Washington River Protection Solutions

EVENT SUMMARY

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

1. Project: Maintenance Craft Support **2. Report Date:** 03/03/2025

3. Investigation Title: C-67 Response West of 241-AW1

4. Investigation Report Number: EIR-2025-029

5. Responsible Manager: [redacted]

6. Event Investigator: [redacted]

7. Area / Building / Location: 200E/Northwest of 241-AW Farm

8. Date and Approximate Time of Event: Date: 02/13/2025 **Time *(military)*:** 0723 hours

9. Associated Action Request (AR) Number: ITDC-AR-2025-1043

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)*

An H2C painter was removing signs north of 241-AW farm and northeast of 217-AW1 change tent when they encountered a stronger than normal odor [level 4 work activity].

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

- H2C Sign-Painter - 1

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

On 02/13/2025 at approximately 0723 hours, an H2C Sign-Painter was removing signs north of 241-AW farm and northeast of 217-AW1 Change Tent and reported a stronger than normal odor described as "sulfur/rotten eggs". At approximately 0755 hours, AZ Area Dayshift Manager (ADM) notified the Central Shift Manager (CSM). The ADM informed the CSM that they will reroute farm access from the 217-AW1 Change Tent to the MO-818 Change Trailer on the East side.

At 0756 hours, the CSM initiated response actions per TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*.

Initially the worker reported no symptoms and declined a medical evaluation. At approximately 0921 hours, the employee requested a precautionary evaluation at Inomedic Health Application (IHA) and was transported. The worker was released back to work without restriction.

At 0845 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*. Direct Readings results were at or below backgrounds levels.

At approximately 0902 hours, TFC-OPS-OPER-C-67 response actions were completed. Response actions did not indicate further actions were necessary regarding worker safety and health occupational exposure limits.

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

- The odor event occurred outside and north of 241-AW farm and northeast of 217-AW1 Change Tent located in the 200 East Area of the Hanford site.
- At the time odors were reported at outside of 217-AW1 Change Tent the worker was wearing Level D Personal Protective Equipment (PPE) and in a work location that is not posted as a radiological controlled area. The personnel were not in an area requiring the use of respiratory protection or personal ammonia monitor (e.g., Ventispro or ToxiRAE).
- 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 0730 hours on 02/13/2025:
  - Temperature: 11°F
  - Relative Humidity: 70%
    Wind Speed: 5.8 mph
  - Wind Direction: from Northwest
  - Barometric Pressure: 29.07 inches of mercury and falling

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

There was no impact to the facility.

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

- CSM rerouted farm access from the AW Change Tent to the East side Change Trailer.
- Industrial Hygiene Technicians (IHTs) took readings around the AW Change Tent per survey plan IHSP-POE-MULTI-TFCOOPSOPERC67, *Industrial Hygiene Odor Evaluation*.
- The worker was offered precautionary medical evaluation.
- The CSM initiated TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*, response actions.
- The DOE Facility Representative was notified of the event.
- The CSM made required TFC-OPS-OPER-C-67 notifications.
- Event Investigation EIR-2025-029, C-67 Response West of 241-AW1, was initiated.

18. Compensatory Actions Taken:

None.

19. Remedial Actions Taken:

None.

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

To summarize the conclusion per Industrial Hygiene Event Investigation Report (IHIR), IHIR-00115, TFC-OPS-OPER-C-67 *Response to Stronger than Normal Odors*, monitoring results did not exceed occupational exposure limits. IHTs performed DRI monitoring outside the AW Change Trailer per IHSP, IHSP-POE-MULTITFCOPSOPERC67, *Industrial Hygiene Odor Evaluation*.

Direct Reading Instrument Monitoring Results:

- Monitoring was performed into the Affected Area from the West. Once the Affected Area had been cleared, the Response Team cleared the portable toilet and then 217-AW1. Next, they crossed 4th Street north and monitored the diesel truck and generators, then west across Buffalo Avenue to monitor the drainpipe and finally AX-151 Diverter Station.

- Direct Readings were at or below backgrounds levels
  Peak readings during response at or below background:
  o Ammonia: less than 1 Parts Per Million (ppm)
  o Volatile Organic Compounds (VOC) (10.6 electron-volt (eV) lamp): 0.030 ppm (associated with the diesel combustion)
  o Hydrogen Sulfide: less than 0.1 ppm

Tank Waste Chemical Vapors:

- While the odor description is inconsistent with Tank Waste Chemical Vapors, due to the proximity to the Tank Farms, monitoring for Tank Waste Chemical Vapors was performed.

- Ammonia is used as a sentinel Tank Waste Chemical Vapor for chemicals of potential concern (COPC). 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) photoionization detector (PID) is utilized to detect multiple VOC COPCs simultaneously.

Figure 2. 200-East Area (with 241-AW, 241-AN, 241-AY/AZ, 241-AX, 241-A Farm projected plume models) at 0723 02/13/2025 from DFAS application, powered by SmartSite™.

NOTE: 241-A and 241-AW Farm Exhausters are not connected to the DFAS; however, an approximate exhauster plume was added for each based on other modelled plumes.

- Review of the DFAS application, powered by SmartSite™, Weather Details dashboard for conditions during response actions:
  02/13/2025 @ 0811(current weather data for Response actions):
  • Wind Speed: 5.3 mph
  • Wind Direction: 286° (out of West Northwest)
  • Mixing Height: 200 feet above grade
  • Stability Class: F/G (moderately stable to extremely stable conditions conditions)

Meteorological information from the Hanford Weather Station for Station #6 on 02/13/2025 @ 0730:
- Temperature: 11°F
- Relative Humidity: 70%
- Wind Speed: 5.8 mph
- Wind Direction: from Northwest
- Barometric Pressure: 29.07 inches of mercury and falling

Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 02/13/2025 @ 0721:
- POR518 (241-A): 1.827 ppm
- POR519 (241-A): 3.113 ppm
- 241-AN: 0 ppm
- 241-AW: 5.636 ppm
- POR126 (241-AX): N/A
- POR127 (241-AX): 0 ppm
- 702AZ (241-AY/AZ): N/A
- 241-AP: N/A

Hydrogen Sulfide:

- Based on the odor descriptor "sulfur/rotten eggs", monitoring for hydrogen sulfide vapors was performed. The American Industrial Hygiene Association (AIHA) Odor Threshold for Chemicals with Established Health Standards, 2nd Edition, lists hydrogen sulfide with the odor character "rotten eggs".

- The Hanford Site Tank Operations Contractor, Hanford Tank Waste Operations and Closure, LLC (H2C), 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 feet) the odor was described as sewer. Further away from septic system (within approximately 100 feet) the odor was described as skunk. Even further away from septic system (within approximately 200 feet) the odor was described as body odor. It should be noted that odors are a perception and can vary between individuals.

- The Affected Area has a long history of similar odors or odors that have been found to be associated with sources other than Tank Farm vapor source emissions, such as septic tank gaseous emissions which are known to change odor profile across a gradient when diluted by ambient atmosphere with distance from a point source.

- The initiating event was a stronger than normal odor which the worker described as “sulfur/rotten eggs”. These odors are indicative of nearby septic related equipment. The closest septic equipment was a portable toilet, “blue room”, located within the Affected Area, immediately north of several “horse trailers”. The cleaning record in the portable toilet indicated it had been serviced sometime during the morning of 02/13/2025.

- The event response DRI results were less than detectable in the Affected Area for hydrogen sulfide, ammonia, and VOCs. It is possible that recent portable restroom maintenance including pumping and standard cleaning chemicals were used within the Affected Area around the time of the event. Due to the proximity and wind direction, the portable restroom was a potential odor source.

- Another potential nearby source of hydrogen sulfide was a drainpipe approximately 200 feet northwest of the Affected Area. The drainpipe has the potential for standing water, and in the past a carcass was discovered and removed. The event response DRI results were less than detectable at the drainpipe for hydrogen sulfide, ammonia, and VOCs. The response team did not note any stronger than normal odors in the area of the drainpipe.

Diesel Combustion:

- Several diesel heaters and generators were approximately 120 feet north of the Affected Area. Due to the wind direction and location this was a potential odor source. However, diesel combustion type odors do not correspond with the reported odor and the response team did not observe unusual odors at the location, so it is unlikely that it is the source. The event response DRI results were less than detectable downwind of the generator for hydrogen sulfide and ammonia. VOC DRI result was 0.030 ppm, which is expected near a combustion source.

241-AX-151 Diverter Station:

- The 241-AX-151 Diverter Station, located approximately 300 feet north northwest of the Affected Area, was utilized for the Plutonium-Uranium Extraction Facility (PUREX) to send waste to the 244-AR Vault or 241-AY/AZ Tank Farms. 241-AX-151 was isolated in 1985, with the lines flushed and blanked, and weather protective foam applied. As of 2006, the catch tank contained approximately two-thousand-eight-hundred-thirty-eight (2,838) gallons of 241-AX Farm-like supernatant waste.

- When outside air pressure changes, there is a small pressure imbalance between the headspace of a passively ventilated tank and the outside air. This imbalance pushes air into the tank or draws it out (barometric breathing). 241-AX-151 may have unsealed emission points that could result in odors through barometric breathing.

- At the approximate time of the event, the barometric pressure was decreasing. As the outside air pressure was decreasing at the time of the event, passively ventilated tanks push air out of the tank ("breathing-out"). Due to wind direction and decreasing barometric pressure AX-151 is a possible odor source. However, the odor description from the Affected Worker of “sulfur/rotten eggs” description is inconsistent with Tank Waste Chemical Vapors. The response team did not note any stronger than normal odors in the area of AX-151. The event response DRI results were less than detectable at AX-151 for hydrogen sulfide, ammonia, and VOCs.

Conclusion:

- Direct Reading Instrumentation monitoring performed during response actions did not indicate further action was necessary to protect worker safety and health. As a result, the area was released from restricted access and work was allowed to continue.

- The review of the atmospheric conditions around the reported time of the event indicates the cause of the odor is unlikely to be from Tank Farm emissions. The atmospheric mixing height was 600 feet above grade, the atmospheric stability class indicated slightly stable conditions and the VMDS/VMDS Alternate Monitoring Ammonia concentrations were well below the high alarm set points. The cause of the odor is unlikely to be from actively ventilated tanks. The barometric pressure trend was decreasing at the time of the event, so passively ventilated tanks would be pushing air out of the tank. Therefore, it is possible but unlikely that the cause of the odor is

from passively ventilated tanks given the odor descriptor did not match Tank Waste Chemical Vapors.

- Several other known nearby upwind potential odor sources exist such as portable restrooms and diesel combustion. However, monitoring performed to support response actions did not readily identify a source.

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:

The response team noted the lack of physical barriers used for access restriction. A Shift Office Event Notification (SOEN) verbal restriction of the affected area was sent out but may not reach all workers or adequately control an area. The use of physical barriers such as stanchions and caution tape or restricted access signs would provide better control.

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]

Washington River Protection Solutions

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)

Event Title:	IHIR Number:
TFC-OPS-OPER-C-67 Response Northwest of 241-AW Farm	IHIR-00115
	IHEI Number: N/A

Date:	Time:	Location:
02/13/2025	0723	Gravel area Northwest of AW Farm

Event Summary and Timeline:

Event Summary:

At approximately 0723 on 02/13/2025 one Sign-Painter encountered stronger than normal "sulfur/rotten eggs" odor while removing signs north of AW farm and northeast of 217-AW1 change tent. The worker did not report symptoms. The worker was initially offered precautionary medical evaluation at the on-site medical provider and declined. The worker later determined to receive the precautionary medical evaluation and was transported to the on-site medical provider. No other workers were in the area. Access to the area was verbally restricted as no work was occurring in the area.

Field Response Timeline:

NOTE: All electronic communication time stamps adjusted to match the clock utilized to record the timeline [Central Shift Office (CSO) clock] which runs approximately 2 minutes fast (e.g., electronic communication time of 0803 = CSO clock time of 0805).

0801 Shift Office Event Notification (SOEN): " Responding per TFC-OPS-OPER-C-67 for stronger than normal odors reported outside of AW Farm to the East of the AW Change Tent. Access is restricted to this area. AW Farm access shall be through the East Change Trailer. CSM"

0804 Production Operations (PO) Industrial Hygienist (IH) arrives at CSO. Affected Worker was in the shift office upon arrival and had started to fill out Odor-Vapor Response Card (OVRC).

0804-0809 PO IH discussed event details with Affected Worker while worker completed OVRC. Approximate time of event was indicated as 0723. No other workers were in the area. No chemicals were being used for work activities.

0806 PO IH notifies PO Shift Industrial Hygiene Technician (IHT) Supervisor of TFC-OPS-OPER-C-67 response and requests IHT support and preparation of equipment based on proximity to 241-AW tank farm and odor descriptor.

- o Direct reading instrumentation (DRI) equipped with the following sensors:
  - Hydrogen sulfide
  - Ammonia
  - Volatile organic compounds (VOC) 10.6 electron-volts (eV) photoionization detector (PID)

0809 Direct Feed Low Activity Waste (DFLAW) Level 3 Safety & Health (S&H) Manager and Effluent Treatment Facility (ETF) IH arrive at CSO.

~0809 IHs review completed OVRC and verify required response instrumentation based on proximity to tank farms and descriptors from OVRC "sulfur/rotten eggs" and to confirm no reported symptoms.

0811 PO IH checks Data Fusion Advisory System (DFAS), powered SmartSite™, for current weather data.

- Wind Speed: 5.3 mph
- Wind Direction: 286° (out of West Northwest)
- Mixing Height: 200 feet above grade
- Stability Class: F/G (moderately stable to extremely stable conditions)

0811 PO IH checks Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 02/13/2025 @ 0721:

- POR518 (241-A): 1.827 ppm
- POR519 (241-A): 3.113 ppm
- 241-AN: 0 ppm
- 241-AP: 5.636 ppm
- 241-AW: N/A
- POR126 (241-AX): 0 ppm
- POR127 (241-AX): N/A
- 702AZ (241-AY/AZ): N/A

Field Response Timeline continued on next page.

Event Summary and Timeline:

Field Response Timeline (continued):

0813 PO IH contacts Hanford Meteorological Station for weather information for Station #6 at 0730 on 02/13/2025:
- Temperature: 11°F
- Relative Humidity: 70%
- Wind Speed: 5.8 mph
- Wind Direction: from Northwest
- Barometric Pressure: 29.07 inches of mercury and falling

0814 DFLAW IH arrives at CSO.
0815 PO Shift IHT Supervisor arrives at CSO and provides update on status of IHTs and instrumentation preparation.
0816 PO IH requests Industrial Hygiene Event Investigation Report (IHIR) number.
0819 Shift IHT 1 arrives at CSO.
0824 Shift IHT 2 arrives at CSO with instrumentation.
0830 DFLAW Level 3 S&H Manager updates Level 1 Environmental, Safety, Health, & Quality (ESH&Q) Manager and delegated Level 2 IH Manager on TFC-OPS-OPER-C-67 response.
0836 CSM contacts ICM (Issues and Concerns Management) to determine point of contact (POC) for Event Investigation Report (EIR)
0838 CSM contacts ICM POC for EIR.
0840 CSM and PO IH sign TFC-OPS-OPER-C-67 Attachment A Sheet 1 of 2, Response Plan
0842 PO IH briefs response team
- 2 IHs, 2 IHTs
- Monitor per IHSP-POE-MULTI-TFCOPSOPERC67:
  - DRI equipped with the following sensors:
    - Hydrogen Sulfide
    - Ammonia
    - VOC 10.6 eV PID
  - Contact IH if source identified
- Respiratory Protection Equipment not required, Voluntary Use
- Hand warmers available

0845 DFLAW IH requests IHIR number.
0846 DFLAW IH receives IHIR number.
0847 Field Response Team departs CSO.
0851 Response team arrives at the Affected Area
0852 Response team reports area readings at the Affected Area were less than detectable.
0853 Response team reports a potential for diesel generator cold start north of Affected Area.
0853 Response team reports area readings in 217-AW1 change tent were less than detectable.
0859 Response team reports continued work with diesel generator north of Affected Area.
0902 Response team reports monitoring complete and Responding IHTs are en route to IHT Lab
0920 Affected Worker requests precautionary medical evaluation at Inomedic Health Applications (IHA)
0921 POE Shift IHT Supervisor notifies CSM and IHs that DRI instrumentation passed Post-Use Function Test
0921 CSM notifies Case Manager of Affected Worker request for precautionary medical evaluation.
0924 CSM notifies Maintenance Level 1 Manager of Affected Worker receiving precautionary medical evaluation at IHA 200 West Area location.
0940 CSM and PO IH sign TFC-OPS-OPER-C-67 Attachment A Sheet 2 of 2, Response Plan
0952 IH personnel depart CSO.
0953 SOEN: "Completed OPS-OPER-C-67 response to the area West of 217-AW1. IHT readings were at or below backgrounds levels, access has been restored to the area. CSM"

Field Response Timeline Acronyms on next page.

Event Summary and Timeline:

Field Response Timeline Acronyms:

CSM	Central Shift Manager	IHT	Industrial Hygiene Technician
CSO	Central Shift Office	mph	miles per hour
DFAS	Data Fusion Advisory System	OVRC	Odor-Vapor Response Cards
DLAW	Direct Feed Low Activity Waste	PID	photoionization detector
DRI	direct reading instrument	PO	Production Operations
EIR	Event Investigation Number	POC	Point of Contact
ESH&Q	Environmental, Safety, Health, & Quality	ppm	parts per million
ETF	Effluent Treatment Facility	RPE	Respiratory Protection Equipment
eV	electron-volts	S&H	Safety & Health
ICM	Issues and Concerns Management	SOEN	Shift Office Event Notification
IH	Industrial Hygienist	SWIHD	Site Wide Industrial Hygiene Database
IHA	Inomedic Health Applications	VMDS	Vapor Monitoring Detection System
IHIR	Industrial Hygiene Event Investigation Report	VOC	Volatile Organic Compound

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- Monitoring was performed into the Affected Area from the West. Once the Affected Area had been cleared, the Response Team cleared the portable toilet and then 217-AW1. Next they crossed 4th Street north and monitored the diesel truck and generators, then west across Buffalo Avenue to monitor the drainpipe and finally AX-151 Diverter Station.
- Peak readings during response at or below background:
  - Ammonia: less than 1 ppm
  - Volatile Organic Compounds (10.6 eV lamp): 0.030 ppm (associated with the diesel combustion)
  - Hydrogen Sulfide: less than 0.1 ppm

SWIHD References:

Event Response Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrumentation (DRI) Survey:

- # 25-00896 "TFC-OPS-OPER-C-67 Response Northwest of 241-AW "

Additional Information:

Concurrent Co-located Work

One work activity was noted by the Response Team near the Affected Area. A crew with a running diesel truck and a running diesel generator mounted to the truck were performing maintenance and attempting to start another diesel generator.

Respiratory Protection

Respiratory Protection Equipment was not prescribed for the Initiating Event. Accordingly, at the time of the Initiating Event, the Affected Personnel were not wearing Respiratory Protection Equipment. Respiratory Protection Equipment was not required, nor worn, for Response Actions.

Tank Waste Chemical Vapors

While the odor description is inconsistent with Tank Waste Chemical Vapors, due to the proximity to the Tank Farms, 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
(Additional Information continued on next page.)

Additional Information:

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, Direct Reading Instrumentation (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 Volatile Organic Compounds (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 parts per million (ppm)*. When monitoring for Tank Waste VOC vapors, DRI equipped with a 10.6 electron-volt (eV) photoionization detector (PID) is utilized to detect multiple VOC COPCs simultaneously.
*NOTE: The 2 ppm Action Limit is not applicable to chemical use.

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

02/13/2025 @ 0723 (weather data at approximate time of Initiating Event):
- Wind Speed: 5.7 mph
- Wind Direction: 306° (out of Northwest)
- Mixing Height: 600 feet above grade
- Stability Class: E (slightly stable conditions)

Figure 1. 200-East Area (with 241-AW, 241-AP, 241-AN, 241-AY/AZ, 241-AX, 241-A Farm projected plume models) at 0723 02/13/2025 from DFAS application, powered by SmartSite™.

NOTE: 241-AN, 241-A, 241-AW Farm Exhausters are not connected to the DFAS; however, an approximate exhauster plume was added for each based on other modeled plumes.

Additional Information continued on next page.

Additional Information:

Figure 2. 200-East Area (with 241-AW, 241-AN, 241-AY/AZ, 241-AX, 241-A Farm projected plume models) at 0723 02/13/2025 from DFAS application, powered by SmartSite™.

NOTE: 241-A and 241-AW Farm Exhausters are not connected to the DFAS; however, an approximate exhauster plume was added for each based on other modeled plumes.

Review of the DFAS application, powered by SmartSite™, Weather Details dashboard for conditions during response actions:

02/13/2025 @ 0811(current weather data for Response actions):

- Wind Speed: 5.3 mph
- Wind Direction: 286° (out of West Northwest)
- Mixing Height: 200 feet above grade
- Stability Class: F/G (moderately stable to extremely stable conditions conditions)

Meteorological information from the Hanford Weather Station for Station #6 on 02/13/2025 @ 0730:

- Temperature: 11°F
- Relative Humidity: 70%
- Wind Speed: 5.8 mph
- Wind Direction: from Northwest
- Barometric Pressure: 29.07 inches of mercury and falling

Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 02/13/2025 @ 0721:

- POR518 (241-A): 1.827 ppm
- POR519 (241-A): 3.113 ppm
- 241-AN: 0 ppm
- 241-AW: 5.636 ppm
- POR126 (241-AX): N/A
- POR127 (241-AX): 0 ppm
- 702AZ (241-AY/AZ): N/A
- 241-AP: N/A

Additional Information continued on next page.

Additional Information:

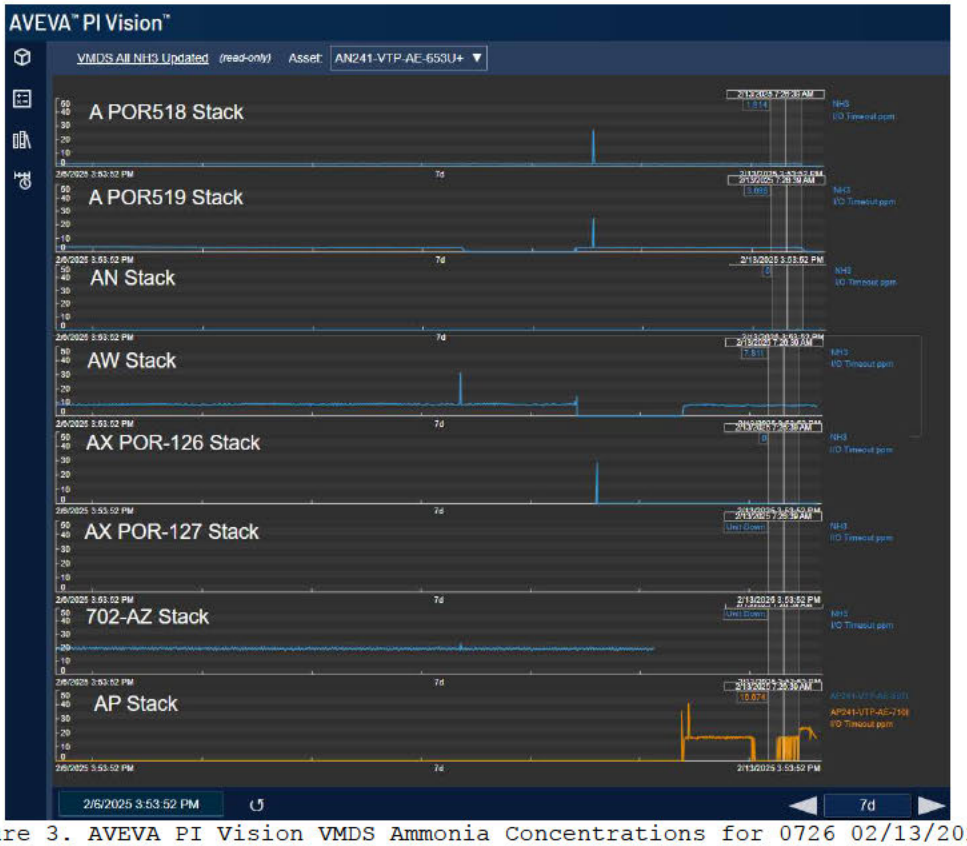


Figure 3. AVEVA PI Vision VMDS Ammonia Concentrations for 0726 02/13/2024.

Memo WRPS-1904672.1, TANK FARM EXHAUST STACK 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 STACK 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		

Additional Information continued on next page.

Additional Information:

Vapor Monitoring Detection System (VMDS) 02/06/2025 @ 0730 to 02/13/2025 @ 0730:

Tank Farm	Exhauster	Minimum*	Maximum*
241-A	POR518/POR519	0 ppm	27.101 ppm
241-AN	Primary	0 ppm	0 ppm
241-AW	Primary	0 ppm	31.632 ppm
241-AX	POR127	0 ppm	28.656 ppm
241-AY/AZ	702AZ	17.925 ppm	23.125 ppm

* VMDS Alternate Real Time Monitoring performed 02/06/2025 to 02/13/2025 for 241-AN and 241-AX. VMDS Alternate Real Time Monitoring performed 02/07/2025 to 02/12/2025 for 241-AP. VMDS Alternate Real Time Monitoring performed 02/06/2025, 02/011/2025, and 02/12/2025 for 241-A.

Maximum reading includes maintenance activities. Peaks on 02/10/2025 and 02/11/2025, see Figure 3, are indicative of VMDS routine maintenance verification checks. Further investigation including discussion with the applicable Maintenance Field Work Supervisors would be required to verify the peaks were caused by maintenance activities.

The 241-AP Primary Exhauster is not currently connected to the VMDS. Readings are acquired in accordance with TF-OPS-IHT-037 when Stack Monitoring for ammonia via the VMDS is unavailable. Stack readings are required once per calendar day in accordance with ARP-T-041-00002.

VMDS Alternate Monitoring 02/06/2025 to 02/13/2025:

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR 518/519	0 ppm	1 ppm
241-AN	Primary	7 ppm	41 ppm
241-AP	Primary	18 ppm	26 ppm
241-AX	POR 126/127	0 ppm	1 ppm

The event response DRI results were less than detectable in the Affected Area for ammonia and VOCs. These results along with the review of the atmospheric conditions (DFAS application, powered by SmartSite™, and those provided by On-Duty Forecaster) around the reported time of the event indicate the cause of the odor is unlikely to be from Tank Farm emissions.

Hydrogen Sulfide

Based on the odor descriptor "sulfur/rotten eggs", monitoring for hydrogen sulfide vapors was performed:

- The American Industrial Hygiene Association (AIHA) Odor Threshold for Chemicals with Established Health Standards, 2nd Edition, lists hydrogen sulfide with the odor character "rotten eggs".
- Refer to TOC-IH-58956 for more detail on the monitoring strategy for response to odors.

The Hanford Site Tank Operations Contractor, Washington River Protections Solutions, LLC (WRPS), Chemical Vapor Solutions Team (CVST) chartered a Fugitive Emissions (FE) sub-team. The primary focus of the FE workscope 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') the odor was described as sewer. Further away from septic system (within approximately 100') the odor was described as skunk. Even further away from septic system (within approximately 200') the odor was described as body odor. It should be noted that odors are a perception and can vary between individuals.

Additional Information continued on next page.

Additional Information:

The Affected Area has a long history of similar odors or odors that have been found to be associated with sources other than Tank Farm vapor source emissions, such as septic tank gaseous emissions which are known to change odor profile across a gradient when diluted by ambient atmosphere with distance from a point source. The initiating event was a stronger than normal odor which the worker described as "sulfur/rotten eggs". These odors are indicative of nearby septic related equipment. The closest septic equipment was a portable toilet, "blue room", located within the Affected Area, immediately north of several "horse trailers". The cleaning record in the portable toilet indicated it had been serviced sometime during the morning of 02/13/2025.

Hydrogen sulfide gas has an offensive distinct rotten egg odor that is detectable at very low concentrations. The lower range of odor values for hydrogen sulfide as 40 ppt (or 0.04 ppb or 0.00004 ppm). Ammonia gas has an offensive pungent, irritating odor that is detectable at very low concentrations. The lower range of odor values for ammonia as 43 ppb (or 0.043 ppm) (AIHA, 2013). While odors may be readily perceived, concentrations are still well below levels of worker exposure concern. Hydrogen sulfide, ammonia, and VOC gas production rate is a function of bacteria/organics concentrations, temperature, and dissolved oxygen.

The resolution of DRI equipped with hydrogen sulfide (0.1 ppm) and ammonia (1 ppm) sensors are comparatively inadequate as a detection tool at the concentrations perceived by the human olfactory sense. While the resolution of the DRI equipped with these sensors are insufficient to detect concentrations at the lower range of odor threshold values, they are sufficient to detect hydrogen sulfide and ammonia at concentrations that approach their established occupational exposure limits (OELs).

Limit Type	Concentrations		
	Hydrogen Sulfide	Ammonia	VOCs
Odor Response Action Limit	0.5 ppm	12 ppm	2 ppm
ACGIH 8-hour TWA-TLV	1 ppm	25 ppm	--
ACGIH 15-minute STEL-TLV	5 ppm	35 ppm	--
OSHA 8-hour TWA-PEL	--	50 ppm	--
OSHA Ceiling-PEL	20 ppm	--	--
OSHA 10-minute Peak-PEL*	50 ppm	--	--
NIOSH IDLH	100 ppm	300 ppm	--

*Allowed for 10-mintues if there is no other exposure to hydrogen sulfide during the shift

The event response DRI results were less than detectable in the Affected Area for hydrogen sulfide, ammonia, and VOCs. It is possible that recent portable restroom maintenance including pumping and standard cleaning chemicals were used within the Affected Area around the time of the event. Due to the proximity and wind direction, the portable restroom was a potential odor source.

Figures 4 and 5. Portable restroom within Affected Area and associated sanitization record.

Additional Information continued on next page.

Additional Information:

Another potential nearby source of hydrogen sulfide was a drainpipe approximately 200 ft northwest of the Affected Area. The drainpipe has the potential for standing water, and in the past a carcass was discovered and removed (circa 2016). The event response DRI results were less than detectable at the drainpipe for hydrogen sulfide, ammonia, and VOCs. The response team did not note any stronger than normal odors in the area of the drainpipe.

Figure 6. Drain Pipe.

Diesel Combustion

Several diesel heaters and generators were approximately 120 feet north of the Affected Area. Due to wind direction and location this was a potential odor source. However, diesel combustion type odors do not correspond with the reported odor and the response team did not observe unusual odors at the location, so it is unlikely that it is the source. The event response DRI results were less than detectable downwind of the generator for hydrogen sulfide and ammonia. VOC DRI result were 0.030 ppm, which is expected near a combustion source.

Figure 7. Diesel truck and generators.

241-AX-151

The 241-AX-151 Diverter Station, located approximately 300 feet north northwest of the Affected Area, was utilized for the Plutonium-Uranium Extraction Facility (PUREX) to send waste to the 244-AR Vault or 241-AY/AZ Tank Farms. 241-AX-151 was isolated in 1985, with the lines flushed and blanked, and weather protective foam applied. As of 2006, the catch tank contained approximately two-thousand-eight-hundred-thirty-eight (2,838) gallons of 241-AX Farm-like supernatant waste.

When outside air pressure changes, there is a small pressure imbalance between the headspace of a passively ventilated tank and the outside air. This imbalance pushes air into the tank or draws it out (barometric breathing). 241-AX-151 may have unsealed emission points that could result in odors through barometric breathing. At the approximate time of the event, the barometric pressure was decreasing. As the outside air pressure was decreasing at the time of the event, passively

(Additional Information continued on next page.)

Additional Information:

ventilated tanks push air out of the tank ("breathing-out"). Due to wind direction and decreasing barometric pressure AX-151 is a possible odor source. However, the odor description from the Affected Worker of "sulfur/rotten eggs" description is inconsistent with Tank Waste Chemical Vapors. The response team did not note any stronger than normal odors in the area of AX-151. The event response DRI results were less than detectable at AX-151 for hydrogen sulfide, ammonia, and VOCs.

- 241-AX-151 Reference Documents:
  - RPP-RPT-31102, Catch Tank 241-AX-151-CT Liquid Level Assessment Report
  - 200-IS-1 Scoping Summary: 241-AX-151
  - HNF-2503, Authorization Basis Status Report (Miscellaneous TWRS Facilities, Tanks and Components)
  - BHI-00179, PUREX Plant Aggregate Area Management Study Technical Baseline Report
  - Waste Information Data System General Summary Report 241-AX-151
  - PNL-MA-588, Resource Book - Decommissioning of Contaminated Facilities at Hanford (Waste Management Facilities)
  - H-2-71635, Piping, Enlarged Plan 241-A & 202-A Areas

Figure 8. 241-AX-151, view from South

References

- 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 (2013). Odor Thresholds for Chemicals with Established
- Health Standards, 2nd Edition.
- Silva, D.P. (2002). The chemical logic behind… Fermentation and Respiration. Retrieved from https://aggie-horticulture.tamu.edu/earthkind/landscape/dont-bag-it/chapter-1-the-decomposition-process/
- Texas A&M (2009). Earth-Kind Landscaping: Chapter 1, The Decomposition Process. Retrieved from https://web.archive.org/web/20080917123419/http://www2.ufp.pt/~pedros/bq/respi.htm

Additional Information Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
COPC	Chemical of Potential Concern
CVST	Chemical Vapor Solutions Team
DFAS	Data Fusion Advisory System
DRI	Direct Reading Instrument
eV	electron-volts
FE	Fugitive Emissions
mph	miles per hour
NIOSH	National Institute for Occupational Safety and Health
OEL	occupational exposure limit
OSHA	Occupational Safety & Health Administration
PEL	Permissible Exposure Limit
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PUREX	Plutonium-Uranium Extraction Facility
QRA	Quantitative Risk Assessment
STEL	short-term exposure limit
TLV	Threshold Limit Value
TWA	time-weighted average
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compound
WRPS	Washington River Protections Solutions, LLC

Recommendations/Conclusions:

Recommendations:
The Response Team noted the lack of physical barriers used for access restriction. SOEN verbal restriction may not reach all workers or adequately control an area. Use of physical barriers such as stanchions and caution tape or restricted access signs would provide better control.

Conclusions:
Direct Reading Instrumentation monitoring performed during response actions did not indicate further action was necessary to protect worker safety and health. As a result, the area was released from restricted access and work was allowed to continue. The review of the atmospheric conditions around the reported time of the event indicates the cause of the odor is unlikely to be from Tank Farm emissions. The atmospheric mixing height was 600 feet above grade, the atmospheric stability class indicated slightly stable conditions and the VMDS/VMDS Alternate Monitoring Ammonia concentrations were well below the high alarm set points. Therefore, the cause of the odor is unlikely to be from actively ventilated tanks. The barometric pressure trend was decreasing at the time of the event, so passively ventilated tanks would be pushing air out of the tank. Therefore, it is possible but unlikely that the cause of the odor is from passively ventilated tanks given the odor descriptor did not match Tank Waste Chemical Vapors. Several other known nearby upwind potential odor sources exist such as portable restrooms and diesel combustion. However, monitoring performed to support response actions did not readily identify a source.

Others:
N/A

Associated Documents:
iCAS Number: WRPS-AR-2025-1043 EIR Number: EIR-2025-029

Industrial Hygienist:
[redacted] [redacted]
Print First and Last Name *Signature / Date*

Industrial Hygiene Level 3 Manager
[redacted] [redacted]
Print First and Last Name *S*

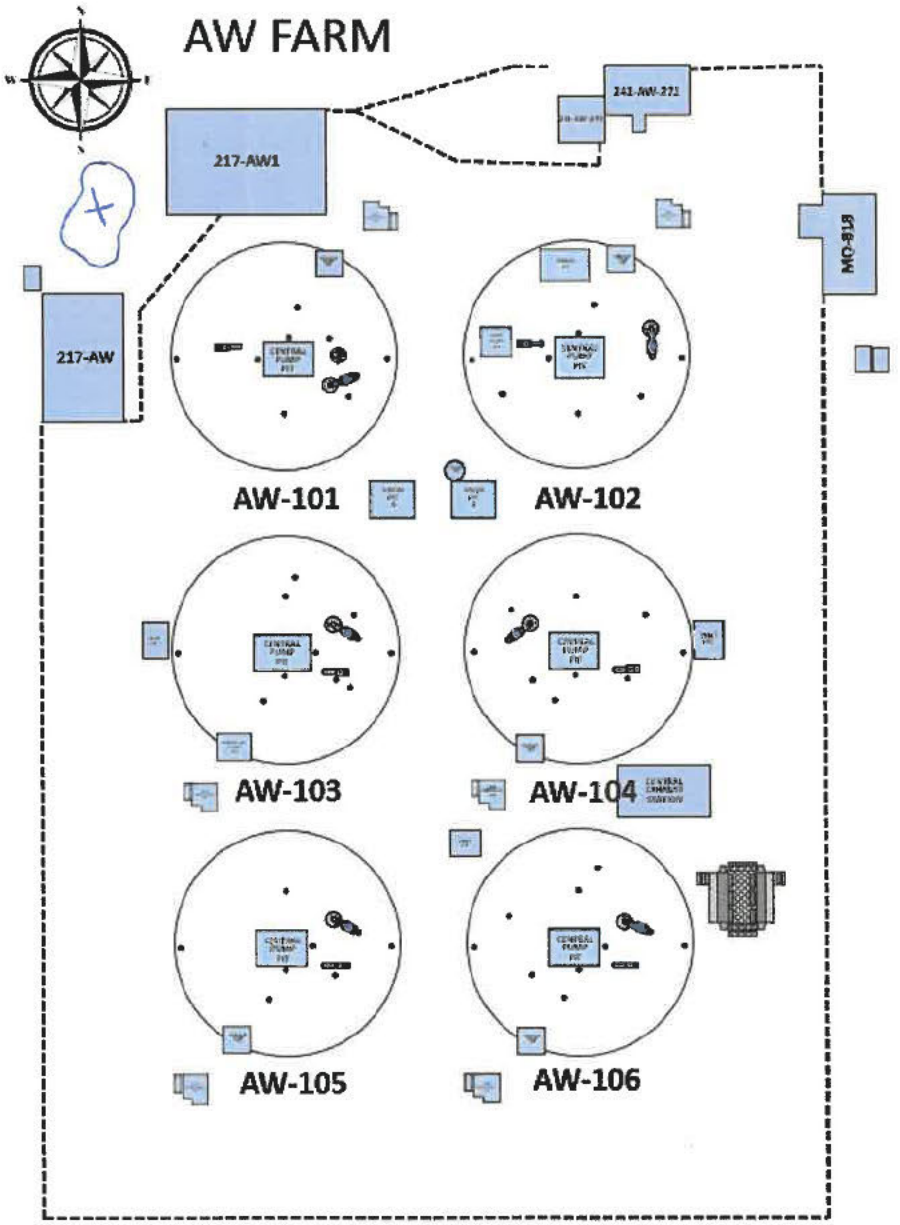
Industrial Hygiene Level 2 Manager:
[redacted] [redacted]
Print First and Last Name *S*

ODOR/VAPOR RESPONSE CARD - 241 AW 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 AW FARM

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

- Date and time of event: 02/13/2025
- Check Applicable:
  - ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] Sign Removal
- Other Work Underway? Describe: Sign removal off of horse trailer
- Location of event *(mark area on map and wind direction)*: 217AW1, West side
- Name(s) of others in or near the affected area: Just me
- Was Industrial Hygiene present, who? NO
- Describe the odor:
  - ☐ Sweet ☐ Sour ☐ Smoky ☐ Septic/Sewer ☐ Musty ☐ Rotten
  - ☐ Metallic ☐ Onion ☐ Earthy ☐ Ammonia ☐ Citrus ☐ Solvent
  - ☒ Other *(describe)*: Sulfur / rotten eggs
- Is source known/likely? Describe: unknown to me
- 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]