

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:** DFLAW/ETF Operations 2. **Report Date:** 07/29/2024

3. **Investigation Title:** C-67 Response Near MO-577 and 2715-AW

4. **Investigation Report Number:** EIR-2024-055

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

6. **Event Investigator:** [REDACTED] (under instruction of [REDACTED])
200 East Area/Outdoors near MO-577 and 2715-AW adjacent to

7. **Area / Building / Location:** refuse dumpster

8. **Date and Approximate Time of Event:** **Date:** 07/23/2024 **Time (military):** 0600 hours

9. **Associated Action Request (AR) Number:** WRPS-AR-2024-2348

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)*

A worker reported stronger than normal odors immediately adjacent to a dumpster when traversing outside near MO-577 and 2715-AW. Traversing between work locations is considered a Level 4 activity, therefore, procedures and/or work order numbers are not applicable.

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

1 WRPS Stationary Operating Engineer (SOE)

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

At approximately 0600 hours on July 23, 2024, one worker reported "propane-like" odors near a dumpster located between MO-577 and 2715-AW. The worker did not report experiencing any symptoms and declined a precautionary medical evaluation. At 0650 hours, the Central Shift Manager (CSM) issued a shift office event notification (SOEN) communication restricting access between MO-577 and 2715-AW.

TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*, was initiated. An Industrial Hygiene Technician (IHT) performed continuous monitoring using Direct Read Instrumentation (DRI) per IHSP-POE-MULTI-TFCOPSOPER67 and Industrial Hygiene (IH) direction for biodegradable odors including Ammonia (NH₃), Hydrogen Sulfide (H₂S), Sulfur Dioxide (SO₂), Volatile Organic Compounds (VOCs).

All IHT readings were less than detectable, reference Figure 1. Initially VOCs were detected at 0.060 ppm upon opening the dumpster, however quickly dissipated to less than detectable. At 0820 hours, the TFC-OPS-OPER-C-67 response actions were complete, and access was restored to the area.

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• DRI readings acquired during field response:				
Location	NH ₃	VOCs	H ₂ S	SO ₂
Downwind (North) of refuse dumpster	< 1 ppm	< 0.010 ppm	< 0.010 ppm	< 1 ppm
Around refuse dumpster inside of restricted access area	< 1 ppm	< 0.010 ppm	< 0.010 ppm	< 1 ppm
Source Readings from refuse dumpster access door	< 1 ppm	0.060 ppm*	< 0.010 ppm	0.1 ppm*
* Readings immediately dissipated				
Sampling/Monitoring Results Acronyms:				
DFLAW	Direct Feed Low Activity Waste			
H ₂ S	Hydrogen Sulfide			
NH ₃	Ammonia			
ppm	Parts Per Million			
SO ₂	Sulfur Dioxide			
VOCs	Volatile Organic Compounds			

Figure 1: Direct Reading Instrumentation readings acquired during field response

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

At the time odors were reported, the individual was wearing standard street clothing and in a work location that is not posted as a radiologically controlled area. The worker was not in an area requiring the use of respiratory protection or a personal ammonia monitor (e.g., VentisPro or ToxiRAE). Respiratory protection equipment was not prescribed for the initiating event response.

The Data Fusion and Advisory System (DFAS) application, powered by SmartSite™, was utilized for outdoor weather details at the time odors were reported, reference Attachment 1. The DFAS dashboard indicated the following weather conditions at 0600 hours on 07/23/2024.

- Wind Speed: 8.1 mph (15-minute average)
- Wind Direction: 265° (out of West)
- Mixing Height: 200 feet above grade
- Stability Class: E (Slightly stable conditions)

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

No impacts to facility safety status, operational capabilities, or facility reliability occurred.

Access was restricted to the area near MO-577 and 2715-AW for approximately 1.5 hours. No impacts to scheduled 07/23/2024 work activities occurred.

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

- The worker was offered a precautionary medical evaluation and declined.
- The CSM initiated TFC-OPS-OPER-C-67, *Response to Stronger than Normal Odors*, response actions for stronger than normal odors.
- Access was restricted to areas immediately around the refuse dumpster in-between MO-577 and 278-AW.
- The CSM made required TFC-OPS-OPER-C-67 notifications.
- IHT performed monitoring in and around the refuse dumpster per IHSP-POE-MULTI-TFCOOPSOPERC67.
- Event Investigation EIR-2024-046, *C-67 Response Near MO-577 and 2715-AW*, was initiated.

18. Compensatory Actions Taken:

None.

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19. Remedial Actions Taken:

None.

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

To summarize the conclusions of Industrial Hygiene Investigative Report (IHIR) IHIR-00100, "TFC-OPS-OPER-C-67, Response at Dumpster near MO577", investigation and DRI monitoring positively identified the odor source was resultant of garbage contained within the MO-577 refuse dumpster and was not indicative of Tank Vapor sources.

DRI monitoring of the identified odor source did not indicate additional action was necessary with regard to a worker safety and health occupational exposure standpoint, as readings were below action levels. As a result, the area was released from restricted access.

The following considerations support the IHIR-00100 conclusion:

- 1) Odors matching the descriptor provided by the affected employee were encountered by the TFC-OPS-OPER-C-67 field response team at a distance of approximately 30 ft. downwind of the MO-577 refuse dumpster. The odor profile then quickly changed to "garbage-like" when the TFC-OPS-OPER-C-67 field response team approached the MO-577 refuse dumpster.

Changes in the odor descriptor profile is typical of biological related odors due to the human olfactory senses having evolutionarily evolved for extreme sensitivity to indications of biotic decay chemistry. Because the odor source produced emissions of many different chemical constituents with wide variation is associated odor thresholds, the resulting concentration gradient (through dilution) results in a change in odor profile from most chemicals with low odor thresholds at the location of initial odor detection to the full mixture of odorous chemicals at the odor source.

- 2) The DFAS weather details dashboard provides an Exhauster Potential Exposure Zone (PEZ) Model of exhaust plumes at the reported time of the event based on wind speed, wind direction, mixing height, and atmospheric stability class (Refer to Attachment 1). Evaluation of the weather details dashboard determined the cause of the odor source is unlikely to be resultant of Tank Farm Exhauster emissions based on the atmospheric stability at the time of the event being slightly stable conditions and the mixing height 200 feet above grade.
- 3) Quantitative Risk Assessment (QRA) modeling indicates MO-577 would not be within potential tank vapor exposure zones in either a waste disturbing or non-waste disturbing farm status during passive or active ventilation in AN-farm, AY/AZ-farm, AX-farm, A-farm, AW-farm, or AP-farm. Therefore, providing additional indication the source of the odor is highly improbable to be resultant of Tank Farm emissions.
- 4) While the odor descriptors provided by the worker were inconsistent with Tank Vapors, due to the location odors were reported being in proximity to the Tank Farms, monitoring for Tank Waste Chemical Vapors was still conducted during the TFC-OPS-OPER-C-67 response.
- 5) Because nitric acid was utilized in nearly all production processes that generated tank waste, and the most common by-product of those processes was reduction of nitrate ion to ammonia during the dissolution (oxidation) of irradiated fuel, ammonia is the most prevalent chemical of potential concern (COPC) found in all tanks. Therefore, ammonia is utilized as a sentinel indicator for Tank Waste Chemical Vapor COPCs and DRIs equipped with an ammonia sensor are utilized at a minimum when monitoring for tank waste chemical vapors/COPCs. Monitoring for VOCs utilizing DRIs equipped with 10.6 eV

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photoionization detectors provides further indication for Tank Waste Chemical Vapors/COPCs.

Investigative TFC-OPS-OPER-C-67 DRI area monitoring was performed in the general areas around and downwind of the MO-577 refuse dumpster. Investigative TFC-OPS-OPER-C-67 DRI area monitoring indicated less than detectable concentrations for ammonia (< 1 ppm) and VOCs (<0.010 ppm), which are below anticipated background levels. Therefore, providing further indication the cause of the reported odors was unlikely to be resultant of Tank Farm exhauster emissions.

Although investigative TFC-OPS-OPER-C-67 DRI source monitoring (obtained from the MO-577 refuse dumpster access door) indicated detectable concentrations for ammonia (0.60 ppm), concentrations quickly dissipated to below anticipated background levels.

- 6) Further DRI monitoring for H₂S and SO₂ was conducted during the TFC-OPS-OPER-C-67 response based on the "propane" odor descriptor provided by the affected employee. Investigative TFC-OPS-OPER-C-67 DRI area monitoring indicated less than detectable concentrations for H₂S (< 0.01 ppm) and SO₂ (< 1.0 ppm), which are below anticipated background levels.

Although investigative TFC-OPS-OPER-C-67 DRI source monitoring (obtained from the MO-577 refuse dumpster access door) momentarily indicated detectable concentrations at the action level for SO₂ (0.1 ppm), concentrations quickly dissipated to below anticipated background levels.

The Occupational Safety and Health Administration (OSHA) has an established SO₂ 8-hour TWA-PEL at 5 ppm and the American Conference of Governmental Industrial Hygienists (ACGIH) (2016) has established a 15-minute Short-Term Exposure Limit (STEL) for SO₂ at 0.25 ppm. Therefore, the acquired readings did not exceed the AL as compared to published OELs. Additionally, because sulfur dioxide readings acquired at the source were below applicable OELs it is unlikely that inadvertent worker exposure to SO₂ would exceed STEL or TWA OELs during normal refuse dumpster use activities, or other work activities typically occurring in the surrounding area.

- 7) Memo WRPS-1904672.1, "TANK FARM EXHAUST STACK CONCENTRATION ALARM/ACTION LEVELS FOR AMMONIA" establishes ammonia concentration stack alarm/action set points for tank farm exhausters based on the predicated ammonia concentration at unspecified ground receptors utilizing the Quantitative Risk Assessment (QRA) model. The exhauster high level alarm was established at concentrations where the predicted ground receptor ammonia concentration of 2.5 ppm (or 10% of the established Occupational Exposure Limit for ammonia) could be observed.

The exhauster high level alarm conservatively established for A Complex (excluding A farm) is 460 ppm. According to the Vapor Monitoring and Detection System (VMDS), the ammonia concentration observed at the time of event occurrence was 12.375 ppm at the 241-AW exhauster, 0 ppm at the POR-126 exhauster, 0 ppm at the POR-127, and 0.518 ppm at the 241-AP exhauster. The AN exhauster and 702-AZ exhauster VMDS ammonia readings were not reporting at the time of event occurrence; therefore, alternate readings were acquired once per calendar day in accordance with TF-OPS-IHT-037. The highest ammonia concentrations observed between 07/16/2024 and 07/23/2024 was 8 ppm at the 702-AZ exhauster and 22 ppm at the AN Exhauster. Conservatively utilizing the higher ammonia concentration observed in the AN exhauster, a predicted ground receptor ammonia concentration of 0.112 ppm (or 0.47% of the established Occupational Exposure Limit for ammonia) would be expected if AN, AY/AZ, AX, or AW farm exhauster emissions were present.

The exhauster high level alarm conservatively established for A farm is 160 ppm. According to the VMDS, the ammonia concentration observed at the time of

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event occurrence was 1.217 ppm at the POR-518 exhauster and 3.556 ppm at the POR-519 exhauster. Thus, a predicted ground receptor ammonia concentration of 0.055 ppm (or 0.22% of the established Occupational Exposure Limit for ammonia) would be expected if A tank farm exhauster emissions were present.

Therefore, providing additional indication the reported odor was unlikely to be resultant of Tank Farms exhauster emissions.

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:

None.

23. Event Investigation:

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

Responsible Manager Approval:

Name (First, Middle Initial, Last)

Digitally signed by _____
Date: 2024.07.29 16:53:29 -07'00'

Signature / Date

CAS Manager Approval:

Name (First, Middle Initial, Last)

Digitally signed by _____
Date: 2024.07.29 16:42:20 -07'00'

Signature / Date

Attachment 1-DFAS Exhauster Potential Exposure Zones and Reported Odor Location



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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR)

Event Title:		IHIR Number:
TFC-OPS-OPER-C-67 Response at dumpster near MO577.		IHIR-00100
		IHEI Number:
		N/A

Date:	Time:	Location:
07/23/2024	0600	Refuse dumpster in-between MO577, MO2350, and 2715AW.

Event Summary and Timeline:

Event Summary:

At approximately 0600 on July 23rd 2024, 1 worker reported “propane-like” odors immediately adjacent to the refuse dumpster in-between MO577, MO2350, and 2715AW. No symptoms were reported, and the employee declined precautionary medical evaluation.

Field Response Timeline:

0618 Central Shift Manager (CSM) contacts Production Operations East (POE) Industrial Hygienist (IH) 1 requesting support for odor related field response actions.

0618 POE IH 1 contacts Shift Industrial Hygiene Technician (IHT) Supervisor to notify that C-67 imminent.

0619 POE IH 1 contacts acting POE Health and Safety Manager to notify that C067 is imminent.

0621 POE IH 1 arrives @ Central Shift Office (CSO) and is briefed of event:

- “Propane-like” odor associated with refuse dumpster.
- No symptoms
- Affected worker in-route to CSO to populate Odor/Vapor Response Card (O/VRC)

0624 Affected worker provides O/VRC

0627 POE IH 1 informs CSM of current weather conditions from Data Fusion Advisory System (DFAS):

- Stability Class E (slightly stable conditions)
- Wind speed 8.1 mph from 265 degrees (West)
- Mixing height 200 ft above grade

0630 POE Shift IHT Supervisor arrives at CSO

0631 POE IH 1 informs CSM of Vapor Monitoring Detection System (VMDS) Ammonia (NH₃) readings @ 0600 07/23/2024:

- POR-518 – 1.217 ppm
- POR-519 – 3.556 ppm
- AN VTP - N/A
- AW VTP - 12.375 ppm
- POR-126 - 0 ppm
- POR-127 - 0 ppm
- 702-AZ VTP – N/A
- AP VTP – 0.518 ppm

0632 POE IH 1 consults TOC-IH-58956 to determine field response actions for biodegradation odors, requests NH₃, Volatile Organic Compounds (VOCs) via 10.6 electron volt (eV) photo ionization detector (PID), Hydrogen Sulfide (H₂S), and Sulfur Dioxide SO₂ Direct Reading Instrumentation (DRI) be prepped for field response actions.

0638 POE Shift IHT Supervisor contacts Retrieval Closure (R&C) IHT Supervisor to request DRI instrumentation.

0644 POE Shift IHT Supervisor notifies Environmental, Safety, Health and Quality (ESH&Q) management of event.

0650 SOEN: “Responding per TFC-OPS-OPER-C-67 for stronger than normal odors reported between MO-577 and 2715-AW. Access restriction in place in between MO-577 and 2715-AW. CSM”

0650 POE IH 1 contacts Hanford Meteorological Station to request additional weather information at time of event.

0650 CSM attempts to contact Issues Management (IM) manager to assign Event Investigation Number (EIR) and Point of Contact (POC).

0652 CSM notifies Department of Energy (DOE) Facility Representative of TFC-OPS-OPER-C-67 response and details.

0702 POE IH contacts IH Records to request Industrial Hygiene Investigation Report (IHIR) number.

0703 POE IH 2 arrives at CSO to support response.

0707 POE IH 1 and CSM sign TFC-OPS-OPER-C-67 Attachment A “Response Plan” Page 1 of 2.

0708 POE Shift IHT arrives at CSO with DRI requested DRIs and is briefed of field response actions:

- Perform monitoring as per IHSP-POE-MULTI-TFCOPSOPERC67:
 - NH₃ – Action Limit 12 ppm
 - VOCs (10.6 eV PID) – Action Limit 2 ppm
 - H₂S – Action Limit 0.5 ppm
 - SO₂ – Action Limit 0.1 ppm
- Respiratory Protection Equipment (RPE) – voluntary use
- Monitor in and around restricted access area and refuse dumpster.

NOTE: Field Response Timeline continued on next page:

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Event Summary and Timeline:

Field Response Timeline continued:

0709 POE Shift IHT, POE Shift IHT Supervisor and POE IH 1 (Field Response Team) depart CSO to event scene.
0710 Field Response Team arrives at event scene. POE IH 1 notes "garbage" odors extending approximately 30 ft. downwind (North) from refuse dumpster. All DRI readings are non-detectable.
0711 Field Response Team enters restricted access area. All DRI readings are non-detect.
0712 POE IH 1 slowly opens refuse dumpster access port on West side of refuse dumpster. Source readings indicate NH₃ and H₂S are less than detectable, VOC at 0.060 ppm, and SO₂ at 0.1 ppm. VOC and SO₂ readings immediately dissipate to less than detectable. "Garbage" odors are very strong.
0714 Field Response Team returns to CSO, POE Shift IHT departs to perform post-use-function test on DRIs.
0748 POE Shift IHT contacts POE IH 1 to notify that DRIs passed post-use-function test.
0750 POE IH 1 and CSM sign TFC-OPS-OPER-C-67 Attachment A "Response Plan" Page 2 of 2.
0820 SOEN: "OPER-C-67 response near MO-577 and 2715-AW is complete. IHT monitoring results are at or below background levels, access to the area has been restored. CSM"

Field Response Timeline Acronyms:

CSM	Central Shift Manager
CSO	Central Shift Office
DFAS	Data Fusion & Advisory System
DOE	Department of Energy
DRI	direct reading instrument
ESH&Q	Environmental, Safety, Health, & Quality
eV	electron-volts
H ₂ S	Hydrogen Sulfide
IH	Industrial Hygienist
IHIR	Industrial Hygiene Investigation Report
IHT	Industrial Hygiene Technician
IM	Issues Management Organization
mph	miles per hour
NH ₃	Ammonia
OVRC	Odor/Vapor Response Card
PID	photoionization detector
POC	Point of Contact
POE	Production Operations-East
ppm	parts per million
S&H	Safety & Health
SO ₂	Sulfur Dioxide
SOEN	Shift Office Event Notification
SWIHD	Site Wide Industrial Hygiene Database
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compound

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- Response Team approached affected area downwind (North) until odor was identified and surveyed area around refuse dumpster, then slowly opened dumpster access door (West side of dumpster).

- DRI readings acquired during field response:

Location	NH ₃	VOCs	H ₂ S	SO ₂
Downwind (North) of refuse dumpster	< 1 ppm	< 0.010 ppm	< 0.010 ppm	< 1 ppm
Around refuse dumpster inside of restricted access area	< 1 ppm	< 0.010 ppm	< 0.010 ppm	< 1 ppm
Source Readings from refuse dumpster access door	< 1 ppm	0.060 ppm*	< 0.010 ppm	0.1 ppm*

* Readings immediately dissipated

Sampling/Monitoring Results Acronyms:

DFLAW	Direct Feed Low Activity Waste
H ₂ S	Hydrogen Sulfide
NH ₃	Ammonia
ppm	Parts Per Million
SO ₂	Sulfur Dioxide
VOCs	Volatile Organic Compounds

SWIHD References:

Event Response Site Wide Industrial Hygiene Database DRI Survey:

- # 24-05601 "TFC-OPS-OPER-C-67 field response at MO577 dumpster"

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.

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 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.

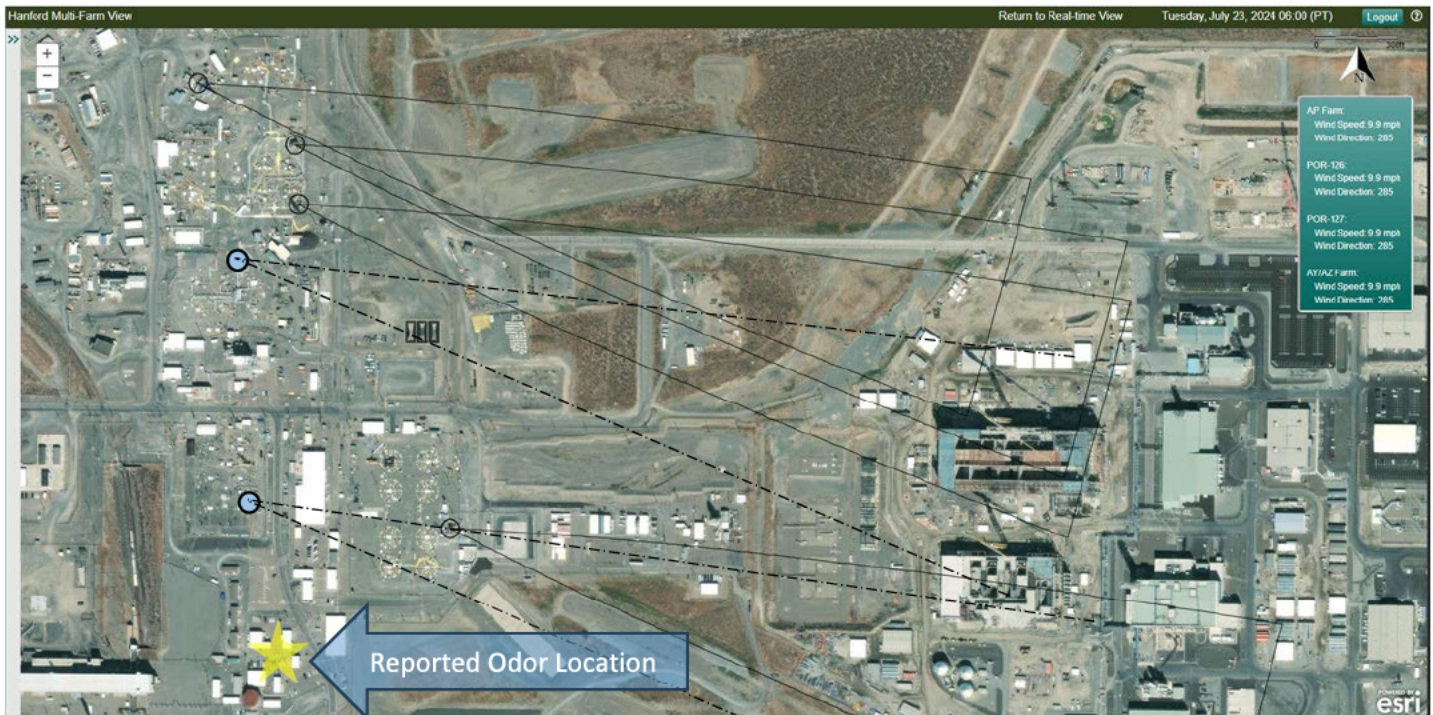
Note: Additional Information continued on next page

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information:

Additional Information continued:

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



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

07/23/2024 @ 0600 (approximate time of initiating event):

- Wind Speed: 8.6 mph (15-minute average)
- Wind Direction: 265° (out of West)
- Mixing Height: 200 feet above grade
- Stability Class: E (slightly stable conditions)

Review of the DFAS application, powered by SmartSite™, dashboard for current conditions during response actions, per TFC-OPS-OPER-C-67 4.2.8:

07/23/2024 @ 0710 (current weather data for Response actions):

- Wind Speed: 7.5 mph (15-minute average)
- Wind Direction: 239° (out of Southwest)
- Mixing Height: 200 feet above grade
- Stability Class: E (Slightly Stable conditions)

Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 07/23/2024 @ 0600:

- POR518 (241-A): 1.217 ppm
- POR519 (241-A): 3.556 ppm
- 241-AN: N/A
- 241-AW: 12.375 ppm
- POR126 (241-AX): 0.000 ppm
- POR127 (241-AX): 0.000 ppm
- 702AZ (241-AY/AZ): N/A
- 241-AP: 0.518 ppm

Note: Additional Information continued on next page

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information:

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) 07/16/2024 @ 0600 to 07/23/2024 @ 0600:

Tank Farm	Exhauster	Minimum**A	Maximum**A
241-A	POR518/POR519	0 ppm	8.562 ppm
241-AN	Primary	N/A	N/A
241-AW	Primary	0 ppm	29.049 ppm
241-AX	POR126/POR127	0 ppm	0 ppm
241-AY/AZ	702AZ	N/A	7.391 ppm
241-AP	Primary	0.132 ppm	17.210 ppm

**A VMDS Alternate Real Time Monitoring performed 07/16/2024 to 07/23/2024 for 241-A (POR518/POR519), 241-AN, 241-AW, 241-AY/AZ, and 241-SY.

The 241-SY Primary Exhauster is not currently connected to the VMDS software. 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.

Vapor Monitoring Detection System (VMDS) Alternate Monitoring 07/16/2024 to 07/23/2024:

Tank Farm	Exhauster	Minimum	Maximum
241-A	POR518/POR519	N/A	N/A
241-AN	Primary	16 ppm	22 ppm
241-AP	Primary	N/A	N/A
241-AW	Primary	3 ppm	4 ppm
241-AX	POR126/POR127	N/A	N/A
241-AY/AZ	702AZ	6 ppm	8 ppm
241-SY	Primary	22 ppm	34 ppm

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.

Note: Additional Information continued on next page

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INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT (IHIR) (Continued)

Additional Information:

Additional Information continued:

Monitoring Selections Based on Information Provided by Affected Workers:

The affected employee reported that the odor was “propane-like” and associated with the MO577 refuse dumpster. DRI monitoring selections were based on biological degradation of organic matter. Based on the odor descriptors provided upon submission of the Odor/Vapor Response Cards DRI monitoring for Hydrogen Sulfide and Sulfur Dioxide was selected in accordance with TOC-IH-58956 “Monitoring Strategy for Response to Odors”:

Environmental Chemical Vapors- Biodegradation:

- Environmental odors are largely the result of natural decay of organic material through biological decomposition. The biological decomposition process produces a great number of odors from decomposition of organic material into simpler intermediate chemical compounds which can be reintroduced into the environment in the form of solids (particulates), liquids (volatile organic compounds such as alcohols, organic acids), and gases (hydrogen sulfide, sulfur dioxide, ammonia, methane). Secondly, odors can arise from products such as chemical communication between decomposition involved biota (pheromones) and reproductive processes (spores) (Silva, 2002; Texas A&M, 2009).

The main constituents to monitor for when the suspected source of an odor event is environmental chemical vapors are ammonia and hydrogen sulfide. Ammonia and hydrogen sulfide biodegradation byproducts that generate malodors. Therefore, when monitoring for environmental chemical vapors, DRI equipped with an ammonia sensor and a hydrogen sulfide sensor should be utilized at a minimum. Additional environmental chemical vapors with DRI monitoring capabilities readily available at the Tank Farms include methane and sulfur dioxide.

See TOC-IH-58956 “Monitoring Strategy for Response to Odors” for more information related to odor monitoring strategy.

Odor Sources Identified:

Unlike the majority of TFC-OPS-OPER-C-67 odor response evolutions where the secondary objective of the field response is to identify and confirm one or more odor sources, during this evolution the odor source was positively identified by the affected worker as the MO577 dumpster. As directed by the Central Shift Manager the field response team responded to the previously identified odor source to perform the primary objective of TFC-OPS-OPER-C-67 responses; to determine if any additional actions are necessary to prevent inadvertent worker exposure to chemical constituents above applicable occupational exposure limits.

Odors matching the descriptor provided by the affected employee were encountered by the field response team at a distance of approximately 30 ft. downwind of the odor source. When approaching the odor source the odor descriptor quickly changed to “garbage-like”. This is typical of biological related odors as the human (and most mammalian) olfactory senses have been evolutionarily selected for extreme sensitivity to indications of biotic decay chemistry. Specifically decay products resulting from anaerobic digestion which often utilize electron acceptors from sources other than oxygen gas. These acceptors can be the organic material itself or may be supplied by inorganic oxides from within the input material. When the oxygen source in an anaerobic system is derived from the organic material itself, the 'intermediate' end products are primarily alcohols, aldehydes, and organic acids, plus carbon dioxide. In the presence of specialized methanogens, the intermediates are converted to the 'final' end products of methane, carbon dioxide, and trace levels of hydrogen sulfide which can be secondarily oxidized (upon release from the substrate to atmosphere) to sulfur dioxide. Because the odor source produced emissions of many different chemical constituents with wide variation is associated odor thresholds, the resulting concentration gradient (through dilution) results in a change in odor profile from mostly chemicals with low odor thresholds at the location of initial odor detection to the full mixture of odorous chemicals at the odor source.

During the field response actions DRI readings acquired at the odor source (via controlled release by slow and partial opening of a refuse dumpster access port door) momentarily met the action limit for Sulfur Dioxide (0.1 ppm), however, this reading quickly dissipated to less than detectable readings. The OSHA (2017) has established the sulfur dioxide 8-hour TWA-PEL at 5 ppm. The ACGIH (2016) has not established a Sulfur dioxide 8-hour TWA-TLV; however, has established a 15-minute Short-Term Exposure Limit (STEL) at 0.25 ppm. Due to the sulfur dioxide electrochemical sensor resolution (0.1 ppm) utilized in the current multi-gas monitor, the sulfur dioxide AL is conservatively rounded down from 0.125 ppm and set at 0.1 ppm for area DRI readings. Therefore, the acquired readings did not exceed the AL as compared to published OELs. Additionally, because sulfur dioxide readings acquired at the source were below applicable OELs it is unlikely that inadvertent worker exposure to Sulfur Dioxide would exceed STEL or TWA OELs during normal refuse dumpster use activities, or other work activities typically occurring in the surrounding area.

Note: Additional Information continued on next page

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

Additional Information:

Additional Information continued:



MO577 Refuse Dumpster.

Additional Information Acronyms:

DFAS	Data Fusion & Advisory System
DRI	direct reading instrument
eV	electron-volts
OVRC	Odor/Vapor Response Card
PEL	Permissible Exposure Limit
PID	photoionization detector
ppm	parts per million
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weighted Average
VMDS	Vapor Monitoring Detection System
VOC	Volatile Organic Compounds

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.
- 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
- 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.

Recommendations/Conclusions:**Recommendations:**

N/A

Conclusions:

As Direct Reading Instrumentation monitoring of identified odor source did not indicate further action was necessary to protect worker safety and health, the area was released from restricted access and work was allowed to continue.

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 exhaust ammonia readings for the approximate time of the Event, the cause of the odor is unlikely to be from Tank Farm Exhauster emissions. The atmospheric stability at the time of the event was stable conditions and the mixing height was 400 feet above grade.

Others:

N/A

Associated Documents:

iCAS Number: N/A

EIR Number: EIR 2024-055

Industrial Hygienist:*Print First and Last Name**Signature / Date*Digitally signed by 
Date: 2024.07.23 12:50:35 -07'00'**Industrial Hygiene Level 3 Manager***Print First and Last Name**Signature / Date*Digitally signed by 
Date: 2024.07.23 12:47:02 -07'00'**Industrial Hygiene Level 2 Manager:***Print First and Last Name**Signature / Date*Digitally signed by 
Date: 2024.07.24 07:20:42 -07'00'

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 5-7-23-24 0500-0600
- Check Applicable:
☒ Odor ☐ Ammonia Alarm (6 ppm) ☐ Ammonia Alarm (12 ppm) ☐ Alarm (other - describe): _____
- Your name and the work you were performing:
[REDACTED] walking between building
- Other Work Underway? Describe:
N/A
- Location of event (mark area on map and wind direction):
MOS 77 & Warehouse
- Name(s) of others in or near the affected area:
N/A
- 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: Propane 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.

ODOR/VAPOR RESPONSE CARD

Instructions:

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM),
at [REDACTED]
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.