

# **AOP-015 Event Investigation Reports (Redacted) EIR-2022-079 (10072022)**

**(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-2022-079 (10072022)

## (Settlement Agreement Deliverable)

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Washington River Protection Solutions

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**APPROVED**  
*By Lynn M Ayers at 9:24 am, Nov 15, 2022*

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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: Retrieval/Construction - Wire Pull      Date: Oct 7, 2022

Area/Building/Location: 200 East, 241-A-101      Approximate Time of Event: 09:36

AR Number: WRPS-AR-2023-0035      Responsible Manager: [REDACTED]

EIR Number: EIR-2022-079      Event Investigator: [REDACTED]

**EVENT SUMMARY PART 1**

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

In support of Retrieval/Construction activities, an electrical work crew's scope of work was to pull wire to POR 627 panel in A-Farm. The Work Order # was 862475.

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

- Subcontractors with American Electric:
- Field Work Supervisor (FWS)
  - Electrician-1; whose personal ammonia monitor (PAM) alarmed at 6 ppm
  - Electrician-2 (No PAM alarm)
  - Electrician-3 (No PAM alarm)

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

One worker's (Electrician-1) Ventis Pro PAM alarmed at 6 ppm ammonia while pulling wires at the 241-A-101 electrical panels. None of the other PAMs alarmed. Work was immediately discontinued and workers moved upwind. No smell of ammonia was detected by Electrician-1 or any of the other workers proximal to the area where the PAM alarmed. An Industrial Hygiene Technician (IHT) was dispatched to the scene. The IHT reported that the Ventis Pro instrument's post-check was completed satisfactorily. Post-event field response TF-AOP-015 monitoring indicated concentrations were at or below anticipated background levels.

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

200 East Area, A-Farm, proximal to tank 241-A-101, electrical panels at typical elevation above grade level. Electrician-1 was south of A-101, between A-101 and the A-Farm change trailers, at the electrical rack. Temperature was in the mid-60s, with winds 6.0 mph from the East/Southeast. Data Fusion Advisory System (DFAS) was queried and showed mixing elevation for the nearby exhausters was at 140-ft. The DFAS dashboard provides a Exhauster Potential Exposure Zone (PEZ) Model of the exhaust plumes at the reported time of the event based on wind speed, wind direction, mixing height, and stability class. Evaluation of the PEZ Model indicates no exhaust plumes were within the work area location at the reported time of the event, thus determining the cause of the personal ammonia alarm was unlikely to be resultant of Tank Farms exhauster emissions.

Workers were wearing FF-APR respiratory protection with chemical vapor cartridges as required by Standing Order SO-OPS-17-003 "Use of Respiratory Protection in Tank Farms" and TFC-PLN-173 "Use of FFAPR in Actively Ventilated Tank Farms".

Workers were within a posted radiological Contamination Area (CA) and were wearing anti-contamination clothing as required by Radiological Work Permit (RWP) AX-001.

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

There was no impact to the facility. Work was temporarily delayed.

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

Area where alarm occurred was evacuated to upwind location.  
Entered procedure actions in TF-AOP-015, Response to Personal Ammonia Monitor Alarm.  
An Odor/Vapor Response Card was completed and submitted to the Central Shift Office (CSO) by

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**EVENT SUMMARY** (Continued)

**Project:** Retrieval/Construction - Wire Pull **Date:** Oct 7, 2022

**Area/Building/Location:** 200 East, 241-A-101 **Approximate Time of Event:** 09:36

**AR Number:** WRPS-AR-2023-0035 **Responsible Manager:** [REDACTED]

**EIR Number:** EIR-2022-079 **Event Investigator:** [REDACTED]

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

Electrician-1.  
Medical attention was offered but declined.  
An IHT was dispatched to initiate TF-AOP-015 actions including on-scene response and monitoring per IHP-09001.  
DFAS data was reviewed, determining mixing height was >100 ft., therefore, no additional access restrictions.

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

09:36 - at time of event, FWS and CSO  
09:47 - DOE-ORP Facility Representative  
09:59 - IHT  
10:27 - Event Investigator and all personnel via Shift Office Event Notification (SOEN)

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

**Basis for Determination:**

Information gathered from various sources is sufficient to conclude that this event does not merit an Event Investigation meeting.

**Responsible Manager:**

[REDACTED]

Print First and Last Name

[REDACTED]

Signature / Date

Digitally signed by [REDACTED]

**CAS Manager:**

[REDACTED]

Print First and Last Name

[REDACTED]

Signature / Date

[REDACTED]

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**EVENT SUMMARY (Continued)**

Project: Retrieval/Construction - Wire Pull

Date: Oct 7, 2022

Area/Building/Location: 200 East, 241-A-101

Approximate Time of Event: 09:36

AR Number: WRPS-AR-2023-0035

Responsible Manager: [REDACTED]

EIR Number: EIR-2022-079

Event Investigator: [REDACTED]

**EVENT SUMMARY PART 2**

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

To summarize the conclusions of the Industrial Hygiene Event Investigation Report, IHIR-00052 "TF-AOP-015 Event at A Farm", the Ventis Pro personal ammonia monitor alarm was not indicative of an employee chemical exposure event or changing Tank Farm conditions related to Tank Farm vapors.

The following considerations support the IHIR-00052 conclusion:

- (1) Three additional workers were within the immediate area of the individual when the Ventis Pro personal ammonia monitor alarmed. The other workers' Ventis Pro personal ammonia monitor did not alarm or indicate elevated ammonia concentrations.
- (2) 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 at the reported time of event (Refer to Attachment 1 for DFAS PEZ Model).
- (3) Ammonia is used as a sentinel tank waste chemical vapor for chemicals of potential concern (COPC), therefore, direct reading instruments (DRIs) equipped with an ammonia sensor are utilized at a minimum when monitoring for tank waste chemical vapors/COPCs. Field response DRI monitoring following initiation of TF-AOP-015, indicated a less than detectable ammonia concentration (<1ppm), which is below background levels. Providing additional indication the cause of the personal ammonia alarm was unlikely to be resultant of Tank Farms exhauster emissions.
- (4) 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 0 ppm at the POR-126 exhauster, 0 ppm at the POR-127 exhauster, and 13.156 ppm at the 702-AZ exhauster. Conservatively utilizing the higher ammonia concentration observed in the 702-AZ exhauster, a predicted ground receptor ammonia concentration of 0.072 ppm (or 0.29% of the established Occupational Exposure Limit for ammonia) would be expected if AY/AZ or AX tank farm exhauster emissions were present. The exhauster high level alarm conservatively established for A farm is 160 ppm. According to the Vapor Monitoring and Detection System (VMDS), the ammonia concentration observed at the time of event occurrence was 2.857 ppm at the POR-518 exhauster and the VMDS at the POR-519 exhauster was not operations at the time of the event. Utilizing the ammonia concentration observed in the POR-518 exhauster, a predicted ground receptor ammonia concentration of 0.045 ppm (or 0.17% of the established Occupational Exposure Limit for ammonia) would be expected if A tank farm exhauster emissions were present. Therefore, providing further indication the cause of the personal ammonia alarm was unlikely to be resultant of Tank Farms exhauster emissions.
- (5) PI Vision was utilized to verify 241-A-101 maintained negative tank pressures at the time of event occurrence, with -0.38 inches water column at the POR-518 and POR-519 exhauster's.

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

None.

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**EVENT SUMMARY (Continued)**

Project: Retrieval/Construction - Wire Pull Date: Oct 7, 2022

Area/Building/Location: 200 East, 241-A-101 Approximate Time of Event: 09:36

AR Number: WRPS-AR-2023-0035 Responsible Manager: [REDACTED]

EIR Number: EIR-2022-079 Event Investigator: [REDACTED]

**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-OPER-C-14, "Event Investigation Process". The facts, findings, and comprehensive account captured under this Event Summary and the Industrial Hygiene Event Investigation Report, IHIR-00052 "TF-AOP-015 Event at A Farm" form the basis that further investigation will provide no additional information or operational benefit.

**Responsible Manager:**

[REDACTED] \_\_\_\_\_ [REDACTED] \_\_\_\_\_ [REDACTED] \_\_\_\_\_  
Print First and Last Name Signature / Date

**CAS Manager:**

[REDACTED] \_\_\_\_\_ [REDACTED] \_\_\_\_\_ [REDACTED] \_\_\_\_\_  
Print First and Last Name Signature / Date

# EIR-2022-079 Attachment 1

**AN EXHAUSTER**  
Estimated Potential Exposure Zone



**702-AZ EXHAUSTER**



**POR-127 EXHAUSTER**



**POR-126 EXHAUSTER**



**POR-518/POR-519 EXHAUSTERS**  
Estimated Potential Exposure Zone



**Location of Ventis Pro Instrument Alarm**

**AW EXHAUSTER**  
Estimated Potential Exposure Zone



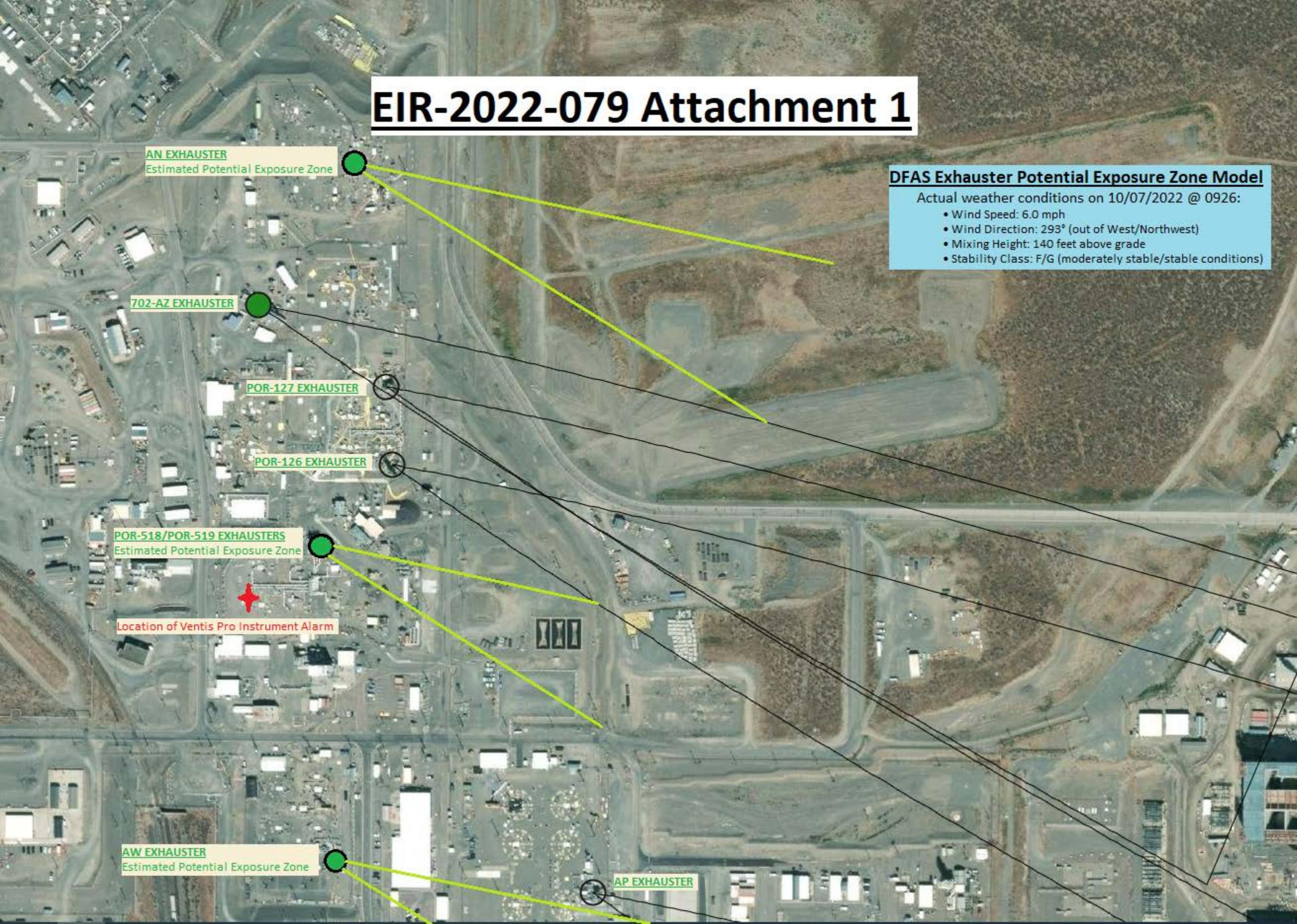
**AP EXHAUSTER**



## DFAS Exhauster Potential Exposure Zone Model

Actual weather conditions on 10/07/2022 @ 0926:

- Wind Speed: 6.0 mph
- Wind Direction: 293° (out of West/Northwest)
- Mixing Height: 140 feet above grade
- Stability Class: F/G (moderately stable/stable conditions)



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**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT**

<b>Event Title:</b>  <p style="text-align: center;">TF-AOP-015 Event at A Farm</p>	<b>PER Number:</b> <p style="text-align: center;">N/A</p>
<b>IHIR Number:</b> <p style="text-align: center;">IHIR-00052</p>	

<b>Date:</b> 10/07/2022	<b>Time:</b> 0926	<b>Location:</b> 241-A Farm A-101
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**Event Summary and Timeline:**

**Event Summary:**  
A Ventis Pro V personal ammonia monitor (PAM) alarmed at six parts per million (ppm) inside 241-A-Farm. The individual whose PAM alarmed was south of A-101 at the electrical rack next to three workers whose PAMs did not have detectable ammonia (NH3) readings. At the time of the event, the four workers were performing wire pulls in support of construction. The Central Shift Manager (CSM) directed the Field Work Supervisor (FWS) to move upwind and away from A-101 area however, the FWS directed work crew to exit the farm. CSM restricted access around A-101 area and entered AOP-015.

**Field Response Timeline:**  
0926 Approximate Time of Event - PAM alarm.  
0930 FWS contacts CSM.

- No odors detected
- No symptoms reported
- Individual declined medical
- CSM requested Odor/Vapor Response Cards (OVRC) and PAM from FWS

0936 SOEN: "Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Access around A-101 is restricted unless authorized by Shift Manager. CSM"

0942 CSM reviews Data Fusion Advisory System (DFAS), powered Smart Site™, for current weather details:

- Wind Speed: 6 miles per hour (mph)
- Wind Direction: 293° West-North-West (WNW)
- Mixing Height: 140 feet above grade
- Stability Class: F/G (moderately to extremely stable conditions)

0947 CSM notifies DOE Facility Representative of AOP-15.  
0959 CSM contacts Retrieval Closure (R/C) Safety and Health (S&H) Manager. R/C S&H Manager concurs with AOP-015 field response actions and notifies R/C Industrial Hygienist (IH).  
1018 CSM notifies Production Operations (P/O) Shift Industrial Hygiene Technician (IHT) for field response action.

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

1035 P/O IHT entered A Farm to perform field response. IHT notifies CSM that ammonia readings less than detectable (<1ppm) and the DRI passed Post-Use-Function-Test.  
1059 SOEN: "Response actions for the TF-AOP-015 event have been completed and the results are at or below background levels. Exiting TF-AOP-015. CSM"

**Sampling/Monitoring Results:**

**Field Response Area Readings:**

- Ammonia: Less than detectable (< 1ppm)

The responding IHT entered A Farm to perform Direct Reading Instrument (DRI) monitoring with the MultiRAE. Inspection and monitoring was performed around A-101 pits for potential sources of ammonia and/or tank vapors. DRI monitoring and observations made by the IHT demonstrated no ongoing conditions which could result in PAM alarm.

Ventis Pro V 004779 (10/07/2022 Event Initiation PAM):

- 0919: 0ppm NH3
- 0920-0922: 3ppm NH3
- 0923-0924: 4ppm NH3
- 0925: 5ppm NH3

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**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT**(Continued)

**Sampling/Monitoring Results:**

- 0926: 6ppm NH3
- 0927: 7ppm NH3
- 0928: 4ppm NH3
- 0929: 2ppm NH3
- 0930: 0ppm NH3

Review of the data-log reported a peak reading of 7ppm ammonia. All readings before 0919 and after 0930 were below detectable limits.

**SWIHD References:**

Field Response Site Wide Industrial Hygiene Database Direct Reading Instrumentation Survey:  
• #22-06414 "TF-AOP-015 Field Response Actions 241-A-101"

**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 Protection 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. VMDS for A Farm exhauster POR519 was down at the time of the event. However, VMDS for exhauster POR518 was operational and had a peak reading less than 3ppm ammonia. Additionally, negative tank pressure was maintained at A-101 and was -0.38 inches water column (in WC) at POR518 and 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 816ppm. 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 2.5ppm and 5ppm, the following set alarms at the exhaust stacks would need to be 160ppm (High Alarm) and 320ppm (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.

**Recommendations/Conclusions:**

The exact cause of the PAM alarm is unknown. All other PAMs in the surrounding area were below the low-level alarm of 6ppm. After entering AOP-015, DRI monitoring was performed by the responding IHT. DRI monitoring and observations made by the IHT during the event response demonstrated conditions that may have caused the alarm were no longer present, allowing the exit of AOP-015. Furthermore, a thorough review was performed of the event and of environmental conditions related to worker location, wind direction, available monitoring data, and the event initiation PAM data-log. It is unlikely that the PAM alarm was caused by Tank Farm vapors.

It is recommended that the Event Investigator and the Industrial Hygienist review the results from the investigation report with the work crew.

**Other:**

N/A

**Industrial Hygienist:**

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**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT**(Continued)

[Redacted]

*Print First and Last Name*

[Redacted]

[Redacted]

*Signature / Date*

Industrial Hygiene Level 2 Manager:

[Redacted]

*Print First and Last Name*

[Redacted]

*Digitally signed by*

[Redacted]

*Signature / Date*