX): N/A
- 702AZ (241-AY/AZ): N/A
- 241-AP: 31.460 ppm
- 241-SY: 9.8317 ppm

NOTE: Additional Information continued on next page.

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: 04/19/2025 @ 0800 to 04/26/2025 @ 0800:

Tank Farm	Exhauster	Minimum*[A]	Maximum*[A]
241-A	POR518/POR519	0.000 ppm	15.572 ppm
241-AN	Primary	0.000 ppm	70.496 ppm
241-AP	Primary	0.000 ppm	32.148 ppm
241-AW	Primary	6.896 ppm	26.740 ppm
241-AX	POR126/POR127	0.000 ppm	0.000 ppm
241-AY/AZ	702AZ	N/A	17.158 ppm
241-SY	Primary	7.818 ppm	37.236 ppm

*[A] VMDS Alternate Real Time Monitoring performed 04/19/2025 to 04/26/2025 for 241-AN, 241-AP, 241-AW, 241-AX (POR126/POR127), and 241-AZ (702AZ) 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.

NOTE: Additional Information continued on next page.

Additional Information continued:

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

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR518/POR519	N/A	N/A
241-AN	Primary	13 ppm	19 ppm
241-AP	Primary	1 ppm	10 ppm
241-AW	Primary	10 ppm	12 ppm
241-AX	POR126/POR127	0 ppm	0 ppm
241-AY/AZ	702AZ	20 ppm	22 ppm
241-SY	Primary	N/A	N/A

Odor descriptors provided by Affected Workers are inconsistent with Tank Vapors. Additionally, review of the DFAS application, powered by SmartSite™, Weather Details dashboard and VMDS exhauster ammonia readings for the approximate time of the Event, indicate the cause of the odor is unlikely to be from Tank Farm Exhauster emissions; as concentrations at emission points was insufficient to allow for the possibility of notable concentrations at the ground receptor, weather conditions 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, and Hydrogen Sulfide was requested:

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".

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.

NOTE: Additional Information continued on next page.

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.

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Sweet	Acetaldehyde	0.001 ppm	0.015 ppm	25 ppm Ceiling (ACGIH TLV)
	Acetone	0.42 ppm	1.7 ppm	250 ppm TWA (ACGIH TLV)
	Acetophenone	0.002 ppm	0.59 ppm	10 ppm TWA (ACGIH TLV)
	Acrylic Acid	0.0088 ppm	1 ppm	2 ppm TWA (ACGIH TLV)
	Benzaldehyde	0.0009 ppm	0.01 ppm	N/A
	Benzene	0.020 ppm	0.6 ppm	0.5 ppm TWA (ACGIH TLV
	Benzyl Acetate	20.6 ppm	1450.2 ppm	10 ppm TWA (ACGIH TLV)
	Bromoform	0.19 ppm	0.21 ppm	0.5 ppm TWA (ACGIH TLV)
	2-Butoxyethanol	0.043 ppm	0.35 ppm	2 ppm TWA (ACGIH TLV)
	2-Butoxyethl Acetate	0.107 ppm	0.198 ppm	20 ppm TWA (ACGIH TLV)
	n-Butyl Acetate	0.002 ppm	0.0093 ppm	50 ppm TWA (ACGIH TLV)
	n-Butyl Acrylate	0.00055 ppm	0.0027 ppm	2 ppm TWA (ACGIH TLV)
	n-Butyl Alcohol (butanol)	0.0033 ppm	0.12 ppm	20 ppm TWA (ACGIH TLV)
	Tert-Butyl Alcohol	3.3 ppm	11.875 ppm	100 ppm TWA (ACGIH TLV)
	Carbon Disulfide	0.022 ppm	0.21 ppm	1 ppm TWA (ACGIH TLV)
	Carbon Tetrachloride	4.6 ppm	21 ppm	5 ppm TWA (ACGIH TLV)
	Chlorobenzene	0.09 ppm	0.21 ppm	10 ppm TWA (ACGIH TLV)
	Chlorodifluoromethane	200192 ppm		1000 ppm TWA (ACGIH TLV)
	Chloroform	0.1 ppm	2.9 ppm	10 ppm TWA (ACGIH TLV)
	Chloropicrin	1.09 ppm		0.1 ppm TWA (ACGIH TLV)
	Chlorotrifluoromethane	199888 ppm		1000 ppm Ceiling (ACGIH TLV)
	Citral	0.01 ppm	0.0097 ppm	5 ppm TWA (ACGIH TLV)
	Cresol	0.00000398 ppm	0.00023 ppm	20 mg/m³ TWA (ACGIH TLV)
	Cyclohexane	2.47 ppm	35 ppm	100 ppm TWA (ACGIH TLV)
	Cyclohexanone	0.12 ppm	0.12 ppm	20 ppm TWA (ACGIH TLV)
	Cyclohexene	0.18 ppm		300 ppm TWA (ACGIH TLV)
	Diacetone Alcohol	0.27 ppm	1.1 ppm	50 ppm TWA (ACGIH TLV)
	Diacetyl	0.0000019 ppm	0.00085 ppm	0.01 ppm TWA (ACGIH TLV)
	Diborane	1.8 ppm		0.1 ppm TWA (ACGIH TLV)
	1,3-Dichloropropene	0.99 ppm		1 ppm TWA (ACGIH TLV)
	Dicyclopentadiene	0.011 ppm	0.02 ppm	5 ppm TWA (ACGIH TLV)
	Diisobutyl Ketone	0.103 ppm	0.309 ppm	25 ppm TWA (ACGIH TLV)
	Dimethylbenzenes (Xylenes)	0.012 ppm	0.23 ppm	10 ppm TWA (ACGIH TLV)
	1,4-Dioxane	0.8 ppm	1.8 ppm	20 ppm TWA (ACGIH TLV)
	Diphenylamine		0.022 ppm	10 mg/m³ TWA (ACGIH TLV)
	2-Ethoxyethanol	0.3 ppm	0.54 ppm	5 ppm TWA (ACGIH TLV)
	2-Ethoxyethyl Acetate	0.048 ppm	0.13 ppm	5 ppm TWA (ACGIH TLV)
	Ethyl Acetate	0.24 ppm	1 ppm	400 ppm TWA (ACGIH TLV)
	Ethyl Acrylate (Acrylic Acid Ethyl Ester)	0.0000066 ppm	0.00037 ppm	5 ppm TWA (ACGIH TLV)
	Ethyl Alcohol (Ethanol)	0.34 ppm	4.6 ppm	1000 ppm STEL (ACGIH TLV)
	Ethylene Dibromide		10 ppm	N/A
	Ethylene Dichloride	6 ppm	41 ppm	10 ppm TWA (ACGIH TLV)
	Ethylene Glycol	5.12 ppm		100 mg/m³ STEL (ACGIH TLV)
	Ethylene Oxide	257 ppm	493 ppm	1 ppm TWA (ACGIH TLV)
	Ethyl Ether	0.165 ppm	1.58 ppm	400 ppm TWA (ACGIH TLV)
	2-Ethylhexyl Alcohol (2-Ethyl Hexanol)	0.024 ppm	N/A	N/A
	Ethyl Isoamyl Ketone	5.9 ppm		N/A
	Ethyl Silicate	3.6 ppm		10 ppm TWA (ACGIH TLV)
	Furfural	0.036 ppm		2 ppm TWA (ACGIH TLV)

NOTE: Chemical Odor Descriptors for "sweet" continued on next page.

Chemical Odor Descriptors for "sweet" continued:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Sweet (continued)	Furfuryl Alcohol (2-furanmethanol)	8 ppm		10 ppm TWA (ACGIH TLV)
	Halothane		33 ppm	50 ppm TWA (ACGIH TLV)
	Sec-Hexyl Acetate	0.0018 ppm		50 ppm TWA (ACGIH TLV)
	n-Hexyl Alcohol	0.0066 ppm	0.024 ppm	N/A
	Hexylene Glycol	3.93 ppm		25 ppm STEL (ACGIH TLV)
	Isoamyl Alcohol	0.0034 ppm	0.044 ppm	100 ppm TWA (ACGIH TLV)
	Isobutyl Alcohol (IIsbutyl Cellosolve)	0.019 ppm	0.11 ppm	50 ppm TWA (ACGIH TLV)
	Isoamyl Acetate	0.0034 ppm	0.0028 ppm	N/A
	Isobutyl Acetate	0.002 ppm	0.008 ppm	10 ppm TWA (ACGIH TLV)
	Isophorone	0.0003 ppm	0.53 ppm	5 ppm Ceiling (ACGIH TLV)
	Isopropyl Acetate	0.14 ppm	0.45 ppm	100 ppm TWA (ACGIH TLV)
	Isopropyl Ether	0.017 ppm	0.053 ppm	250 ppm TWA (ACGIH TLV)
	D-Limonene (cyclohexene)	0.00808 ppm	0.3948 ppm	300 ppm TWA (ACGIH TLV)
	Menthol	0.000063 ppm	0.000078 ppm	N/A
	Mesityl Oxide (Methyl Isobutyl Ketone)	0.017 ppm	0.05 ppm	20 ppm TWA (ACGIH TLV)
	2-Methoxyethanol (Methyl Cellosolve)	2.7 ppm		0.1 ppm TWA (ACGIH TLV)
	2-Methoxyethyl Acetate	0.3 ppm	0.64 ppm	0.1 ppm TWA (ACGIH TLV)
	Methyl Acetate	0.231 ppm	20.8 ppm	200 ppm TWA (ACGIH TLV)
	Methyl Alcohol (Methanol)	3.05 ppm	7.63 ppm	200 ppm TWA (ACGIH TLV)
	Methyl n-Amyl Ketone	0.0065 ppm		50 ppm TWA (ACGIH TLV)
	2-Methyl Butyl Acetate	0.026 ppm		N/A
	Methyl n-butyl Ketone (2-Hexanone)	0.024 ppm		1 ppm TWA (NIOSH REL)
	Methyl Chloride		10 ppm	50 ppm TWA (ACGIH TLV)
	Methyl Chloroform	0.97 ppm	16 ppm	350 ppm TWA (ACGIH TLV)
	Methylene Chloride (Dichloromethane)	12 ppm		50 ppm TWA (ACGIH TLV)
	Methyl Ethyl Ketone	0.07 ppm	5.4 ppm	200 ppm TWA (ACGIH TLV)
	Methyl Isoamyl Ketone	0.0021 ppm	0.049 ppm	20 ppm TWA (ACGIH TLV)
	Methyl Isobutyl Ketone	0.024 ppm	0.15 ppm	20 ppm TWA (ACGIH TLV)
	Methyl Isopropyl Ketone	0.51 ppm	4.3 ppm	20 ppm TWA (ACGIH TLV)
	2-Methylnapthalene	0.00069 ppm		0.5 ppm TWA (ACGIH TLV)
	Methyl Propyl Ketone	0.028 ppm	3.1 ppm	150 ppm STEL (ACGIH TLV)
	Methyl Vinyl Ketone (3-Buten-2-one)	0.175 ppm		0.2 ppm STEL (ACGIH TLV)
	Pentane	1.29 ppm		1000 ppm TWA (ACGIH TLV)
	Pentanol	0.0017 ppm	0.23 ppm	N/A
	Perchloryl Fluoride	14.58 ppm		3 ppm TWA (ACGIH TLV)
	Phenol	0.0055 ppm	0.034 ppm	5 ppm TWA (ACGIH TLV)
	Picolines (Methyl Pyridines)	0.0026 ppm	0.0236 ppm	1 ppm TWA (ACGIH TLV)
	Piperdine	0.14 ppm	0.57 ppm	N/A
	n-Propyl Acetate	0.048 ppm	0.084 ppm	200 ppm TWA (ACGIH TLV)
	n-Propyl Alcohol (1-Propanol)	0.03 ppm	0.081 ppm	100 ppm TWA (ACGIH TLV)
	Propylene Dichloride	0.26 ppm	0.52 ppm	10 ppm TWA (ACGIH TLV)
	Propylene Glycol	5.14 ppm		N/A
	Propylene Oxide	10 ppm	35 ppm	2 ppm TWA (ACGIH TLV)
	Propyl Mercaptan (1-Propanethiol)	0.000013 ppm	0.00074 ppm	0.5 ppm Ceiling (NIOSH REL)
	Styrene	0.016 ppm	0.047 ppm	20 ppm TWA (ACGIH TLV)
	Toluene	0.089 ppm	0.93 ppm	20 ppm TWA (ACGIH TLV)
	Toluene 2,4-Diisocyanate	0.020 ppm	2 ppm	0.001 ppm TWA (ACGIH TLV)
	Toluene 2,6-Diisocyanate	0.020 ppm	2 ppm	0.001 ppm TWA (ACGIH TLV)
	Turpentine	0.041 ppm	4.49 ppm	20 ppm TWA (ACGIH TLV)
	Vanillin (Benzaldehyde)	0.00000016 ppm	0.000000643 ppm	N/A
	Vinyl Chloride	203 ppm		1 ppm TWA (ACGIH TLV)
	Vinylidene Chloride	50 ppm		5 ppm TWA (ACGIH TLV)
	Xylene	0.081 ppm	0.23 ppm	100 ppm TWA (ACGIH TLV)
	Styrene Oxide (Epoxyethel Benzene)	0.063 ppm	0.4 ppm	N/A
	Carbitol Acetate	0.26 ppm	0.157 ppm	N/A
	p-Diethylbenzene	0.00038 ppm		N/A
	Skatole	0.0000056 ppm	0.019 ppm	N/A
	Isobutyl n-Butyrate	0.03 ppm		N/A

NOTE: Chemical Odor Descriptors for "sweet" continued on next page.

Chemical Odor Descriptors for "sweet" continued:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Sweet (continued)	Methyl Cyclopentane	1.7 ppm		N/A
	Ethyl Phenylacetate	0.7 ppm		N/A
	Isobutyl Formate	0.49 ppm		N/A
	Nitric Oxide	0.29 ppm		25 ppm TWA (ACGIH TLV)
	Nitrogen Dioxide	0.12 ppm		0.2 ppm TWA (ACGIH TLV)
	Methyl Propionate			N/A
	Caryophylliene			N/A
	p-Xylene	0.058 ppm		100 ppm TWA (ACGIH TLV)
	m-Xylene	0.04 ppm		100 ppm TWA (ACGIH TLV)
	Myrcene			N/A
	n-Butyl Isovalerate	0.12 ppm		N/A
	n-Hexyl Acetate	0.0018 ppm		N/A
	Allyl Mercaptan	0.0015 ppm		N/A
	Ethyl n-butyrate	0.00004 ppm		N/A
	Musk Xylene	0.081 ppm	0.23 ppm	100 ppm TWA (ACGIH TLV)

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

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
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	0.0000002 ppm	0.000071 ppm	0.5 ppm TWA (ACGIH TLV)

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Septic/Sewer	Hydrogen Sulfide	0.00007 ppm	0.00046 to 0.00093 ppm	1 ppm TWA (ACGIH TLV)
	Butane (see Propyl Mercaptan)			1000 ppm STEL (ACGIH TLV)
	Ethyl Mercaptan	0.000017 ppm	0.00029 ppm	0.5 ppm TWA (ACGIH TLV)
	Methyl Mercaptan	0.0000002 ppm	0.000071 ppm	0.5 ppm TWA (ACGIH TLV)
	Propane (see Propyl Mercaptan)			1000 ppm STEL (ACGIH TLV)
	Propyl Mercaptan (1-Propanethiol)	0.000013 ppm	0.00074 ppm	0.5 ppm Ceiling (NIOSH REL)

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 Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Onion	Acrylonitrile	1.6 ppm	22 ppm	2 ppm TWA (ACGIH TLV)
	Butyl Mercaptan	0.0000027 ppm	0.00073 ppm	0.5 ppm TWA (ACGIH TLV)
	Dimethyl Disulfide	0.00029 ppm	0.00286 ppm	0.5 ppm TWA (ACGIH TLV)
	Ethyl Mercaptan	0.000017 ppm	0.00029 ppm	0.5 ppm TWA (ACGIH TLV)
	Phosphine		0.010 ppm	0.3 ppm TWA (ACGIH TLV)
	Propyl Mercaptan	0.000013 ppm	0.00074 ppm	N/A
	Diethyl Trisulfide	0.001 ppm		N/A
	Isoamyl Mercaptan	0.00000077 ppm	0.0000285 ppm	N/A
	Methyl Thiocyanate		0.25 ppm	N/A
	Allyl Mercaptan		0.0015 ppm	N/A
	1-Nonene	0.00054 ppm		N/A

NOTE: Additional Information continued on next page.

Additional Information continued:

Odor Descriptor	Chemical	Lowest Detection Concentration	Lowest Recognition Concentration	Applicable OEL
Sour	Acetic Acid	0.0004 ppm	0.02 ppm	10 ppm TWA (ACGIH TLV)
	Acetic Anhydride	0.14 ppm	0.36 ppm	1 ppm TWA (ACGIH TLV)
	n-Butylamine	0.08 ppm	0.24 ppm	5 ppm Ceiling (ACGIH TLV)
	Methyl Alcohol	3.05 ppm	7.63 ppm	200 ppm TWA (ACGIH TLV)
	Propionic Acid	0.00099 ppm	0.0083 ppm	10 ppm TWA (ACGIH TLV)
	Pyridine	0.007 ppm	0.021 ppm	1 ppm TWA (ACGIH TLV)
	Toluene	0.089 ppm	0.93 ppm	20 ppm TWA (ACGIH TLV)
	Vinyl Acetate	0.12 ppm	0.4 ppm	10 ppm TWA (ACGIH TLV)
	Isohexanoic Acid	0.0004 ppm		N/A

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

WTP Operational Configuration Timeline:

At the time of the initiating event the WTP was in the process of pumping approximately 75,000 gallons (75 Kgal) of sewage to tanker trucks. Transport of sewage via trucks to the 200 West (200W) Area sewage treatment plant (6608) was along the West and North of 200E area Tank Farms "A-Complex" along WTP Loop Road and Canton Avenue.

Respiratory Protection Equipment and Odors:

It was noted that some workers experienced odors despite utilization of RPE for tank waste chemical vapors. The RPE typically prescribed at Hanford Tank Farms for tank waste chemical vapors is Full Face Air Purifying Respirators (FFAPR) with Organic Vapor (OV) or Particulate Combination (OV/P100) cartridges. The charcoal based filtration in OV cartridges is sufficient for adsorption of organic compounds but poorly suited for adsorption of reduced sulfur compounds associated with sewage odors (e.g. H_2S, mercaptans, thiols, dimethyl sulfides). Additionally, these compounds typically have extremely low odor detection thresholds (typically sub-parts per billion concentrations). Therefore, it is expected that the odorous compounds would not be eliminated by the use of RPE utilized within the tank farms.

NOTE: Additional Information continued on next page.

Additional Information continued:

Additional Information Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Limit
COPC	chemicals of potential concern
DFAS	Data Fusion & Advisory System
DRI	direct reading instrument
eV	electron-volts
FFAPR	Fill-Face Air Purifying Respirator
H_2S	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
P-100	Particulate RPE cartridge rating
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.

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
- 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
- Cushman-Roisin, B. (2012). Environmental Transport and Fate- Smokestack Plumes (lecture slides). Dartmouth College: Thayer School of Engineering. Retrieved from https://cushman.host.dartmouth.edu/courses/engs43/Smokestack-plumes.pdf

Recommendations/Conclusions:

Recommendations:

Communication that odors are common and expected for operational activities such as sewage pumping and transport operations should be increased. Although the expected time and date of this specific instance was known to WTC management this information was not sufficiently communicated to H2C. Pertinent Information about potentially odorous activities should be provided so that pre-job briefings can include co-located activities that may produce odors in a work area not related to the specific tasks, especially during back-shift and overtime work evolutions when atypical operations such as sewage operations are intentionally scheduled to reduce the potential for facility impact. Facility culture needs to include knowledge that odors are normal and typical of various operational activities and does not necessarily equate to overexposure.

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 neutral atmospheric stability conditions and the mixing height was 500 feet above grade.

The Central Shift Manager concluded that WTP sewage operations was the source of the odors. DRI instrumentation results indicated that further actions were not necessary to protect worker safety and health, therefore access restriction was discontinued, and work was resumed.

Other:

Revision History:

- Revision 1: Updates to date in first paragraph of Event Summary and Timeline, Event Summary, as per direction of IH Technical Specialist.

Associated Documents:

iCAS Number: N/A **EIR Number:** EIR 2025-042

Industrial Hygienist:

[redacted] [redacted]

Print First and Last Name *Signature / Date*

Industrial Hygiene Level 3 Manager (delegated):

[redacted] [redacted]

Print First and Last Name

Industrial Hygiene Level 2 Manager (delegated):

[redacted] [redacted]

Print First and Last Name *Signature / Date*

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4-26-25 8:30 pm
- Check Applicable: (Did Not Smell)
  ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing:
  [redacted] wire pull
- Other Work Underway? Describe:
  NA
- Location of event *(mark area on map and wind direction)*:
- 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)*: Rotten Eggs
- 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.

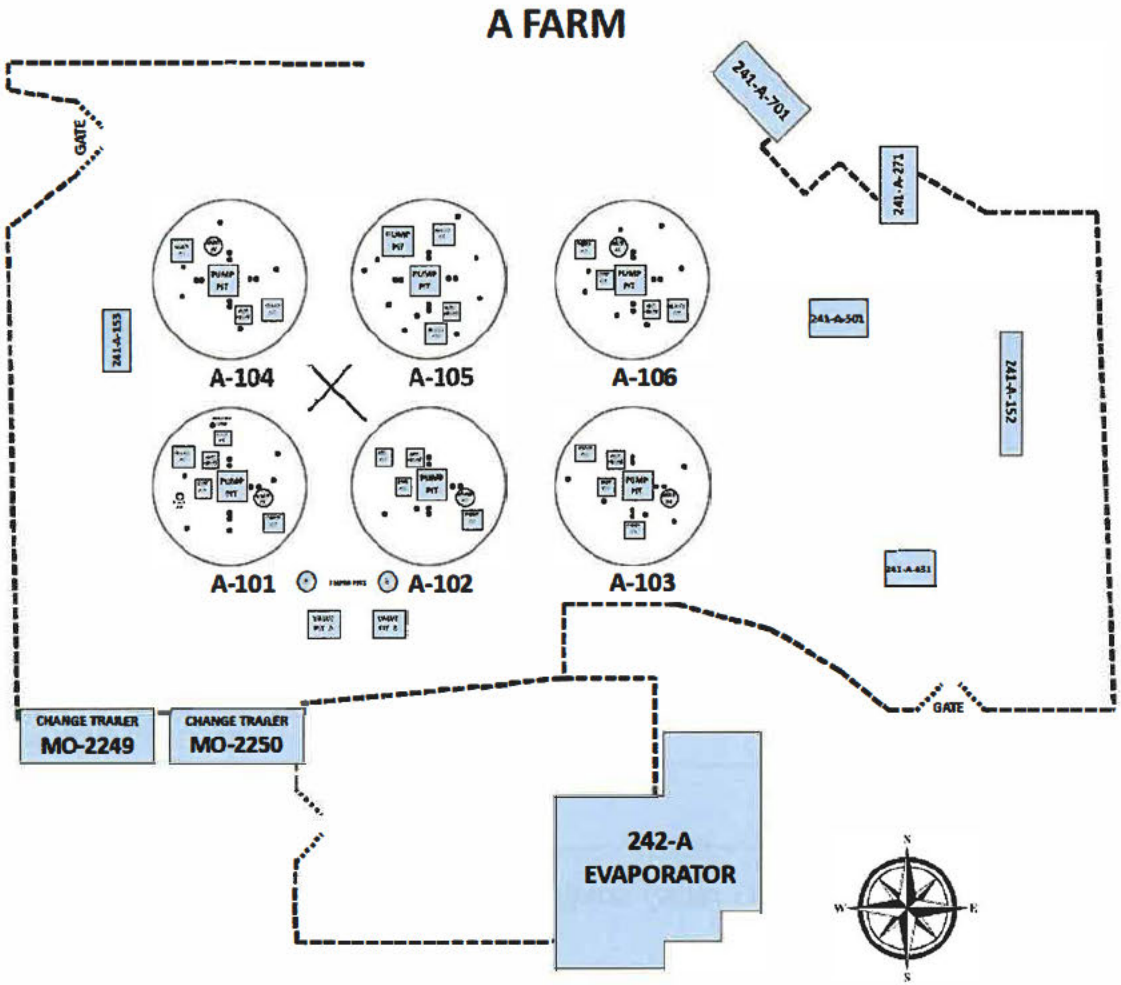
[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

Instructions:

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

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



[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 8:30 A.M.
- Check Applicable:
  - ☑ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted]
  Wire pulls to A106 and A103
- Other Work Underway? Describe:
- Location of event *(mark area on map and wind direction)*:
  No wind
- 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)*: Didn't personally smell other workers smelled rotten
- 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)*:

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.

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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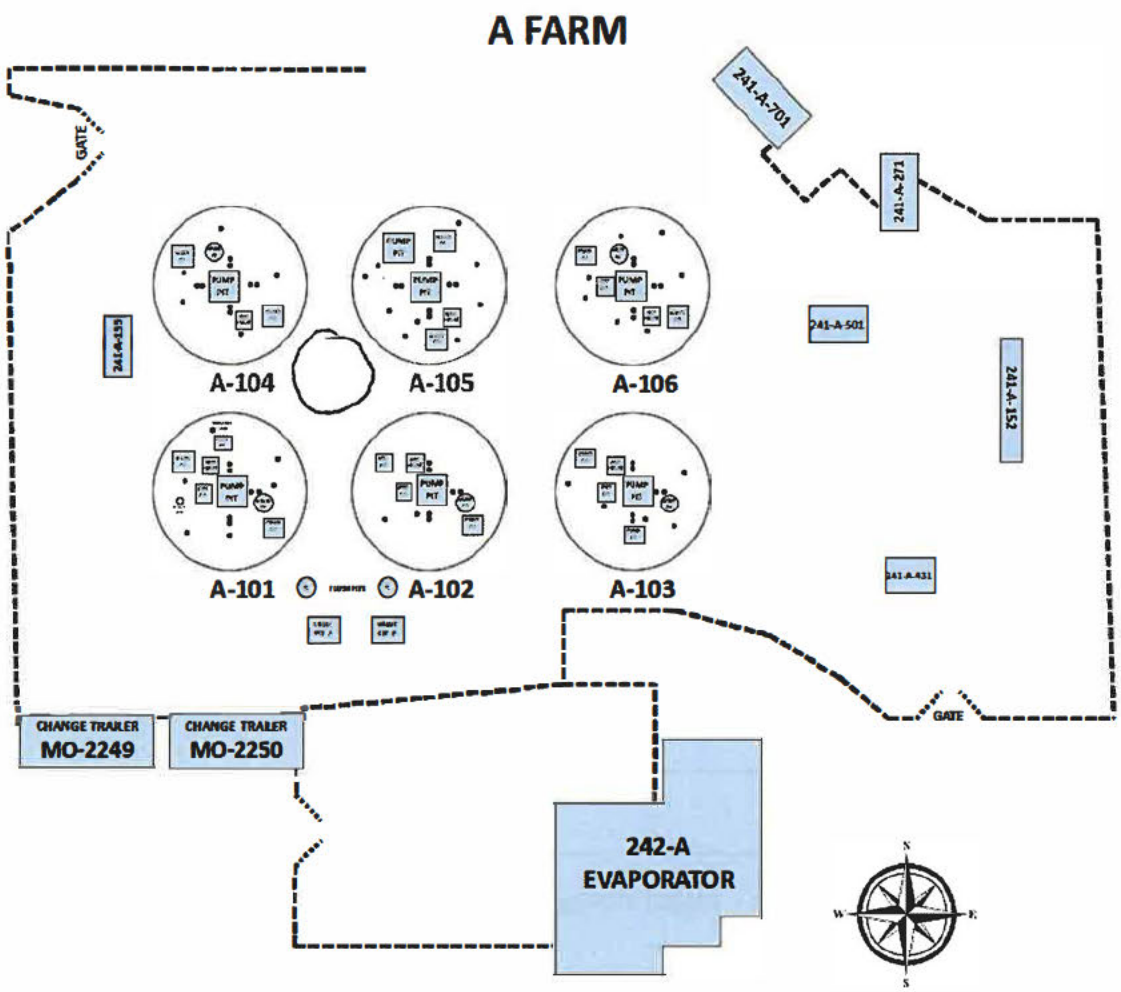
   a. Approximate location, see map at right;
   b. Wind direction, speed and description, such as stable or gusty wind;
   c. Environmental conditions, such as hot, cold, windy, rainy;
   d. Other work or contractors in the area;
   e. Anything else you think is relevant.
4. Provide the completed card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

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



[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4/26/25 8:30 AM
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] to form the pull wire
- Other Work Underway? Describe: Crew was pulling wire between A104 / A105 domes
- Location of event *(mark area on map and wind direction)*: no wind, unnoticeable
- 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)*: None
- 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.

ODOR/VAPOR RESPONSE CARD - 241 A FARM

Instructions:

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

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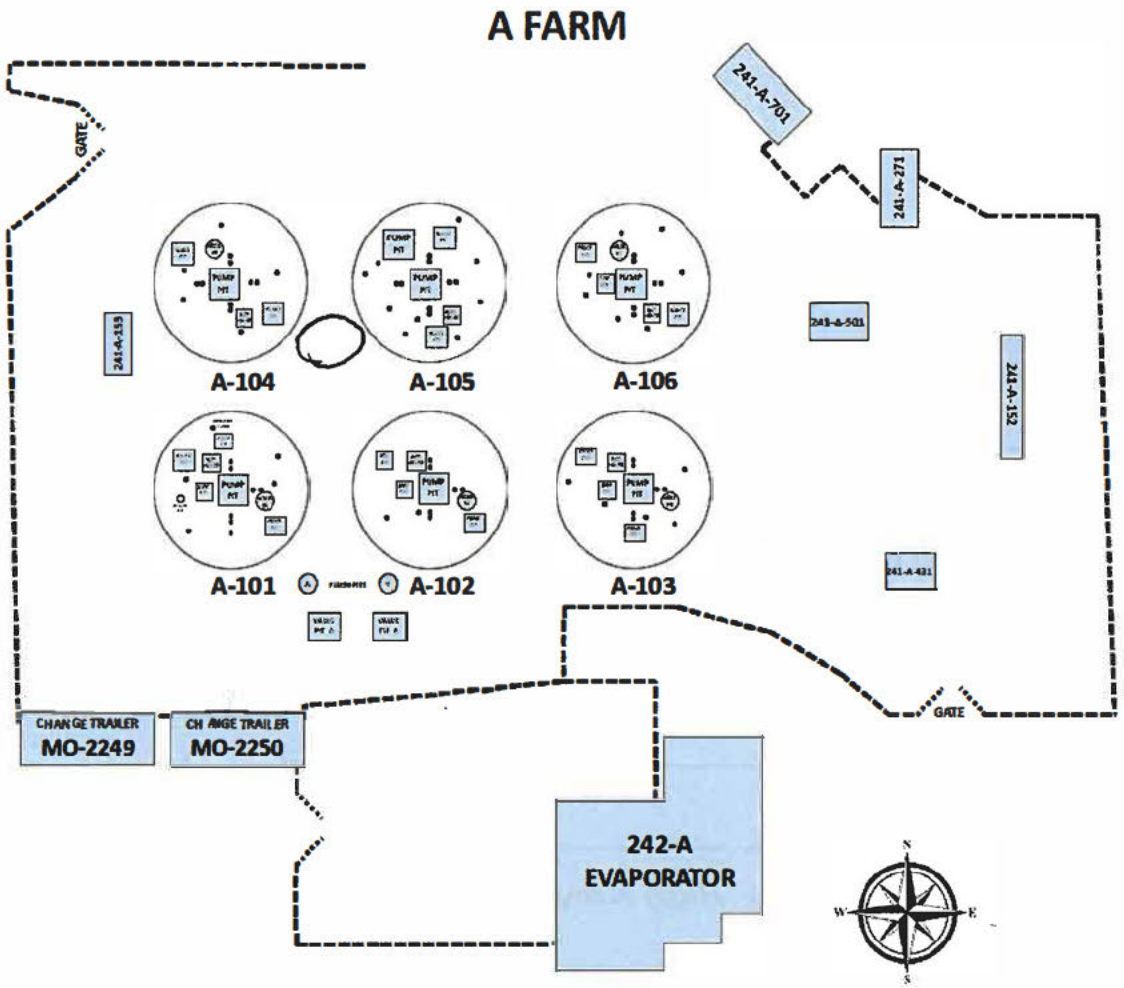

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 04/26/2025 @ 8.30 am.
- Check Applicable:
  - ☐ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] working at shop.
- Other Work Underway? Describe:
- Location of event *(mark area on map and wind direction)*:
- Name(s) of others in or near the affected area: myself
- Was Industrial Hygiene present, who? no.
- Describe the odor:
  - ☐ Sweet ☐ Sour ☐ Smoky ☐ Septic/Sewer ☐ Musty ☐ Rotten
  - ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  - ☐ Other *(describe)*: no odor
- 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.

ODOR/VAPOR RESPONSE CARD - 241 A FARM

Instructions:

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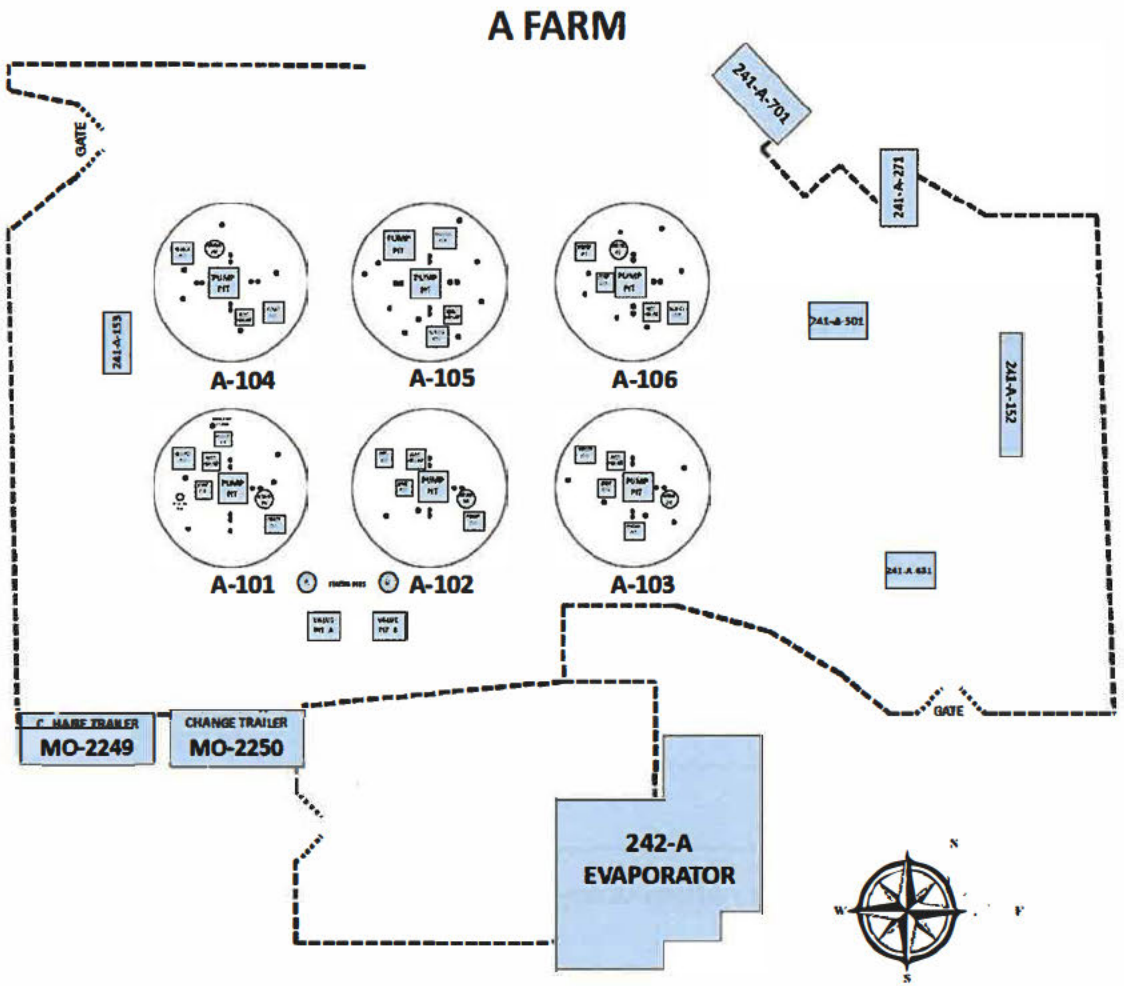

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4/26/25 8:30 AM
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your [redacted] were performing: / Electrical work (wire pull)
- Other Work Underway? Describe:
- Location of event *(mark area on map and wind direction)*: #
- Name(s) of others in or near the affected area:
- Was Industrial Hygiene present, who? N/A
- Describe the odor:
  - ☐ Sweet ☐ Sour ☐ Smoky ☐ Septic/Sewer ☐ Musty ☐ Rotten
  - ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  - ☒ Other *(describe)*:
- Is source known/likely? Describe: Did not smell odor
- 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.

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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2. Contact Central Shift Manager (CSM), at (509) 373-2689.
3. Complete both pages of this form and include as many details as possible, including:
   a. Approximate location, see map at right;
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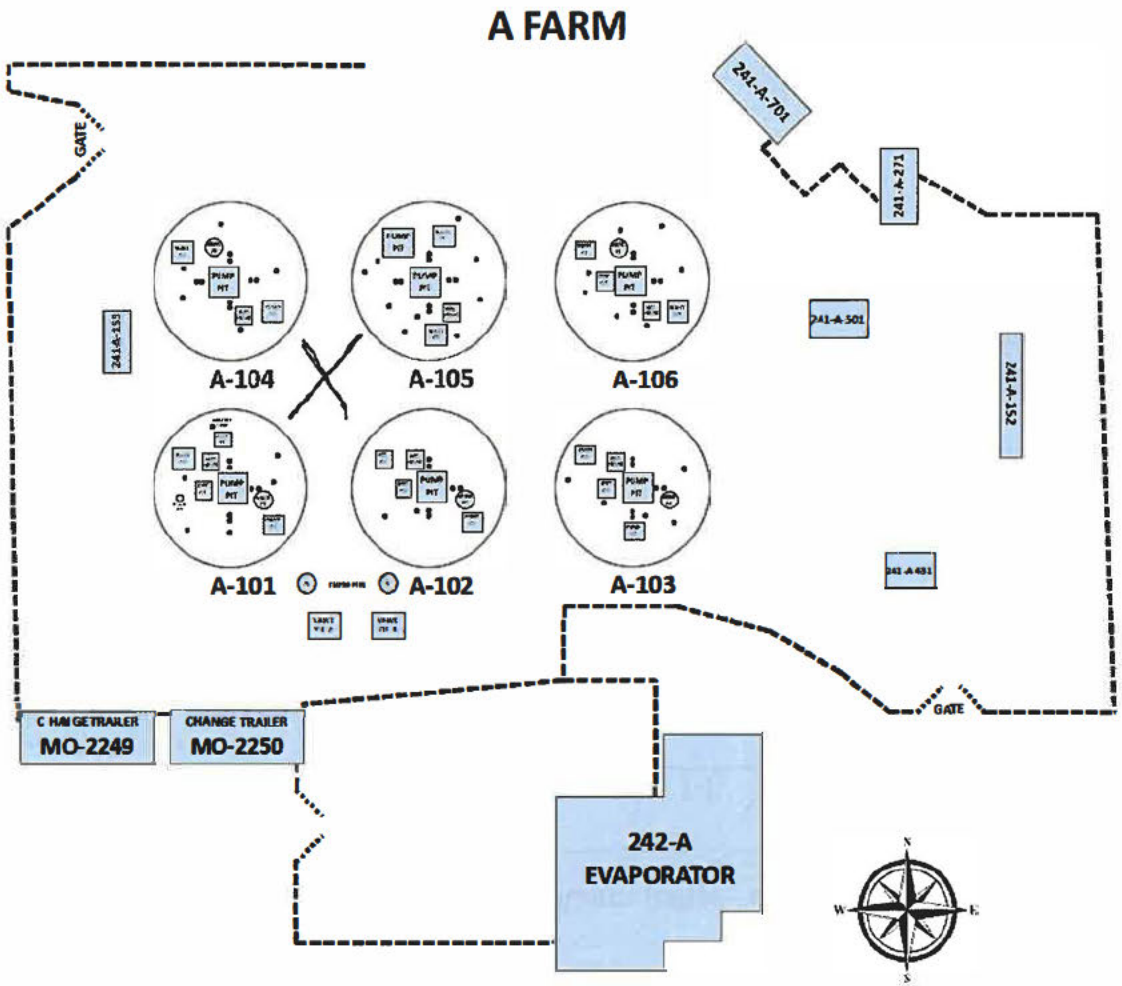

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4-26-25 8:30 AM
- Check Applicable:
  ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing:
  [redacted] laying wire out walking South
- Other Work Underway? Describe:
  N/A
- Location of event *(mark area on map and wind direction)*:
  Between A 104 A-106
- 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 Rotten Eggs ☐ Musty ☐ Rotten
  ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  ☐ Other *(describe)*:
- 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)*:

2. Provide this completed card *(Page 1 & 2)* to Supervisor, Industrial Hygiene, your Union Safety Representative or the CSM.

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[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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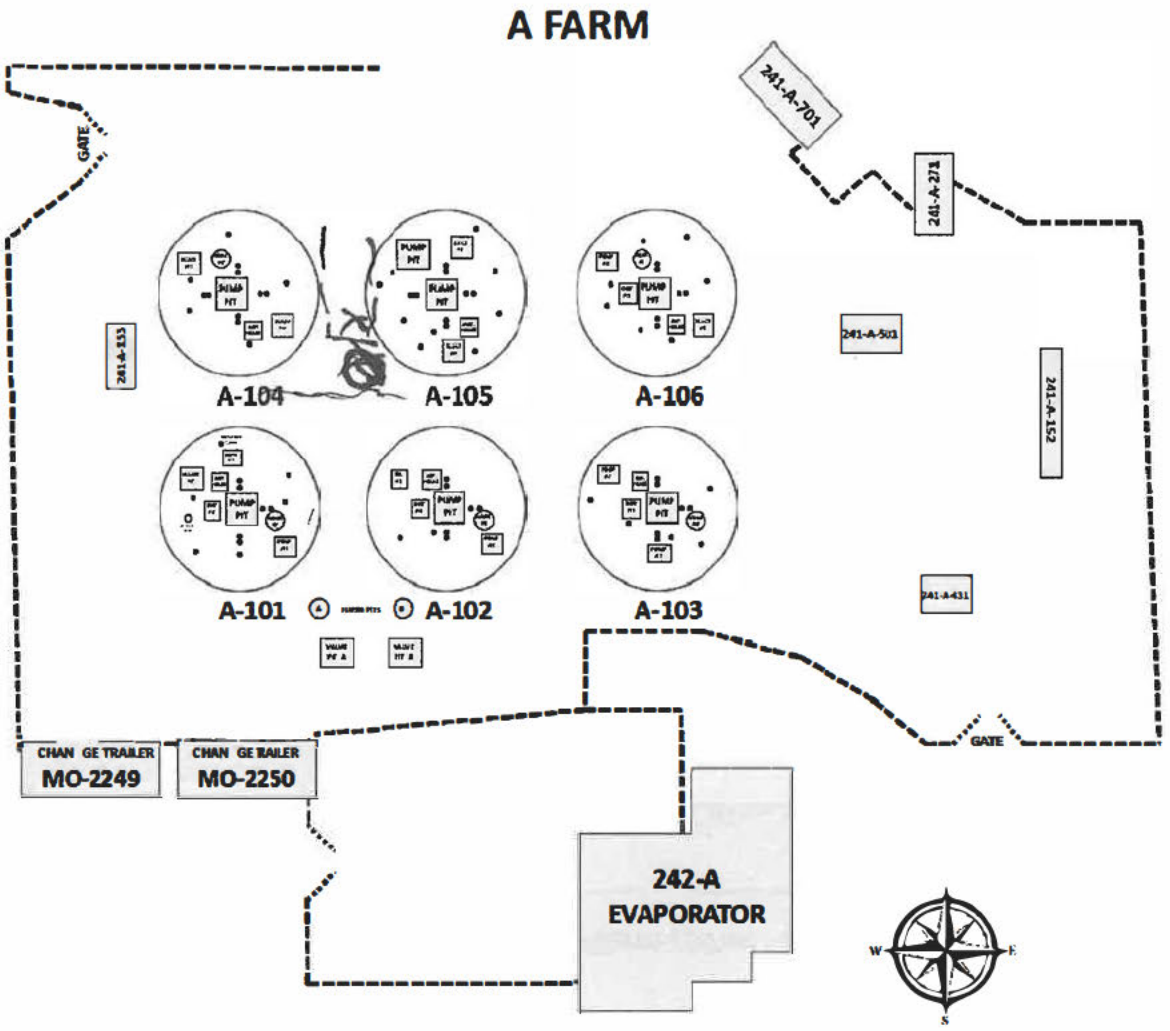

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4-26-25 8:30 am
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] Laying out wire to be pulled.
- Other Work Underway? Describe:
- Location of event *(mark area on map and wind direction)*: marked with "X" on other side.
- Name(s) of others in or near the affected area: [redacted]
- Was Industrial Hygiene present, who? NO
- Describe the ~~odor~~:
  - ☐ Sweet ☐ Sour ☐ Smoky ☒ ~~Septic/Sewer~~ Rotten Egg's ☐ Musty ☐ Rotten
  - ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  - ☐ Other *(describe)*:
- 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)*:

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[redacted]

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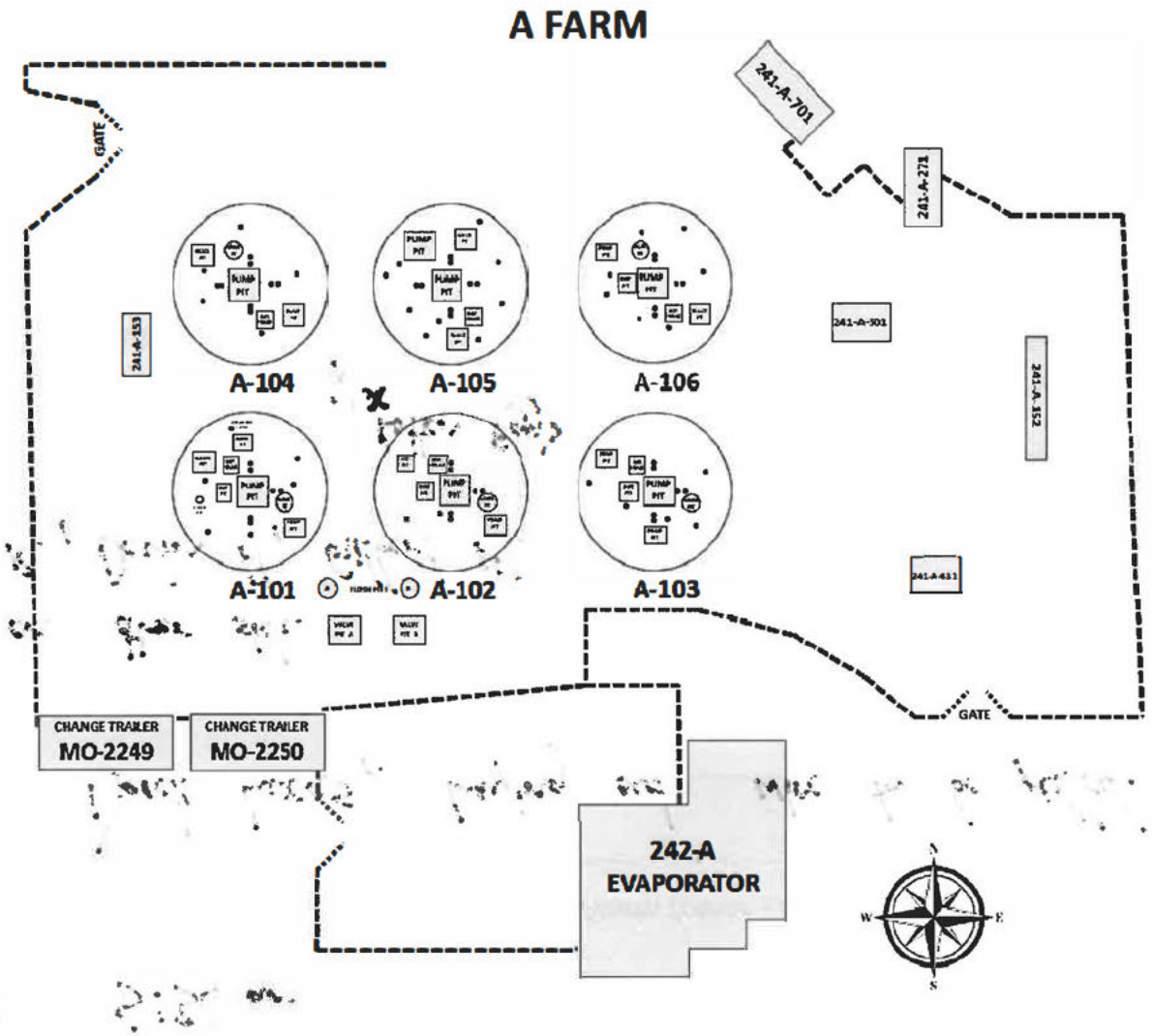

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4.26.25
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] supporting the electritions with wire pull
- Other Work Underway? Describe:
- Location of event *(mark area on map and wind direction)*: Ay-A farm
- Name(s) of others in or near the affected area:
- Was Industrial Hygiene present, who? No
- Describe the odor:
  - ☐ Sweet ☐ Sour ☐ Smoky ☐ Septic/Sewer ☐ Musty ☐ Rotten
  - ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  - ☒ Other *(describe)*: Chlorine pool like smell
- 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.
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[redacted]

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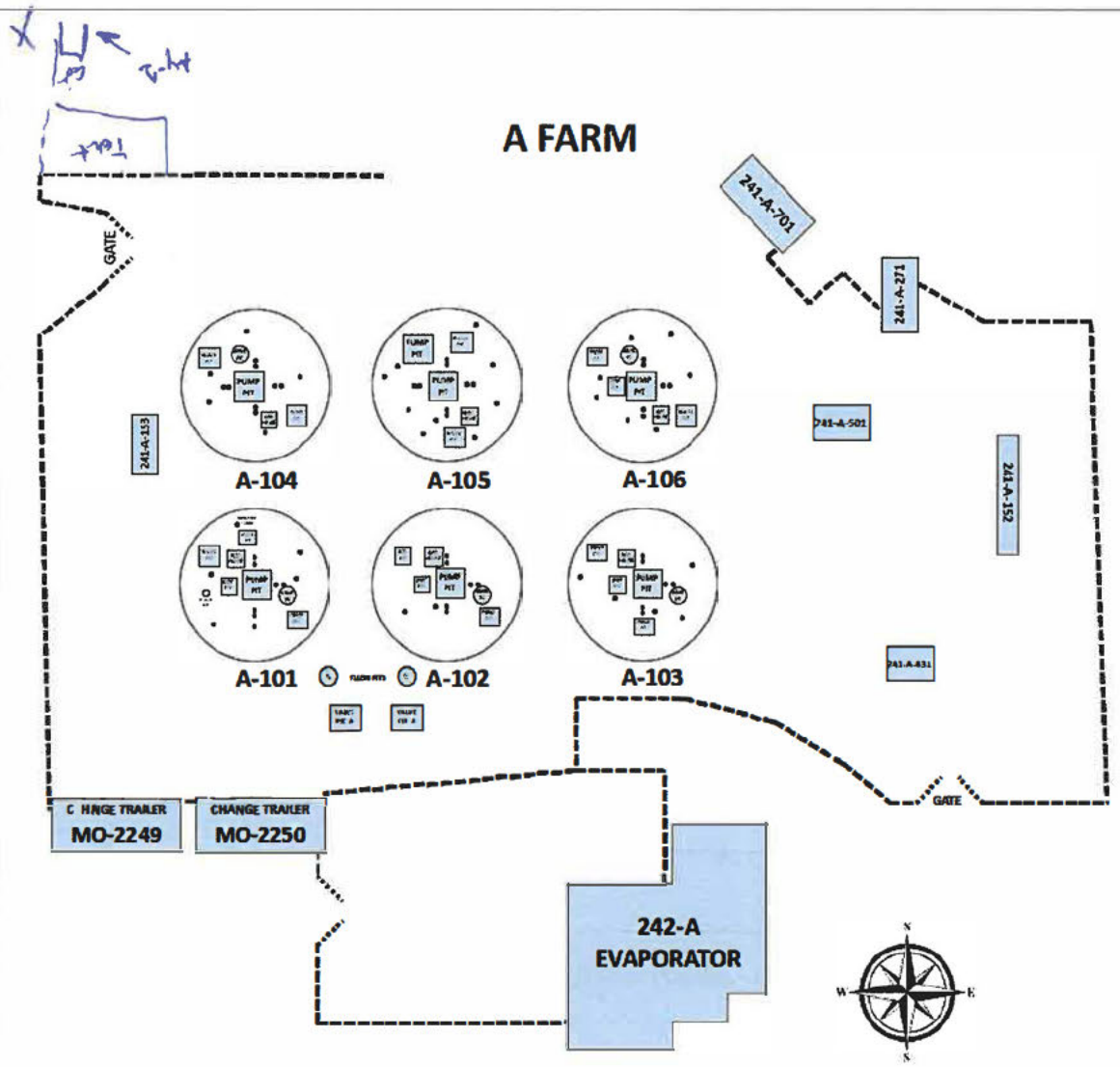
2. Contact Central Shift Manager (CSM), at (509) 373-2689.
3. Complete both pages of this form and include as many details as possible, including:
   a. Approximate location, see map at right;
   b. Wind direction, speed and description, such as stable or gusty wind;
   c. Environmental conditions, such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

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



[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4/26/25 9:45
- Check Applicable:
  ☑ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] Labor support electrician craft
- Other Work Underway? Describe: wire pull
- Location of event *(mark area on map and wind direction)*: AY-1
- 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:
- 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 - 241 A FARM

Instructions:

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM), at (509) 373-2689.
3. Complete both pages of this form and include as many details as possible, including:
   a. Approximate location, see map at right;
   b. Wind direction, speed and description, such as stable or gusty wind;
   c. Environmental conditions, such as hot, cold, windy, rainy;
   d. Other work or contractors in the area;
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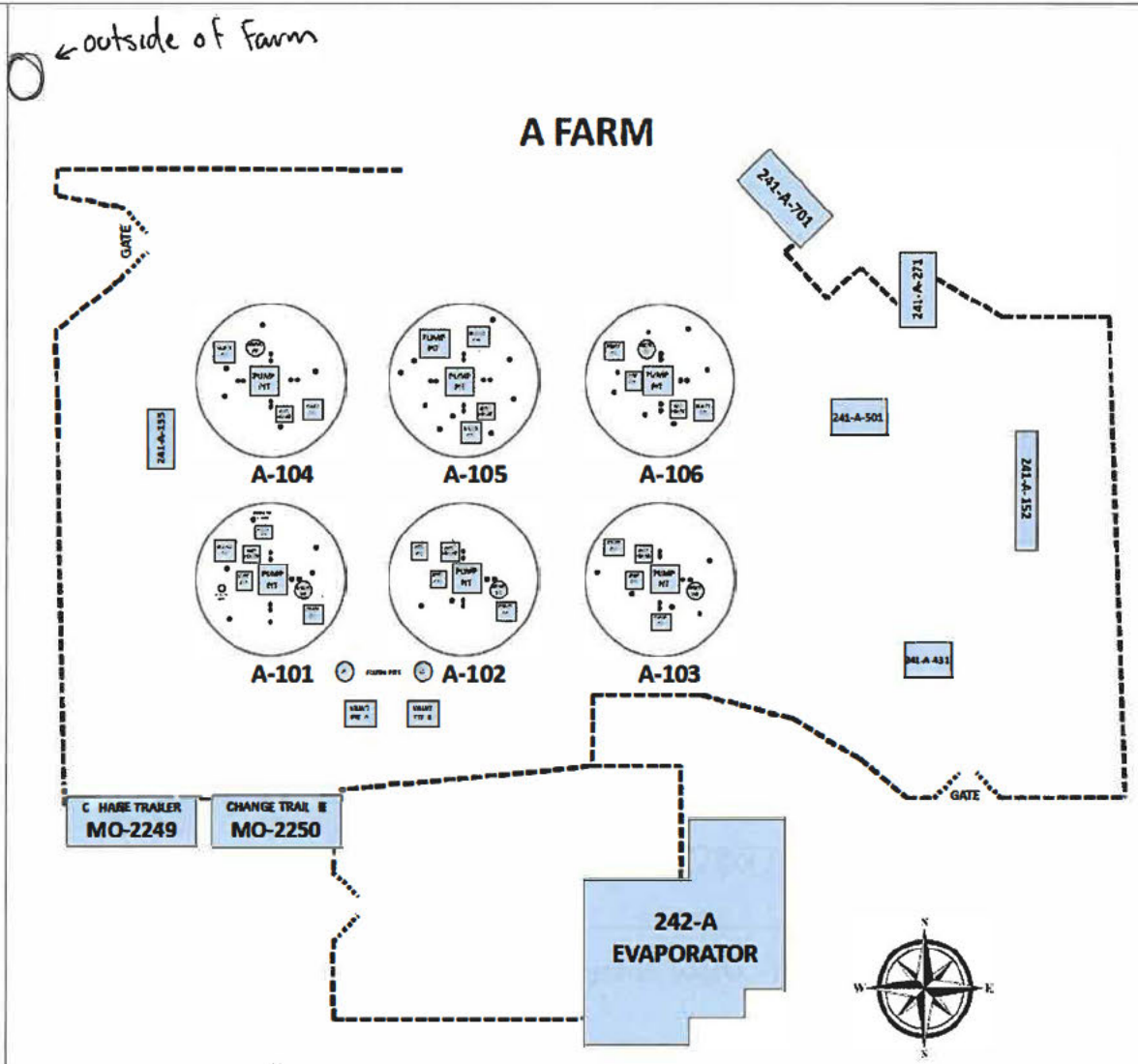

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 4-26-25 9:45
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] Laborer supporting craft electricians
- Other Work Underway? Describe: wire pull
- Location of event *(mark area on map and wind direction)*: AY-1
- 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: not sure
- Your symptoms? ☒ None
  - ☐ Headache ☐ Dizziness ☐ Nausea ☐ Cough ☐ Fatigue
  - ☐ Weakness ☐ Sore Throat ☐ Difficulty Breathin [redacted] ☒ Eye Irritation ☐ Rash
  - ☐ Itch ☐ Tingling ☐ Numbness ☒ Taste 4-26-25
  - ☐ 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.

[redacted]

ODOR/VAPOR RESPONSE CARD - 241 A FARM

Instructions:

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM), at (509) 373-2689.
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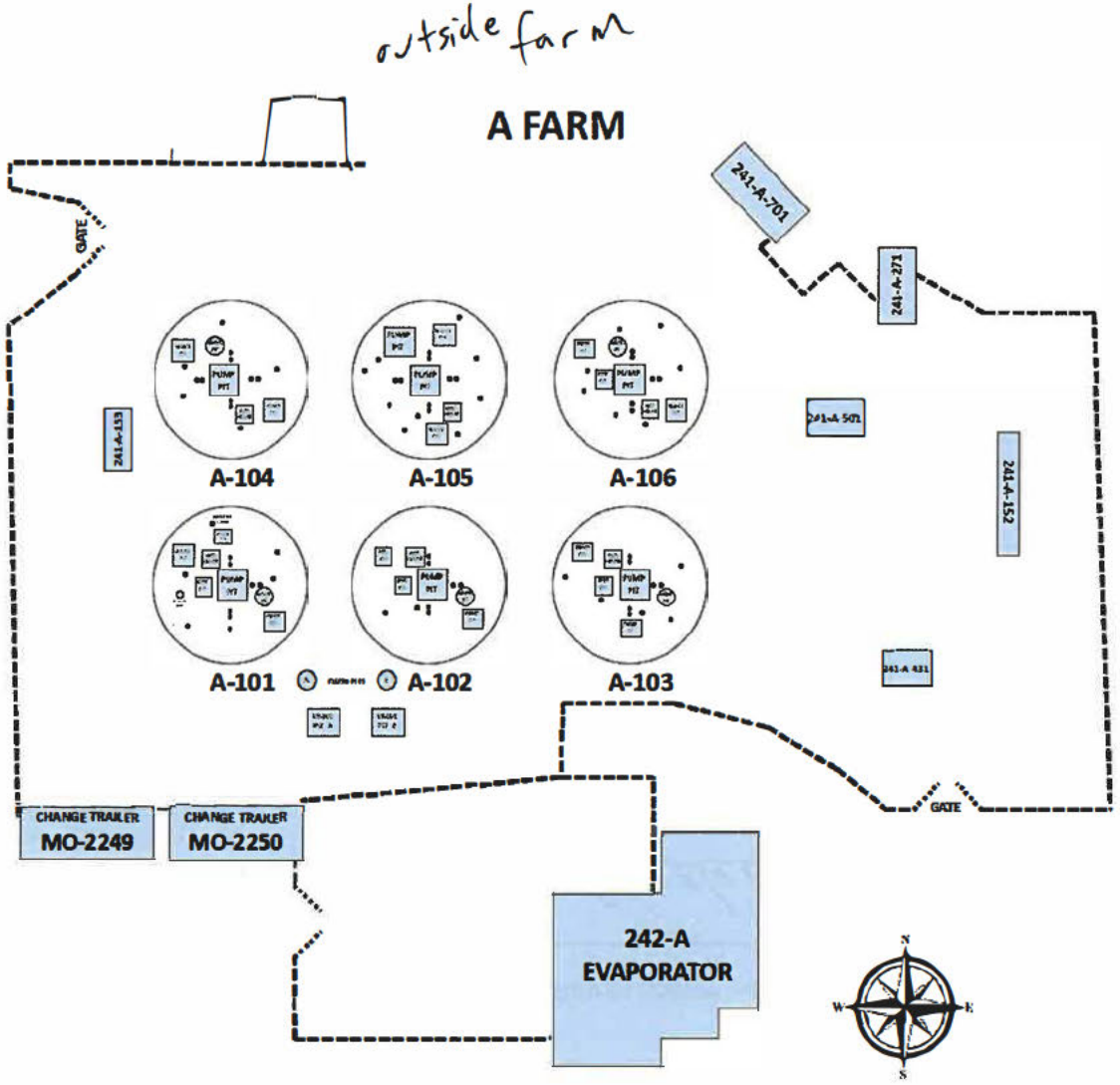

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