TOC-WP-24-0370
Revision 0

C-67 Event Investigation Reports (Redacted) EIR 2023-054 C-67 (07/24/2023)

(Settlement Agreement Deliverable)

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-08RV14800

P.O. Box 850
Richland, Washington 99352

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C-67 Event Investigation Reports (Redacted) EIR 2023-054 C-67 (07/24/2023)

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R. Cortez
Washington River Protection Solutions

Date Published
January 2024

WRPS

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APPROVED
By Lynn M Ayers at 11:48 am, Jan 16, 2024

Release Approval Date

Approved for Public Release;
Further Dissemination Unlimited

Washington River Protection Solutions

EVENT SUMMARY

Check PART 1 box to hide that section of the form. Check PART 2 box it will show that section.

☐ **PART 1 *(hide)**** ☒ **PART 2 *(show)****

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:*

Project: Production Operations Date: 07/24/2023

Area/Building/Location: 200E/MO-2522 Approximate Time of Event: 0801 Hours

AR Number: WRPS-AR-2023-2030 Responsible Manager: [redacted]

EIR Number: EIR-2023-054 Event Investigator: [redacted]

EVENT SUMMARY PART 1

Activity in Progress *(What activity was under way, include procedures and work order numbers, as applicable)*:

2 Nuclear Chemical Operators from the the Environmental Surveillance organization were performing laundry restock at MO-2522 which is considered skill of the craft work activities.

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

- 2 Nuclear Chemical Operators (NCOs)

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

On 07/24/2023, at approximately 0801 hours, 2 NCOs reported stronger than normal "sulfur" like odors while performing laundry restock at MO-2522. The two NCOs indicated they had symptoms (1 with a minor headache and 1 with cleared sinuses)on their Odor/Vapor Response Card.

At approximately 0805 hours, the Environmental Surveillance Supervisor transported the 2 NCOs to the onsite medical provider

At approximately 0910 hours, the 2 NCOs were released to return to work without restriction after their evaluation from the onsite medical provider.

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

MO-2522 (Field Shower Trailer - East of Grout Drive)

NCOs were wearing standard street clothes (which is considered Level D PPE) and were in a work location that is not posted as a radiological controlled area. Workers were performing work activities that do not require use of respiratory protection or a personal ammonia monitor (e.g., ToxiRAE or VentisPro).

The Hanford Site Meteorological Station #6 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 0801 hours on 7/24/2023:

. Wind Speed: 8.9 miles per hour (mph)
. Wind Direction: 280 ° (out of West)
. Mixing Height: 1,400 feet above grade
. Stability Class: D (neutral conditions)
. Temperature: 73 ° F
. Barometric Pressure: 29.11 inches Hg
. Humidity: 38%

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

Access was restricted to MO-2522.

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EVENT SUMMARY (Continued)

Project: Production Operations | Date: 07/24/2023

Area/Building/Location: 200E/MO-2522 | Approximate Time of Event: 0801 Hours

AR Number: WRPS-AR-2023-2030 | Responsible Manager: [redacted]

EIR Number: EIR-2023-054 | Event Investigator: [redacted]

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

- The Environmental Surveillance Supervisor transported the 2 NCOs to the onsite medical provider.
- Central Shift Manager (CSM) initiated TFC-OPS-OPER-C-67, restricted access to MO-2522, and issued SOEN.
- Production Operations Industrial Hygienist and CSM reviewed the DFAS data and determined no additional access restrictions were required.
- CSM made required TFC-OPS-OPER-C-67 notifications.
- Production Operations Shift Industrial Hygiene Technician (IHT) initiated TFC-OPS-OPER-C-67 response actions and monitoring per IHSP-POE-MULTI-TFCOPSOPERC67. The Production Operations Shift IHT reported direct-reading instrument (DRI) readings were below action levels at MO-2522.
- The showers were ran for a few minutes to fill any potentially dried out P-traps and the sulfur smell seemed to dissipate.
- Event Investigation EIR-2023-007 ""C-67 Odor Response at MO-2522" was initiated.

Notifications Already Made *(Time and personnel notified)*:

[0801 hours] - The CSM entered TFC-OPS-OPER-C-67 and contacted DFLAW Area Day Manager to restrict access at MO-2522. CSM contacted Production Operations Industrial Hygienist for assistance.
[0808 hours] - The CSM provided radio announcement and issued SOEN, "Responding per OPER-C-67 at MO-2522 in Grout Loop. Access to MO-2522 is restricted." CSM contacted the on-call DOE Facility Representative and informed them of TFC-OPS-OPER-C-67 event initiation.
[0822 hours] - CSM provided TFC-OPS-OPER-C-67, Attachment B - Initial Communication Summary email to distribution list "DL - WRPS Odor/Vapor Event Notification."
[0910 hours] - Environmental Surveillance Supervisor reported to CSM that the 2 NCOs were released from the onsite medical provider to return to work with no restrictions. CSM notified Workers Compensation, Production Operations Manager and on-call DOE Facility Representative of workers being released to return to work with no restrictions.
[0915 hours] CSM exited TFC-OPS-OPER-C-67 and issued SOEN, "OPER-C-67 response at MO-2522 is complete. IHT readings were at or below background levels. Access restored to MO-2522."
[0928 hours]- CSM provided TFC-OPS-OPER-C-67, Attachment C - Follow-up Event Summary to email to distribution list "DL - WRPS Odor/Vapor Event Notification".

☐ This event does not merit an Event Investigation meeting

☒ This event merits an Event Investigation meeting

Basis for Determination:

Information gathered from interviews and documentation reviews have provided sufficient information regarding this event.

Responsible Manager:

[redacted] — *Print First and Last Name*

[redacted] Digitally signed by [redacted] Date: 2023.07.25 06:55:17 -07'00' — *Signature / Date*

CAS Manager:

[redacted] — *Print First and Last Name*

[redacted] — *Signature / Date*

EVENT SUMMARY PART 2

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

Correction to the Event Summary Part 1 information includes the following:
- This event does not merit an Event Investigation meeting.

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EVENT SUMMARY (Continued)

Project: Production Operations Date: 07/24/2023

Area/Building/Location: 200E/MO-2522 Approximate Time of Event: 0801 Hours

AR Number: WRPS-AR-2023-2030 Responsible Manager: [redacted]

EIR Number: EIR-2023-054 Event Investigator: [redacted]

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

To summarize the conclusions of IHIR-00077, "TFC-OPS-OPER-C-67 Response MO2522," the source of the reported odors was determined to likely be resultant of the plumbing P-trap being dried-out in the MO-2522 shower drains. Direct reading instrument (DRI) monitoring performed during odor investigation and TFC-OPS-OPER-C-67 response actions did not indicate further action was necessary with regard to a worker safety and health occupational exposure limit standpoint. As a result, the area was released from restricted access.

The following considerations support the IHIR-00077 conclusion:

(1) IH Personnel performing TFC-OPS-OPER-C-67 response actions noted strong odors within the south side of MO-2522 that were described as being similar to "backed-up sewer". The location odors were noted and the odor descriptors were consistent with the information provided by the Affected Workers'. After running the showers to flush water down the drains, the noted odors rapidly dissipated. Therefore, providing indication the P-trap in drainage piping likely dried out.

(2) 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 "sulfur" odor, which is indicative of nearby septic related equipment. The closest sewer system (2607-E10 Septic Tank) is located ~100' upwind of the Affected Area, of which the MO-2522 shower drains are connected. Therefore, this further supports the conclusion that the cause of the odors is likely to be from septic tank gaseous emissions from the shower drains located inside the MO-2522 Shower Trailer due to dried-out P-traps.

(3) The "sulfur" odor descriptors provided by Affected Workers are consistent with stagnant water/ dried-out P-traps in drainage piping of the MO-2522 showers. Low levels of hydrogen sulfide gas (consistent with Affected Workers' odor description), ammonia, and various VOCs are a function of bacteria/organics concentrations, temperature, and dissolved oxygen and may be produced by stagnant water and/or from a dried-out P-trap in drainage piping.

While transient odors may be readily perceived, concentrations are still well below levels of worker exposure concern. Investigative TFC-OPS-OPER-C-67 DRI monitoring conducted within the general areas of MO-2522 and source readings from the shower drains indicated less than detectable concentrations for ammonia (< 1 ppm), VOCs (0.010 ppm), and hydrogen sulfide (<0.1 ppm).

(4) DRI monitoring for hydrogen sulfide was conducted during the TFC-OPS-OPER-C-67 response based on the "sulfur" odor descriptor provided by the Affected Workers. Investigative TFC-OPS-OPER-C-67 DRI monitoring indicated hydrogen sulfide concentrations of <0.1 ppm.

The resolution of DRI equipped with a hydrogen sulfide sensor (0.1 ppm) is comparatively inadequate as a detection tool at the concentrations perceived by the human olfactory senses. Hydrogen sulfide gas has an offensive distinct rotten egg odor that is perceived by the human olfactory sense at very low concentrations, with the lower range odor threshold value being 0.00004 ppm. While the resolution of the DRI is insufficient to detect concentration at the lower range of the odor threshold value, they are sufficient to detect hydrogen sulfide at concentrations below their established action level and occupational exposure limit (OEL).

(5) Evaluation of the weather details determined the cause of the odor source was unlikely to be resultant of Tank Farms exhauster emissions based on the wind direction, wind speed, mixing height, and stability class.

(6) 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 still conducted during the TFC-OPS-OPER-C-67 response.

Project: Production Operations | Date: 07/24/2023

Area/Building/Location: 200E/MO-2522 | Approximate Time of Event: 0801 Hours

AR Number: WRPS-AR-2023-2030 | Responsible Manager: [redacted]

EIR Number: EIR-2023-054 | Event Investigator: [redacted]

Because nitric acid was utilized in nearly all production processes that generated tank waste, and the most common byproduct 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, thus direct reading instruments (DRIs) equipped with an ammonia sensor are utilized at a minimum when monitoring for tank waste chemical vapors/COPCs. Monitoring for VOCs utilizing a DRI equipped 10.6 eV photoionization detector provides further indication for Tank Waste Chemical Vapors/COPCs.

Investigative TFCOPSOPER-C-67 DRI monitoring indicated less than detectable concentrations for ammonia (<1 ppm) and VOCs (<0.010 ppm) utilizing a DRI equipped 10.6 eV photoionization detector. Providing further indication the odor source was unlikely to be resultant of Tank Farms exhauster emissions.

(7) The Tank Farm Exhauster's ammonia concentrations were significantly less than the high level alarm set point at the time odors were reported. 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 28.341 ppm at the 241-AN exhauster, 0 ppm at the 241-AW exhauster, 7.870 ppm at the POR-126 exhauster, 9.578 ppm at the POR-127 exhauster and 30.724 ppm at the 702-AZ exhauster. The AP exhauster is not currently connected to VMDS, therefore, readings are acquired once per calendar day in accordance with TF-OPS-IHT-037 when ammonia stack monitoring via VMDS is unavailable. The highest ammonia concentrations observed between 06/13/2023 and 06/19/2023 was 9 ppm at the AP exhauster. Conservatively utilizing the highest ammonia concentration observed in the 241-AW exhauster, a predicted ground receptor ammonia concentration of 0.167 ppm (or 0.668% of the established Occupational Exposure Limit for ammonia) would be expected if AY/AZ, AN, AW, AP, or AX tank farm exhauster emissions were present.

The exhauster high level alarm conservatively established for A Farm is 160 ppm. According to VMDS, the ammonia concentration observed at the time of event occurrence was 2.539 ppm at the POR-518 exhauster, 1.400 ppm at the POR-519 exhauster. Conservatively utilizing the ammonia concentration observed in the POR-518 Exhauster, a predicted ground receptor ammonia concentration of 0.040 ppm (or 0.159% of the established Occupational Exposure Limit for ammonia) would be expected if A tank farm exhauster emissions were present.

The predicated ammonia concentrations at unspecified ground receptors provides further justification the odor source was unlikely to be resultant of Tank Farms exhauster emissions.

(8) While MO-2522 is located within the area of the Grout Treatment Facility (GTF), the cause of the odors is unlikely to be resultant from the GTF. The GTF Waste Information Data System (WIDS) General Summary Report indicates the GTF ditch was backfilled and stabilized. In addition, the leachate that was stored at GTF and the excess water from the vaults and flush solutions was transferred back to the Double Shell Tank (DST) System. The dry materials (from the Dry Materials Receiving and Handling Facility) were trucked to the Transportable Grout Equipment, where the dry blend was mixed with liquid additives and aqueous waste to form a cementitious slurry. The slurry was pumped to a below grade vault located in the GTF Landfill, where it hardened.

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EVENT SUMMARY (Continued)

Project: Production Operations Date: 07/24/2023

Area/Building/Location: 200E/MO-2522 Approximate Time of Event: 0801 Hours

AR Number: WRPS-AR-2023-2030 Responsible Manager: [redacted]

EIR Number: EIR-2023-054 Event Investigator: [redacted]

Additional Compensatory/Remedial Measures *(any additional measures taken if different from immediate actions)*:

None.

Lessons Learned or Information That the Work Force Needs Immediately:

None. Per TFC-OPS-OPER-C-28, "Operating Experience/Lessons Learned", this event did not meet the criteria requiring generation of a Lessons Learned.

☐ 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

Basis for Determination:

This event does not require continuation of the event investigation process under TFC-OPS-OPERC-14, "Event Investigation Process." The facts, findings, and comprehensive account captured under this Event Summary and the Industrial Hygiene Event Investigation Report, IHIR-00077, "TFC-OPS-OPER-C-67 Response MO2522," form the basis that further investigation will provide no additional information or operational benefit.

Responsible Manager:

[redacted] [redacted]

Print First and Last Name *Signature / Date*

CAS Manager:

[redacted] [redacted]

Print First and Last Name *Signature / Date*

Washington River Protection Solutions

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT

Event Title:	PER Number:
TFC-OPS-OPER-C-67 Response MO2522	N/A
	IHIR Number: IHIR-00077

Date:	Time:	Location:
07/24/2023	0750	MO2522 [Wet Grout Loop Men's Change Room (Shower Trailer)]

Event Summary and Timeline:

Event Summary:
At approximately 0750 on 7/24/2023 two Nuclear Chemical Operators (NCOs) encountered a stronger than normal "sulfur" odor inside of MO2522 while restocking laundry. Symptoms of "temporary minor headache" and "clearing of stuffy nose" were reported. Both Affected Workers were sent for precautionary medical surveillance.

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).

0800 Affected Workers arrive at CSO to notify Central Shift Manger (CSM) of stronger than normal odors and symptoms
- CSM sends Affected Workers for precautionary medical surveillance and requests Odor/Vapor Response Cards

0803 CSM notifies Production Operations-East (POE) Industrial Hygienist (IH)-1 of stronger than normal odors and TFC-OPS-OPER-C-67 response

0803 POE IH-1 notifies POE IH-2 and Level POE Level 3 Safety & Health (S&H) Manager of stronger than normal odors and TFC-OPS-OPER-C-67 response

0803 POE IH-2 notifies POE Shift Industrial Hygiene Technician (IHT) Supervisor of stronger than normal odors and TFC-OPS-OPER-C-67 response

0804 POE IHs arrive at CSO

0805 CSM updates POE IHs on stronger than normal odors:
- Odor Descriptor: "Sulfur"
- MO2522 (shower trailer in Wet Grout Loop)
- Two Affected Workers
- Both NCOs performing laundry activities
- Both reported symptoms
  - o "Stuffy nose cleared up"
  - o "Minor headache that cleared up after exiting MO2522"
- Affected Workers in route for precautionary medical surveillance

0805 POE IH-2 requests POE Shift IHT Supervisor have Direct Reading Instrumentation (DRI) equipped with a Hydrogen Sulfide sensor prepared

0806 POE IHs check Data Fusion Advisory System (DFAS), powered Smart Site™, for current weather details:
- Wind Speed: 7.6 mph
- Wind Direction: 261° (out of West)
- Mixing Height: 1400 feet above grade
- Stability Class: D (neutral conditions)

0807 POE IHs check Vapor Monitoring Detection System (VMDS) exhauster ammonia readings (current):
- POR518 (241-A): 2.605 ppm
- POR519 (241-A): 1.391 ppm
- 241-AN: 28.958 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 7.956 ppm
- POR127 (241-AX): 9.596 ppm
- 702AZ (241-AY/AZ): 24.770 ppm
- 241-AP: N/A

All available readings << High Alarm set point

Field Response Timeline continued on next page.

Event Summary and Timeline:

Field Response Timeline (continued):

0809 POE IHs check Site Wide Industrial Hygiene Database (SWIHD) for VMDS Alternate Monitoring ammonia readings:
- 241-AP 07/23/2023 @ 1917: 5 ppm
- 241-AW 07/23/2023 @ 1925: 6 ppm
- 702AZ (241-AY/AZ) 07/23/2023 @ 1932: 38 ppm

All readings << High Alarm set point

0809 CSM notifies Department of Energy (DOE) Facility Representative (Fac. Rep.) of stronger than normal odors and TFC-OPS-OPER-C-67 response

0810 Shift Office Event Notification (SOEN): "Responding per OPER-C-67 at MO-2522 in Grout Loop. Access to MO-2522 is restricted. CSM"

0812 POE Shift IHT Supervisor confirms requested DRI sensors with POE IH-2:
- POE Shift IHT Supervisor → POE IH-2: Hydrogen Sulfide, Ammonia, Volatile Organic Compounds (VOC) 10.6 eV photoionization detector (PID)?
- POE IH-2 → POE Shift IHT Supervisor: Correct

0812 POE Level 3 S&H Manager updates Level 1 Environmental, Safety, Health, & Quality (ESH&Q) Manager and Level 2 IH Manager on TFC-OPS-OPER-C-67 response:
- Two Affected Workers with symptoms, sent for precautionary medical surveillance
  - Headache, nose
- "Sulfur"
- MO2522 Shower Trailer down at Wet Grout Loop
- Affected Workers performing laundry activities

0814 POE Level 3 S&H Manager updates Level 1 ESH&Q Manager and Level 2 IH Manager on TFC-OPS-OPER-C-67 response:
- One Affected Worker had a "stuffy nose that cleared up as they entered" MO2522

0814 POE IH-1 and CSM discuss Respiratory Protection Equipment (RPE) requirements for response:
- None required, Voluntary Use

0815 POE Level 3 S&H Manager updates Level 1 ESH&Q Manager and Level 2 IH Manager on TFC-OPS-OPER-C-67 response:
- POE Shift IHT preparing instruments for Hydrogen Sulfide monitoring of drains
- Additionally, Ammonia and VOCs will be monitored

0815 POE Shift IHT Supervisor arrives at CSO

0819 POE IH-2 requests POE Shift IHT Supervisor have grab air sample equipment prepared

0823 POE Shift IHT Supervisor requests POE Shift IHT prepare grab air sample equipment

0824 POE IHs check VMDS exhauster ammonia readings for approximate time of Initiating Event (07/24/2023 @ 0750):
- POR518 (241-A): 2.539 ppm
- POR519 (241-A): 1.400 ppm
- 241-AN: 28.341 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 7.870
- POR127 (241-AX): 9.578 ppm
- 702AZ (241-AY/AZ): 30.724 ppm
- 241-AP: N/A

All available readings << High Alarm set point

0827 POE Shift IHT arrives at CSO

0828 CSM and POE IH-2 sign TFC-OPS-OPER-C-67 Attachment A Sheet 1 of 2, Response Plan

0828 POE IH-1 provides POE Shift IHT and POE IH In-Training briefing for response:
- Monitor per IHSP-POE-MULTI-TFCOPSOPERC67:
  - DRI equipped with the following sensors:
    - Hydrogen Sulfide
    - Ammonia
    - VOC 10.6 eV PID
  - Survey around the floor drains/p-traps
  - Survey general area inside MO2522
- Respiratory Protection Equipment not required, Voluntary Use
- POE IH-2 shows PopFon map of MO2522 location
- POE IH-2 will accompany POE Shift IHT for Response Actions

Field Response Timeline continued on next page.

Field Response Timeline (continued):

0830 POE Shift IHT departs CSO
0830 POE IH-2 submits request to Hanford Meteorological Station to obtain weather information for Station #6 at 0750 on 07/24/2023
0831 POE IH-2 submits request to IH Records to obtain an IH Event Investigation Report (IHIR) number
0831 Responding POE IH (POE IH-2) and POE IH In-Training depart CSO to meet up with POE Shift IHT for Response Actions
0834 CSM contacts Performance Assurance (PA) to obtain PA Point-of-Contact
- PA assigns PA Technical Specialist

0834 POE IH-1 asks CSM for Event Investigation Report (EIR) number
- EIR #2023-054

0838 POE IH-2 updates POE Level 3 S&H Manager and POE IH-1:
- At Affected Area
- South side of MO2522 smells fairly strong of "backed up sewer"

0842 POE IH-2 updates POE Level 3 S&H Manager and POE IH-1:
- Checking North side of MO2522
- Odor not encountered on North side of MO2522

0844 POE IH-2 updates POE Level 3 S&H Manager and POE IH-1:
- Running showers to flush water down drains
- Heating, ventilation, air conditioning (HVAC) running on both sides of MO2522

0845 POE IH-2 updates POE Level 3 S&H Manager and POE IH-1:
- Odor rapidly dissipating with showers running

0846 POE IH-1 updates POE IH-2 and POE Level 3 S&H Manager:
- CSM would like doors to MO2522 opened to air-out facility

0846 PA Technical Specialist requests CSM provide update on Affected Workers
- CSM → PA Technical Specialist:
  - Both Day Shift NCOs
  - Restocking laundry

0850 POE IH-2 updates POE Level 3 S&H Manager and POE IH-1:
- Doors were left ajar during Response Actions

0851 Responding POE IH (POE IH-2) returns to CSO
- POE Shift IHT in route to perform Post-Use Function Test
- All reading less than detection limits
  - Hydrogen Sulfide- Less than detectable (< 0.1 ppm)
  - Ammonia- Less than detectable (< 1 ppm)
  - VOCs- Less than detectable (< 0.010 ppm)

0903 POE Shift IHT informs POE IH-1 that DRI have passed the post-use function test
0905 CSM updates Production Operations (PO) Level 1 Operations Manager on stronger than normal odors and TFC-OPS-OPER-C-67 response:
- Odor Descriptor: "Sulfur"
- MO2522 (shower trailer in Wet Grout Loop)
- Two Affected Workers
- Both NCOs performing laundry activities
- Both reported symptoms
  - "Stuffy nose cleared up"
  - "Minor headache that cleared up after exiting MO2522"
- Affected Workers sent for precautionary medical surveillance
- Odor encountered during Response Actions
  - Odors dissipated after running showers, most likely source dried-out p-trap
- IHT has completed monitoring and DRI passed post-use function test
  - All readings were at or below background

0910 IH Records provides POE IHs IHIR number: IHIR-00077
0911 CSM and POE IH-2 sign TFC-OPS-OPER-C-67 Attachment A Sheet 2 of 2, Response Plan
0912 CSM notified Affected Workers were released without restriction
- CSM requests Affected Workers populate Odor/Vapor Response Cards

0913 CSM updates PO Level 1 Operations Manager on Affected Workers:
- Affected Workers were released without restriction

0914 CSM attempts to update DOE Fac. Rep.
0934 SOEN: "OPER-C-67 response at MO-2522 is complete. IHT readings were at or below background levels. Access restored to MO-2522. CSM"

Field Response Timeline continued on next page.

Field Response Timeline (continued):

Field Response Timeline Acronyms:

CSM	Central Shift Manager	NCO	Nuclear Chemical Operator
CSO	Central Shift Office	PA	Performance Assurance
DFAS	Data Fusion Advisory System	PID	photoionization detector
DOE	Department of Energy	PO	Production Operations
DRI	direct reading instrument	POE	Production Operations-East
EIR	Event Investigation Number	ppm	parts per million
ESH&Q	Environmental, Safety, Health, & Quality	RPE	Respiratory Protection Equipment
eV	electron-volts	S&H	Safety & Health
HVAC	heating, ventilation, air conditioning	SOEN	Shift Office Event Notification
IH	Industrial Hygienist	SWIHD	Site Wide Industrial Hygiene Database
IHIR	Industrial Hygiene Event Investigation Report	VMDS	Vapor Monitoring Detection System
IHT	Industrial Hygiene Technician	VOC	Volatile Organic Compound
mph	miles per hour		

Sampling/Monitoring Results:

Direct Reading Instrument Monitoring Results:

- Monitoring performed in and around Affected Area
  - Comments by Responding POE IH- "MO2522 is split into separate North and South shower units. North contains 1 shower and a small 'locker room' area, no toilets or sinks. Souths contains 3 showers and a small 'locker room' area, no toilets or sinks". "Fairly strong odor of 'backed up sewer', matching the provided odor descriptors, was present in South side [of] MO2522 during field response actions." "No distinguishable odor encountered during response action in the North side of MO2522." "Doors to facility were left ajar during response actions, triggering HVAC cycle." "After initial monitoring, ran all showers and odor dissipated."
  - Comments by Responding IHT- "IHT performed continuous monitoring for [ammonia, hydrogen sulfide, and VOCs] at MO2522 for TFC-OPS-OPER-C-67 from approx. 0835 to 0846. Readings were taken while monitoring our way in and in the general area of the trailer. Upon entering the shower trailer it had a smell of sewage similar to what you would experience at home if you had a unused bathroom for prolonged periods of time. Along with general area readings there was also source readings taken at the floor drains in the shower stalls."
- Peak readings during response at or below background.

Location	Ammonia	VOCs	Hydrogen Sulfide
MO2522 South Side General Area	< 1 ppm	< 0.010 ppm	< 0.1 ppm
MO2522 South Side Shower Drains	< 1 ppm	< 0.010 ppm	< 0.1 ppm
MO2522 North Side General Area	< 1 ppm	< 0.010 ppm	< 0.1 ppm
MO2522 North Side Shower Drains	< 1 ppm	< 0.010 ppm	< 0.1 ppm

Refer to IHIR-00077 Attachment A for SmartSite™ Summary, Response Map, and Response Pictures.

SWIHD References:

Event Response Site Wide Industrial Hygiene Database Direct Reading Instrumentation (DRI) Survey:
- # 23-04798 "TFC-OPS-OPER-C-67 Response MO2522"

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.

Additional Information continued on next page.

Additional Information:

07/24/2023
1040 Affected Workers' Odor/Vapor Response Cards submitted to CSM and POE IHs for review
- Odor/Vapor Response Cards consistent with verbal account provided to CSM

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.

Review of the DFAS application, powered by SmartSite™, Weather Details dashboard for the approximate time of the Event:

07/24/2023 @ 0745 (weather data for 5 minutes prior to approximate time of Initiating Event):
- Wind Speed: 7.6 mph
- Wind Direction: 260.50° (out of West)
- Mixing Height: 1400 feet above grade
- Stability Class: D (neutral conditions)

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

07/24/2023 @ 0806 (current weather data for Response actions):
- Wind Speed: 7.6 mph
- Wind Direction: 261° (out of West)
- Mixing Height: 1400 feet above grade
- Stability Class: D (neutral conditions)

Meteorological information from the Hanford Weather Station for Station #6 on 07/24/2023 @ 0750:
- Temperature: 80°F
- Relative Humidity: 28.3%
- Wind Speed: 15 mph
- Wind Direction: from West
- Barometric Pressure: 29.20 inches of mercury and decreasing

Additional Information continued on next page.

Additional Information (continued):

Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 07/24/2023 @ 0750:
- POR518 (241-A): 2.539 ppm
- POR519 (241-A): 1.400 ppm
- 241-AN: 28.341 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 7.870
- POR127 (241-AX): 9.578 ppm
- 702AZ (241-AY/AZ): 30.724 ppm
- 241-AP: N/A

Vapor Monitoring Detection System (VMDS) exhauster ammonia readings on 07/24/2023 @ 0807:
- POR518 (241-A): 2.605 ppm
- POR519 (241-A): 1.391 ppm
- 241-AN: 28.958 ppm
- 241-AW: 0 ppm
- POR126 (241-AX): 7.956 ppm
- POR127 (241-AX): 9.596 ppm
- 702AZ (241-AY/AZ): 24.770 ppm
- 241-AP: N/A

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		

Vapor Monitoring Detection System (VMDS) 07/17/2023 @ 1424 to 07/24/2023 @ 1424:

Tank Farm	Exhauster	Minimum*A	Maximum*A
241-A	POR518/POR519	0 ppm	10.879 ppm
241-AN	Primary	-1.709 ppm	50.828 ppm
241-AW	Primary	0 ppm	0 ppm
241-AX	POR127	0 ppm	304.969 ppm*B
241-AY/AZ	702AZ	14.445 ppm	37.667 ppm

*A VMDS Alternate Real Time Monitoring performed 07/17/2023 to 07/23/2023 for 241-AP, 241-AW, and 702AZ (241-AY/AZ).
*B Readings above 50% of 241-AX Farm High Alarm Set Point (> 230 ppm) and below 241-AX Farm High Alarm Set Point (< 460 ppm) occurred on 07/18 from approximately 1126 to 1531 and on 07/19 from approximately 1037 to 1425. Based on SOENs, AX101 Recirculation was in-progress.
  - SOEN 07/18 @ 0727- "AX101 Recirculation has begun. AZ ADM"
  - SOEN 07/18 @ 1427- "AX101 Recirculation has been secured. AZ ADM"
  - SOEN 07/19 @ 0800- "AX101 Recirculation has begun. AZ ADM"
  - SOEN 07/19 @ 1246- "AX101 Recirculation has been secured. AZ ADM"

Additional Information continued on next page.

Additional Information (continued):

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.

Vapor Monitoring Detection System (VMDS) Alternate Monitoring 06/13/2023 to 06/19/2023:

Tank Farm	Exhauster	Minimum	Maximum
241-AP	Primary	5 ppm	9 ppm
241-AW	Primary	6 ppm	8 ppm
241-AY/AZ	702AZ	21 ppm	46 ppm

Based on the odor descriptor "sulfur", 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.

MO2522 NI Narrative, Original Inspection Date 04/2013-

The MO2522 unit was constructed in 2008, installed in 2010, and is 360 gross square feet in size. The unit was previously installed at 200W and has recently [prior to 04/2013] been relocated at the grout facility at the east end of the 200E. The unit has electric, water, sewer, and the HVAC is provided by a Bard wall mounted heat pump on the south end. Building access is provided by two personnel doors on the west side with one door on the east side of the unit. The structure provides shower and locker space for site contractor personnel.

Reference
MO2522 NI Narrative. Retrieved from http://idmsweb/idms/livelink.exe?func=ll&objId=200302917&objAction=Open&nexturl=%2Fidms%2Flivelink%2Eexe%3Ffunc%3Dsrch%2ESearchCache%26cacheId%3D1918826341&logStopConditionID=12955727_1231004005_5_open

Grout Treatment Facility (GTF) Waste Information Data System (WIDS) General Summary Report-

The GTF included the Transportable Grout Equipment from the 241-AP-102 tank. The feed line is WIDS sitecode 200-E-308-PL. The fenced area, previously known as the Grout Treatment Facility has been transitioned to the construction contractor that will build the new Waste Treatment Facility (vitrification plant). The head end of the 216-A-29 ditch was located within this fenced area. The ditch was backfilled and stabilized.

The technology and process operation of the GTF was demonstrated from August 1988 through July 1989 with the treatment of 3,785,400 liters (1,000,000 gallons) of radioactive, non-dangerous waste. Processing of this waste generated leachate that was a corrosive mixed waste. The leachate was stored at GTF and later transferred back to the Double Shell Tank (DST) System.

The GTF was put on long term standby and the project was later canceled. The feed transfer system was disconnected from the 241-AP-102 Tank. The High Efficiency Particulate Air (HEPA) filters were removed from the Liquid Collection Tank/Mixer Module (Transportable Grout Equipment) ventilation system. This reduced the level of contamination in the facility. A failed mixer pump in Tank 241-AP-102 was removed in 1995. The Grout Treatment Facility was to be used as an emergency option in the event that tank space is not available to resolve tank safety issues. During operations, the waste was stored in Tank 241-AP-104 and pumped to the Grout Feed Tank 241-AP-102 . The dry materials (from the Dry Materials Receiving and Handling Facility) were trucked to the Transportable Grout Equipment. The Transportable Grout Equipment mixed the dry blend with liquid additives and aqueous waste to form a cementitious slurry. The slurry was pumped to a below grade vault located in the Grout Treatment Facility Landfill, where it hardened. Excess water from the vaults and flush solutions from the Transportable Grout Equipment were pumped to feed Tank 241-AP-102 or other tanks in the tank farms.

Additional Information continued on next page.

Additional Information (continued):

GTF WIDS General Summary Report (continued)-

Reference
WIDS. Grout Treatment Facility- General Summary Report. Retrieved from [redacted]idms/livelink.exe/fetch/2000/18814/1081672/227793668/300922911/300982835/156482318/-/01_WIDS_Summary_Sheet.pdf?nodeid=156482325&vernum=-2

Additional information about odor conditions around Tank Farm facilities-

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 be 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 "sulfur" odor. Sulfur odors are indicative of nearby septic related equipment. The closest sewer system located upwind of the Affected Area, and connected to the Affected Area's drains, is the 2607-E10 Septic Tank system (~100' upwind).

2607-E10 Septic System-

Water to MO2522 was tied in to the existing line currently feeding the restrooms in MO-041. Sewer was tied in down stream from MO-041 to the existing system flowing to drain field 2607-E10.

The 2607-E10 Septic Tank system consists of two tanks and two drain fields. It receives sanitary wastewater and sewage. The drain fields associated with this system has a design capacity of 1,298 gallons (4,900 liters) per day and an estimated rate of 665 gallons (2,500 liters) per day. This unit lies north of the 216-A-37-1 Crib and east of the 241-AP Tank Farm, in the area known as the Grout Treatment Facility. The 2607-E10 Septic Tank is associated with a drain field, the Grout Trailer, MO-392, MO-041, MO-282, MO-283, MO-284, MO-997 and MO-243-G4.

As of 10/06/2021, the 2607-E10 Septic Tank system was an active, permitted system that was scheduled to be abandoned in the year 2023. Document 51506-39-SUB-096-001 states MSA removed pumps, piping, valves, pipe stands, electrical wires, grouted plug openings, removed structure to 2 ft. below grade and filled with Controlled Density Fill (CDF) in 2020. One existing tank was left in place for emergency storage.

References
WIDS. 2607-E10; 2607-E10 Septic System- General Summary Report. Retrieved from [redacted]/idms/livelink.exe/fetch/2000/18814/1081672/227793668/300922911/300982835/158692742/-/01_WIDS_Summary_Sheet.pdf?nodeid=158692749&vernum=-2
WRPS-NVC-12-007. Relocate Shower Facility to Wet Grout Area. Retrieved from [redacted]/idms/livelink.exe/fetch/2000/18814/1081672/60849/154706650/154709122/165711107/-/WRPS-NVC-12-007_Relocate_Shower_Facility_MO-2522_to_Wet_Grout_Area_Grout_Drive_-_DOE_CX-00059.pdf?nodeid=167252060&vernum=-2

Additional Information continued on next page.

Additional Information (continued):

Stagnant Water/Dried-Out P-Trap Odors-

Transient odors are associated with stagnant water. Additionally, transient odors are an anticipated occurrence when a p-trap in drainage piping dries out. Low levels of hydrogen sulfide gas (consistent with Affected Workers' odor description), ammonia, and various VOCs may be produced by the stagnant water and/or from a dried-out p-trap. While odors may be readily perceived, concentrations are still well below levels of worker exposure concern.

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).

		Concentrations	
Limit Type	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

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

The event response DRI results were less than detectable in the Affected Area for ammonia, hydrogen sulfide, and VOCs. These results along with the review of the atmospheric conditions (DFAS application, powered by SmartSite™, and those provided by On-Duty Forecaster) outside of Affected Area around the reported time of the event indicate the cause of the odor is unlikely to be from Tank Farm emissions. The Atmospheric Stability Class at 0745 was neutral conditions. The Atmospheric Mixing Height was steady at 1400 feet above grade.

Additional Information continued on next page.

Additional Information (continued):

At the approximate time of the event, the Barometric Pressure was decreasing. When the 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). As the outside air pressure was decreasing at the time of the event, passively ventilated tanks, such as septic tanks, pushes air out of the tank ("breathing-out"). Therefore, the cause of the odors is likely to be from septic tank gaseous emissions, via barometric breathing and/or dried-out p-traps, from the shower drains located inside the MO2522 Shower Trailer. This observation is further supported by the dissipation of odors after flushing water down the shower drains, ensuring their associated p-traps had sufficient water.

Refer to IHIR-00077 Attachment A for SmartSite™ Summary, Response Map, and Response Pictures.

Additional Information Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienist		
ADM	Area Dayshift Manager	OSHA	Occupational Safety & Health Administration
AIHA	American Industrial Hygiene Association	PEL	Permissible Exposure Limit
COPC	Chemical of Potential Concern	PID	photoionization detector
CVST	Chemical Vapor Solutions Team	ppb	parts per billion
DFAS	Data Fusion Advisory System	ppm	parts per million
DRI	Direct Reading Instrument	ppt	parts per trillion
DST	Double Shell Tank	QRA	Quantitative Risk Assessment
eV	electron-volts	SOEN	Shift Office Event Notification
FE	Fugitive Emissions	STEL	short-term exposure limit
GTF	Grout Treatment Facility	TLV	Threshold Limit Value
HEPA	High Efficiency Particulate Air	TWA	time-weighted average
HVAC	heating, ventilation, air conditioning	VMDS	Vapor Monitoring Detection System
mph	miles per hour	VOC	Volatile Organic Compound
OEL	occupational exposure limit	WIDS	Waste Information Data System

Recommendations/Conclusions:

Recommendations: Evaluate the need for a routine to prevent p-traps from drying out.

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. Odor descriptors provided by Affected Workers are consistent with stagnant water/dried-out p-traps associated with MO2522 shower drains. The odor was also perceived by Responding Personnel upon entry into the Affected Area. The odor dissipated after water was flushed down the shower drains, ensuring their associated p-traps had sufficient water. Although known nearby sources exist, monitoring performed to support response actions did not readily identify a source, as readings indicated that further response action was not necessary. Based on observations during Response Actions, the source of the odors is the MO2522 shower drains.

Other:

- Both Affected Workers reported symptoms and were sent for precautionary medical surveillance.
- Event Investigation Report (EIR) #2023-054.

Industrial Hygienist:

[redacted] *Print First and Last Name*

[redacted] Digitally signed by [redacted] Date: 2023.07.24 18:53:36 -07'00' *Signature / Date*

Industrial Hygiene Level 2 Manager:

[redacted] *Print First and Last Name*

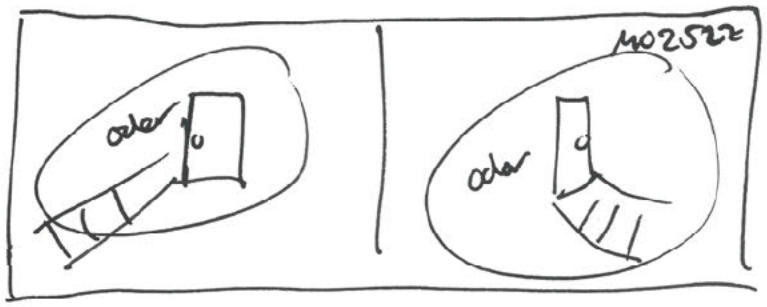
[redacted] Digitally signed by [redacted] Date: 2023.07.25 05:12:15 -07'00' *Signature / Date*

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.



[redacted]

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 7/24/2023 8:00am
- Check Applicable:
  ☒ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*: _____
- Your name and the work you were performing: [redacted] Laundry
- Other Work Underway? Describe: no
- Location of event *(mark area on map and wind direction)*: MO 2522
- 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)*: sulfur
- 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.

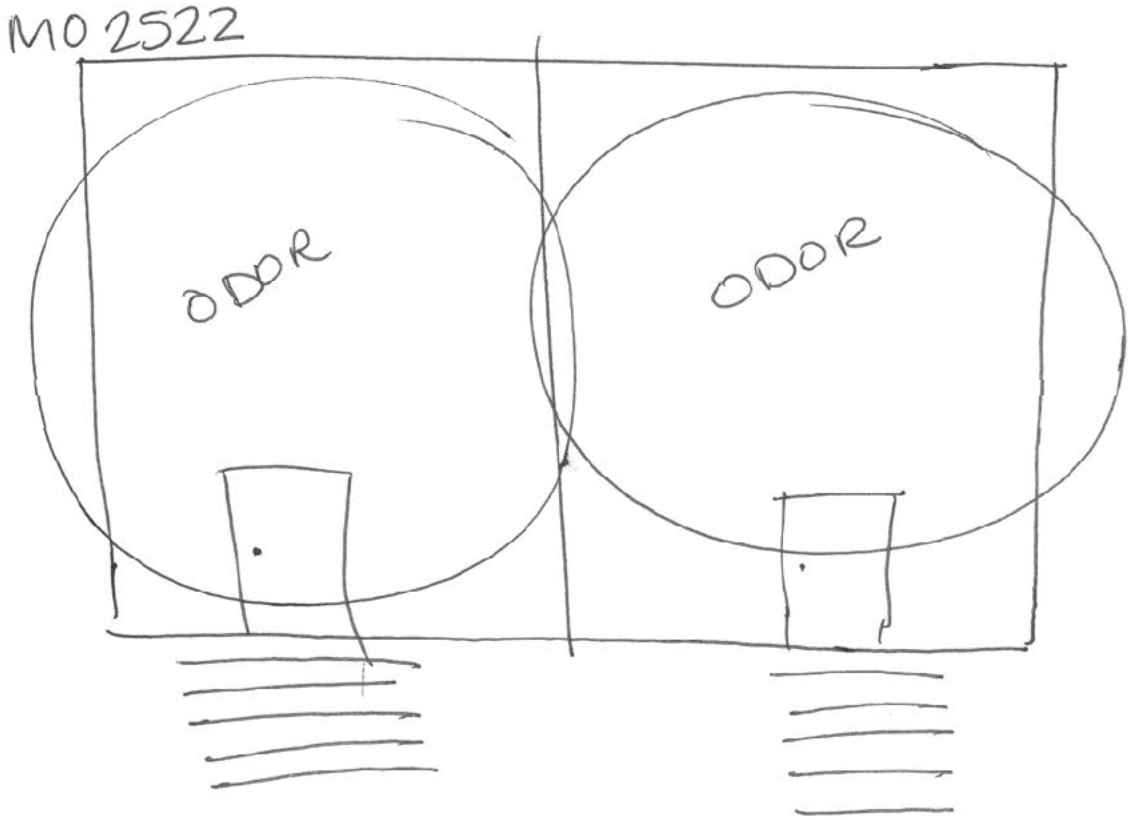
[redacted]

ODOR/VAPOR RESPONSE CARD

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.



[redacted]

ODOR/VAPOR RESPONSE CARD

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

- Date and time of event: 0800
- Check Applicable:
  - ☑ Odor ☐ Ammonia Alarm *(6 ppm)* ☐ Ammonia Alarm *(12 ppm)* ☐ Alarm *(other - describe)*:
- Your name and the work you were performing: [redacted] - Laundry
- Other Work Underway? Describe: none
- Location of event *(mark area on map and wind direction)*: 200 east 2522
- 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)*: Sulfur
- 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)*: Cleared nasal

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]