

AOP-015 Event Investigation Reports (Redacted) EIR-2022-26 (03/22/2022)

(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**

AOP-015 Event Investigation Reports (Redacted) EIR-2022-26 (03/22/2022)

(Settlement Agreement Deliverable)

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Washington River Protection Solutions

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WRPS

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APPROVED
By Lynn M Ayers at 11:14 am, Apr 28, 2022

Release Approval

Date

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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: Tank Farm Projects / Construction

Date: 3/22/2022

Area/Building/Location: 200E/A Farm near tank 241-A-101 PIT 01A Approximate Time of Event:

AR Number: WRPS-AR-2022-1092

Responsible Manager: [REDACTED]

EIR Number: EIR-2022-026

Event Investigator: [REDACTED]

EVENT SUMMARY PART I

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

The work crew was positioning the Georgia Buggy near Single Shell Tank (SST)241-A-101 Pit 01A to load miscellaneous electrical equipment in to it.

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

Laborers (American Electric): 6

Electricians (American Electric): 3

Field Work Supervisors (American Electric): 2

Health Physics Technicians (Washington River Protection Solutions): 4

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

The affected worker was spotting for the Georgia Buggy while it was being taken back to SST 241-A-101 Pit 01A. The driver of the Georgia Buggy stopped the machine near SST 241-A-101 Pit 01A and shut the Georgia Buggy off. The spotter was standing on the side of the Georgia Buggy near the exhaust outlet. As the driver turned the Georgia Buggy off the Personal Ammonia Monitor (ToxiRAE) on the spotter alarmed.

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

The TF-AOP-15, Response to Personal Ammonia Monitor Alarm, event occurred in the 200 East area in 241-A Farm near tank 241-A-101 Pit 01A.

The Hanford Site Meteorological Station number 6 200E weather data reported at 1300 Hours:

Temperature - 60 degrees Fahrenheit

Winds - 4 mph out of the South East

Relative Humidity - 47%

Pressure - 29.65" steady

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

Entering in to TF-AOP-15 resulted in restricting access near A-101A pit.

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

3/22/2022

- All workers placed work area in to a safe configuration and immediately exited the farm. (1300 hours)
- The Field Work Supervisor (FWS) notified the Central Shift Manager (CSM) of the ToxiRAE alarm. The CSM entered TF-AOP-015 "Response to Personal Ammonia Monitor Alarm." (1335 Hours).
- The worker with the alarming ToxiRAE completed an Odor Response Card. The worker was offered medical surveillance and declined. The worker did not smell any odor and reported no symptoms.
- Industrial Hygiene Technicians responded to the area and took Direct Reading Instrument (DRI) readings. DRI monitoring results were less than detectable.
- The ToxiRAE instrument post-use function test passed and was within normal operating parameters.
- Initiated Event Investigation EIR-2022-026, "TF-AOP-015 Event at A101A Pit." (1346 Hours)
- The CSM exited TF-AOP-015 and the access restriction to the work area was lifted (1454 Hours).

Notifications Already Made (Time and personnel notified):

- The FWS reports ToxiRAE alarm to the CSM (1335 Hours).
- DOE Facility Representative notified of TF-AOP-021 by CSM (1335 Hours).
- DOE Facility Representative notified of TF-AOP-021 was exited by CSM (1454 Hours).

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Tank Farm Projects / Construction Date: 3/22/2022

Area/Building/Location: 200E/A Farm near tank 241-A-101 PIT 01A Approximate Time of Event:

AR Number: WRPS-AR-2022-1092 Responsible Manager: [REDACTED]

EIR Number: EIR-2022-026 Event Investigator: [REDACTED]

Notifications Already Made (Time and personnel notified):
- DOE Facility Representative notified of Event Investigation Report by CSM (1719 Hours).

- This event does not merit an Event Investigation meeting
- This event merits an Event Investigation meeting

Basis for Determination:
Logbook entries, interviews, and documents reviews were used to provide initial information on the event.

Responsible Manager:
[REDACTED] [REDACTED] 4/7/2022
Print First and Last Name Signature / Date

CAS Manager:
[REDACTED] [REDACTED]
Print First and Last Name Signature / Date

EVENT SUMMARY PART II

Key Elements of the Investigation (Key investigation points):
Industrial Hygiene Event Investigation Report (IHIR) number IHIR-00033 reported the following key data about the event:

Field Response Area Readings:
• Ammonia: Less than detectable (less than 1 ppm)
• Volatile Organic Compounds (VOCs): Less than detectable (less than 1 parts per billion (ppb))
During the response, two IHTs performed DRI monitoring with the MultiRAE for potential sources of ammonia and/or tank vapors at A-101 01A, 01C, and 01H pits, the surrounding area, and the Georgia Buggy. The Georgia Buggy was turned off at the time of the response. There were no known sources or elevated readings identified.

ToxiRAE 002626 (Event Initiation ToxiRAE):
• Ammonia: Peak reading of 6 ppm on instrument display
• Ammonia: Peak reading of 6 ppm on data-log at 1310.
Data points on the ToxiRAE are saved at one-minute increments. Review of the ToxiRAE data-log indicated that ammonia levels gradually increased leading up to the Personal Ammonia Monitor (ToxiRAE) alarm. According to the data-log, ammonia was not detected on the Personal Ammonia Monitor (ToxiRAE) until 1252, with a recorded reading of 1 ppm for approximately 9 minutes. At 1301 and 1302, ammonia was detected at 2 ppm and 3 ppm respectively. At 1303, ammonia was detected at 4 ppm for approximately 7 minutes. At 1310, the ToxiRAE alarmed at the response level of 6 ppm and did not sustain. At 1311, ammonia dropped below the response limit with a recorded reading of 3 ppm.

At the time of the initiating event, the worker whose Personal Ammonia Monitor (ToxiRAE) alarmed was wearing respiratory protection equipment in accordance with the Management Directed Respiratory Form, "MDRPF-PLN-173" Task 1: Full Face Air Purifying Respirator (FF-APR) with Gas/Vapor cartridges (MSA GME Chemical Vapor).

Exhauster stacks in A Farm have enhanced monitoring, Vapor Monitoring and Detection System (VMDS) that can be used to detect elevated readings and provide further warnings of unexpected conditions. The A-Farm exhausters POR518 and POR519 were operational at the time of the event. VMDS in A-Farm had a peak reading of 4 ppm ammonia at POR518 and a peak reading of 1.8 ppm ammonia at POR519 at

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Tank Farm Projects / Construction

Date: 3/22/2022

Area/Building/Location: 200E/A Farm near tank 241-A-101 PIT 01A Approximate Time of Event:

AR Number: WRPS-AR-2022-1092

Responsible Manager:

EIR Number: EIR-2022-026

Event Investigator:

Key Elements of the Investigation (Key investigation points):

1300. Additionally, negative tank pressure was maintained at A-101 and was -0.586 inches water column (in WC) (POR518) and -0.610 in WC (POR519).

Exhauster stack occupational exposure level (OEL) concentrations to reach ground level were calculated from Computation Fluid Dynamics (CFD) modeling and is reported in 62043-000-SUB-055-002, "QRA 241-A Tank Farm Quantitative Risk Analysis. Table 3, "Minimum Exhauster Stack Concentrations of COPCs Required to Reach Concentrations of Concern in Breathing Zones" states that to reach an action level at ground level in A Farm the exhauster stack concentration for ammonia would need to be 816 ppm. If such conditions do occur, they are rare and/or of short duration and will vary with different meteorological conditions.

Additionally, a more conservative approach was established for High Alarm and High High Alarm set points for the exhausters per the Interoffice Memorandum WRPS-1904672.1. To reach predicted ground receptor ammonia concentrations of 2.5 ppm and 5 ppm, the following set alarms at the exhaust stacks would need to be 160 ppm (High Alarm) and 320 ppm (High High Alarm), respectively. Furthermore, the review of VMDS data concludes that there was very low potential for ground level exposure from A-Farm exhausters.

Industrial Hygiene personnel conducted a follow-up investigation to determine whether the Georgia Buggy exhaust caused the Personal Ammonia Monitor (ToxiRAE) alarm. This investigation was performed using a ToxiRAE and MultiRAE. While the Georgia Buggy was turned on and idling, the IHT held both instruments approximately 6 inches away from the exhaust. While the ToxiRAE reported ammonia at 11 ppm, the MultiRAE only recorded levels for ammonia at 1 ppm. It appears the discrepancy between instrument readings demonstrate a correlation from the Georgia Buggy exhaust with the passive ammonia sensor in the ToxiRAE.

Conclusions:

A thorough review was performed of the event investigation findings and of environmental conditions related to worker location, wind direction, available monitoring data, event initiation ToxiRAE data-log, and the follow-up investigation. Based on this information, it is determined that the Personal Ammonia Monitor (ToxiRAE) alarm was likely caused by an interference related to direct exposure to the engine exhaust and not by Tank Farm Vapors.

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

Under instructions from the Industrial Hygienist, the Industrial Hygienist Technicians performed monitoring of the Georgia Buggie's exhaust.

Lessons Learned or Information That the Work Force Needs Immediately:

Workers should stand up wind when feasible and away from the exhaust during the use of a Georgia Buggy. When the Georgia Buggy is stationary, turn it off so it does not idle.

- 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:

Based on the event investigation findings of environmental conditions related to worker location, wind direction, available monitoring data, event initiation ToxiRAE data log, and the follow-up investigation, it is determined that the ToxiRAE alarm was likely caused by a direct exposure to the engine exhaust of the Georgia Buggy.

The event investigation process will be exited. The Condition Report (CR) and any corrective

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Tank Farm Projects / Construction

Date: 3/22/2022

Area/Building/Location: 200E/A Farm near tank 241-A-101 PIT 01A Approximate Time of Event:

AR Number: WRPS-AR-2022-1092

Responsible Manager:

EIR Number: EIR-2022-026

Event Investigator:

Basis for Determination:

actions will continue to be managed in the iCAS database.

Responsible Manager:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

4/7/2022

CAS Manager:

[Redacted]

Print First and Last Name

[Redacted]

Signature / Date

4/7/22

Washington River Protection Solutions
INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT

| | |
|--|--|
| Event Title: <p style="text-align: center;">TF-AOP-15 Response for ToxiRAE Alarm at A Farm</p> | PER Number: <p style="text-align: center;">N/A</p> |
| IHIR Number: <p style="text-align: center;">IHIR-00033</p> | |

| | | |
|----------------------------|----------------------|--|
| Date: 03/22/2022 | Time: 1310 | Location: 241-A Farm A-101 A Pit |
|----------------------------|----------------------|--|

Event Summary and Timeline:

Event Summary:
A personal ammonia monitor (PAM) alarmed at 6 parts per million (ppm) inside 241-A-Farm. At the time of the event, 15 workers were present in the work area performing non-intrusive work at A-101, 01A pit. The work scope for the day was to remove miscellaneous equipment that was on top of the installed cover blocks and included operation of the Georgia Buggy. The Georgia Buggy was operated by one laborer with two support spotters, one in the front and one in the back. The worker whose PAM alarmed was spotting in the back, on the exhaust side while the Georgia Buggy was being brought back to the work area. As the operator shut the Georgia Buggy off, the PAM alarmed. The Field Work Supervisor (FWS) notified Central Shift Manager (CSM) and workers exited the area.

Field Response Timeline:
1310 Approximate Time of Event - PAM alarm.
1319 Production Operations (P/O) Industrial Hygienist (IH) arrives at Central Shift Office (CSO). CSM determined to enter AOP-15.
1325 P/O IH calls meteorological station.

- Station 6 at 1315
- Wind Speed: 4 miles per hour (mph)
- Wind Direction: East
- Temperature: 59 degrees Fahrenheit
- Relative Humidity: 49%
- Barometric Pressure: 29.7 inches of Mercury and steady

1326 P/O Safety and Health Manager calls Retrieval Closure (R/C) Safety and Health manager for resources.
1327 CSM request Odor Response Cards (ORCs) on phone with R/C IH. R/C IH en route to CSO.
1327 FWS contacts CSM. CSM directs FWS to stand 20ft away from Georgia Buggy.
1332 P/O IH initiates Site Wide Industrial Hygiene Database (SWIHD).
1335 SOEN: "Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm for ToxiRAE alarm in A Farm. Access restricted to area immediately surrounding the Georgia buggy near A-101A pit. CSM"
1335 CSM notifies DOE Facility Rep of AOP-15 via phone.
1340 R/C IH arrives at CSO.
1342 P/O IH to R/C IH turnover.

- Affected worker en route to CSO.

1345 R/C Industrial Hygiene Technicians (IHTs) arrive at CSO.
1346 P/O IH briefs R/C IHTs for field response actions:

- Monitor per IHP-09001 "Response to Ammonia Monitor Alarm"
- Respiratory Protection Form "TF-AOP-015" Task 4 (Voluntary Use)
- If not voluntarily use, then "MDRPF-PLN-173" Task 1

1347 The worker whose PAM alarmed, FWS, and PAM arrive at CSO.

- Confirmed peak reading at 6 parts-per-million (ppm)
- Odor/Vapor Response Card populated

1348 R/C IHT departs CSO to download data-log from PAM.
1351 Responding R/C IHTs leave CSO to perform field response.
1351 CSM call with contractor assurance (PA group)
1352 The worker whose PAM alarmed was offered medical surveillance and declined. The worker reported no symptoms.
1434 R/C IH contacts responding R/C IHTs:

- Ammonia - Less than detectable (one [1] parts per million)

1436 R/C IHTs notify R/C IH that Direct Reading Instrumentation (DRI) passed Post-Use-Function-Test.
1535 SOEN: "Exited TF-AOP-015 Response to Personal Ammonia Monitor Alarm for ToxiRAE alarm in A

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

Event Summary and Timeline:

Farm. IHP-09001 response actions near A-101A pit are complete and no hazards were detected. Response actions for the TF-AOP-015 event have been completed and the results are at or below background levels. Normal access is restored. CSM"

Sampling/Monitoring Results:

Field Response Area Readings:

- Ammonia: Less than detectable (less than 1 ppm)
- Volatile Organic Compounds (VOCs): Less than detectable (less than 1 parts per billion (ppb))

During the response, two IHTs performed DRI monitoring with the MultiRAE for potential sources of ammonia and/or tank vapors at A-101 01A, 01C, and 01H pits, the surrounding area, and the Georgia Buggy. The Georgia Buggy was turned off at the time of the response. There were no known sources or elevated readings identified.

ToxiRAE 002626 (Event Initiation ToxiRAE):

- Ammonia: Peak reading of 6 ppm on instrument display
- Ammonia: Peak reading of 6 ppm on data-log at 1310.

Data points on the ToxiRAE are saved at one-minute increments. Review of the ToxiRAE data-log indicated that ammonia levels gradually increased leading up to the PAM alarm. According to the data-log, ammonia was not detected on the PAM until 1252, with a recorded reading of 1 ppm for approximately 9 minutes. At 1301 and 1302, ammonia was detected at 2 ppm and 3 ppm respectively. At 1303, ammonia was detected at 4 ppm for approximately 7 minutes. At 1310, the ToxiRAE alarmed at the response level of 6 ppm and did not sustain. At 1311, ammonia dropped below the response limit with a recorded reading of 3 ppm.

SWIHD References:

Field Response Site Wide Industrial Hygiene Database Direct Reading Instrumentation Survey:

- #22-02114, "241-A Farm PAM Response TF-AOP-015"
- #22-02142, "AOP-15 A Farm Georgia Buggy Investigation"

Additional Information:

At the time of the initiating event, the worker whose PAM alarmed was wearing respiratory protection equipment in accordance with the Management Directed Respiratory Form, "MDRPF-PLN-173" Task 1: Full Face Air Purifying Respirator (FF-APR) with Gas/Vapor cartridges (MSA GME Chemical Vapor).

Exhauster stacks in A Farm have enhanced monitoring, Vapor Monitoring and Detection System (VMDS) that can be used to detect elevated readings and provide further warnings of unexpected conditions. The A-Farm exhausters POR518 and POR519 were operational at the time of the event. VMDS in A-Farm had a peak reading of 4 ppm ammonia at POR518 and a peak reading of 1.8 ppm ammonia at POR519 at 1300. Additionally, negative tank pressure was maintained at A-101 and was -0.586 inches water column (in WC) (POR518) and -0.610 in WC (POR519).

Exhauster stack occupational exposure level (OEL) concentrations to reach ground level were calculated from Computation Fluid Dynamics (CFD) modeling and is reported in 62043-000-SUB-055-002, "QRA 241-A Tank Farm Quantitative Risk Analysis. Table 3, "Minimum Exhauster Stack Concentrations of COPCs Required to Reach Concentrations of Concern in Breathing Zones" states that to reach an action level at ground level in A Farm the exhauster stack concentration for ammonia would need to be 816 ppm. If such conditions do occur, they are rare and/or of short duration and will vary with different meteorological conditions.

Additionally, a more conservative approach was established for High Alarm and High High Alarm set points for the exhausters per the Interoffice Memorandum WRPS-1904672.1. To reach predicted ground receptor ammonia concentrations of 2.5 ppm and 5 ppm, the following set alarms at the exhaust stacks would need to be 160 ppm (High Alarm) and 320 ppm (High High Alarm), respectively.

Furthermore, the review of VMDS data concludes that there was very low potential for ground level exposure from A-Farm exhausters.

Industrial Hygiene personnel conducted a follow-up investigation to determine whether the Georgia

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

Additional Information:

Buggy exhaust caused the PAM alarm, (reference SWIHD #22-02142, "AOP-15 A Farm Georgia Buggy Investigation"). This investigation was performed using a ToxiRAE and MultiRAE. While the Georgia Buggy was turned on and idling, the IHT held both instruments approximately 6 inches away from the exhaust. While the ToxiRAE reported ammonia at 11 ppm, the MultiRAE only recorded levels for ammonia at 1 ppm. It appears the discrepancy between instrument readings demonstrate a correlation from the Georgia Buggy exhaust with the passive ammonia sensor in the ToxiRAE.

Recommendations/Conclusions:

Recommendations:

- Communicate results from the event investigation report with the whole work crew.
- Further communication should be made to the work crew to stand up wind when feasible and away from the exhaust during the use of a Georgia Buggy. When the Georgia Buggy is stationary, turn it off so it does not idle.
- Industrial Hygiene should further investigate and understand the correlation from emissions generating equipment with the passive ammonia sensor in the PAM.

Conclusions:

A thorough review was performed of the event investigation findings and of environmental conditions related to worker location, wind direction, available monitoring data, event initiation ToxiRAE data-log, and the follow-up investigation. Based on this information, it is determined that the PAM alarm was likely caused by an interference related to direct exposure to the engine exhaust and not by Tank Farm Vapors.

Other:

N/A

Industrial Hygienist:

████████████████████

Print First and Last Name

████████████████████

Digitally signed by ██████████

Date: 2022.04.06 14:16:59 -07'00'

Signature / Date

Industrial Hygiene Level 2 Manager:

████████████████████

Print First and Last Name

████████████████████

Digitally signed by ██████████

Date: 2022.04.06 15:19:23 -07'00'

Signature / Date

ODOR/VAPOR RESPONSE CARD - 241 A FARM

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

- Date and time of event: 3-22-22 1:00pm
- Check Applicable:
 - Odor
 - Ammonia Alarm (6 ppm)
 - Ammonia Alarm (12 ppm)
 - Alarm (other - describe):

Your name and the work you were performing:

Removing electrical

Other Work Underway? Describe: No

Location of event (mark area on map and wind direction): A-101

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

Was Industrial Hygiene present, who? No

Describe the odor:

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

Is source known/likely? Describe: No

Your symptoms? None

- Headache
- Dizziness
- Nausea
- Cough
- Fatigue
- Weakness
- Sore Throat
- Difficulty Breathing
- Eye Irritation
- Rash
- Itch
- Tingling
- Numbness
- Taste
- Other (describe):

2. Provide this completed card (Page 1 & 2) to Supervisor, Industrial Hygiene, your Union Safety Representative or the CSM. If received by Supervisor/IH/U-SR, Supervisor/IH/U-SR will ensure card is provided to the CSM.

ODOR/VAPOR RESPONSE CARD - 241 A FARM

Instructions:

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM), at (509) [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; *Firm SW*
 - c. Environmental conditions, such as hot, cold, windy, rainy; *Warm*
 - d. Other work or contractors in the area; *NO*
 - e. Anything else you think is relevant. *Working next to Bags*
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.

A FARM

