

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 Farms Projects/Construction      Date: Apr 5, 2021

Area/Building/Location: AW Farm      Approximate Time of Event: 1430

AR Number: WRPS-AR-2021-2961      Responsible Manager: [REDACTED]

EIR Number: EIR-2021-022      Event Investigator: [REDACTED]

**EVENT SUMMARY PART I**

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

Excavation was being performed around the AW-02A pit in support of Work Order # 570167, Project T1P207: Perform Excavations and Isolate PW Lines [241-AW Perform Excavations, Cap PW-462/472].

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

Field Work Supervisor (Intermech): 1  
Electricians (Intermech): 2  
Laborers (Intermech): 6  
Operations Engineer (Intermech): 1  
Health Physics Technicians (WRPS): 3

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

The employees were performing excavation around the AW-02A pit at the time of the reported personal ammonia monitor alarm. The ToxiRAE alarmed at 6 ppm and peaked at 7 ppm ammonia.

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

AW-02A pit. All workers were wearing respiratory protection.

Central Shift Manager (CSM) reviewed the Data Fusion and Advisory System (DFAS) which reported: the mixing height data for neighboring farm (AP Farm) and the current mixing height is around 1500 ft elevation with the wind blowing West to East around 5-7 mph; and the CSM determined that no additional access restrictions were required.

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

No impact to the facility occurred.

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

All workers exited the farm after placing the work in a safe configuration. Access to AW Farm was restricted.

The workers were directed to fill out odor response cards. No one smelled odors, no one reported symptoms, and the twelve (12) workers declined precautionary medical evaluation.

Industrial Hygiene Technicians (IHTs) responded to the area and took direct reading instrument (DRI) readings. DRI instrument readings were below action levels. The CSM exited TF-AOP-015 and access to AW Farm is no longer restricted.

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

CSM entered TF-AOP-015 (1501) and notified DOE Facility Representative (1505).  
CSM exited TF-AOP-015 (1612) and notified DOE Facility Representative (voicemail).

This event does not merit an Event Investigation meeting

This event merits an Event Investigation meeting

**Basis for Determination:**

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**EVENT SUMMARY (Continued)**

Project: Tank Farms Projects/Construction Date: Apr 5, 2021

Area/Building/Location: AW Farm Approximate Time of Event: 1430

AR Number: WRPS-AR-2021-2961 Responsible Manager: [REDACTED]

EIR Number: EIR-2021-022 Event Investigator: [REDACTED]

**Basis for Determination:**

Personnel information provided (odor response card), logbook entries, and Industrial Hygiene sampling plans and results provided.

**Responsible Manager:**

[REDACTED]

Print First and Last Name

Signature / Date

**CAS Manager:**

[REDACTED]

Print First and Last Name

Signature / Date

**EVENT SUMMARY PART II**

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

Industrial Hygiene (IH) reported the following key data about the event:

Field response area readings:

- Ammonia: Less than detectable (less than 1 parts per million)
- Volatile Organic Compounds (VOC): 20.9 part per billion

Industrial Hygiene Technicians (IHTs) swept the area including around all sides of the AW-02A pit using a MultiRAE to look for potential sources of ammonia/tank vapors. No sources of ammonia/tank vapors were identified.

ToxiRAE 002969, the event initiating instrument, passed the post bump test. Readings were reported as:

- Ammonia: Reported alarm of 6 parts per million
- Ammonia: Display and data log peak reading of 7 parts per million
- Ammonia: In the 30 minutes prior to the peak reading event, readings increased sporadically ranging between 1 parts per million and 7 parts per million.
- Ammonia: In the 30 minutes following the peak reading event, readings declined from 7 parts per million and 0 parts per million.

ToxiRAE 004045 that was also present at the event:

- Ammonia: Peak of zero parts per million

At the time of the event the affected worker was surveying dirt inside of a Georgia Buggy (motorized concrete cart). This required the worker to come in to close contact with all sides of the Georgia Buggy while it was left idling. Both the Field Work Supervisor (FWS) and the affected worker observed that the ToxiRAE alarmed when the worker was closest to the exhaust of the Georgia Buggy. IH used this information to conduct follow-up testing to determine if the exhaust generated from the Georgia Buggy caused the ToxiRAE to alarm.

On April 6, 2021, IH used a ToxiRAE and a MultiRAE to perform the testing. An IHT held the ToxiRAE and MultiRAE side by side directly in the exhaust stream of the Georgia Buggy at a distance of approximately 3 to 4 feet and took three readings. All three testing events resulted in detectable ammonia readings on the ToxiRAE. The MultiRAE detected 0 parts per million. Additionally, in all three testing events where there were detectable ammonia readings observed on the ToxiRAE, substantial readings for both VOCs and carbon monoxide were observed. IH concluded that based on this data an interference phenomenon was occurring. At this time the direct cause of the interference phenomenon is unclear, but could be the result of the presence of a VOC generated in the combustion process and interference resulting from elevated carbon monoxide, or a combination

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**EVENT SUMMARY (Continued)**

Project: Tank Farms Projects/Construction Date: Apr 5, 2021

Area/Building/Location: AW Farm Approximate Time of Event: 1430

AR Number: WRPS-AR-2021-2961 Responsible Manager: [REDACTED]

EIR Number: EIR-2021-022 Event Investigator: [REDACTED]

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

of both. IH reported the elevated ammonia readings could also be as a result of the ToxiRAE being placed directly in the exhaust stream of the Georgia Buggy causing an impingement of the passive ammonia sensor.

[At the time of the issuance of this Event Summary form Part II, the Industrial Hygiene Event Investigation Report (IHIR) IHIR-0009 had not received final review and signatures.]

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

None.

**Lessons Learned or Information That the Work Force Needs Immediately:**

Instruction needs to be provided to remind workers to stand upwind of the exhaust stream of Georgia Buggies when they are left idling.

- 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:**

The TF-AOP-015 response plan was initiated and completed, all readings were obtained and were below action limits, and none of the affected workers experienced any symptoms.

Given the Data Fusion and Advisor System (DFAS) data, the time of the event, the field response survey readings, and the follow-up IH testing done on the exhaust stream from the Georgia Buggy, its unlikely the ToxiRAE alarm was caused by a tank vapor associated event. It appears that a bi-product of combustion engine exhaust or proximity of the ToxiRAE unit to the equipment's exhaust stream caused an impingement of the passive ammonia sensor.

**Responsible Manager:**

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

**CAS Manager:**

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

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**INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT**

Event Title:  TF-AOP-015 Entry at 241-AW Farm, AW-02A Pit		PER Number:  N/A
		IHIR Number:  IHIR-00009
Date: 04/05/2021	Time: 1430	Location:  241-AW Farm AW-02A Pit

**Event Summary and Timeline:**

Event Summary:

A personal Ammonia Monitor alarmed and indicated greater than 6 (six) parts per million ammonia but less than 12 (twelve) parts per million ammonia in the area around AW-02A pit. Twelve (12) workers were present at the time of personal ammonia monitor alarm. Workers immediately exited the area. Workers were performing digging outside of AW-02A Pit. All workers were wearing Personal Ammonia Monitors.

Field Response Timeline:

- 1430 Approximate Time of Event - Personal Ammonia Monitor alarm
- 1446 Projects Field Work Supervisor notifies Central Shift Manager of Personal Ammonia Monitor alarm
- 1450 Central Shift Manager notifies Production Operation Safety & Health Manager of Personal Ammonia Monitor alarm
- 1452 Production Operations Industrial Hygienists arrive at Central Shift Office
- 1453 Central Shift Manager briefs Production Operations Industrial Hygienists on TF-AOP-015
  - Projects job
  - AW-02A Pit
  - Intermec
  - Projects Field Work Supervisor en route to Central Shift Office
- 1454 Central Shift Manager discusses restricted access boundary with Operator
- 1457 Production Operations Shift Industrial Hygiene Technician Supervisor arrives at Central Shift Office
- 1501 Shift Office Event Notification (SOEN): "....."
- 1503 Projects Field Work Supervisor and Projects Industrial Hygiene Technician arrive at Central Shift Office
  - Affected worker did not come to Central Shift Office
- 1504 Projects Industrial Hygiene Technician informs Production Operations Industrial Hygienists a personal sampling set was worn by a worker on the job during the time of the Personal Ammonia Monitor alarm
- 1505 Production Operations Industrial Hygienist requests Affected Personnel fill out Odor/Vapor Response Cards (Odor/Vapor Response Card - 241-AW Farm A-6006-930)
  - Projects Field Work Supervisor fills out Odor/Vapor Response Card for the Affected Personnel as they were next to the Affected Personnel at the time of the Personal Ammonia Monitor alarm
- 1507 Projects Industrial Hygiene Technician turns in the Affected Personnel's Personal Ammonia Monitor
- 1510 Central Shift Manager reviews Data Fusion and Advisor System (DFAS) application, powered by SmartSite™, Weather Details dashboard
  - Wind West to East at five to seven miles per hour
  - High Mixing Height
  - Central Shift Manager determines no additional restricted assess required
- 1510 Production Operations Industrial Hygienist contacts Hanford Weather Station to acquire record of atmospheric conditions outside of affected area during event:
  - At Weather Station six (6) 1445 04/05/2021
  - Temperature: sixty (60) degrees Fahrenheit
  - Wind speed and direction: Out of West North West at six (6) miles per hour
  - Relative Humidity: fourteen (14) percent
  - Barometric Pressure: twenty-nine-point-three-seven (29.37) inches of Mercury and falling

Field Response Timeline continued on next page

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

**Event Summary and Timeline:**

Field Response Timeline (continued):

- 1517 Project Industrial Hygienist arrives at the Central Shift Office
- 1517 Central Shift Office briefs Industrial Hygiene Technicians for response actions
- 1519 Industrial Hygiene Technicians leave to check out respiratory equipment
- 1522 Industrial Hygiene Technician calls Central Shift Manager to request Car 11
- 1524 Central Shift Manager requests Car 11
- 1527 Event Investigation group contacts Central Shift Office
- 1527 Production Operations Industrial Hygienist contacts Hanford Weather Station to acquire record of atmospheric conditions outside of affected area during event:
- At Weather Station six (6) 1430 04/05/2021
  - Temperature: fifty-nine (59) degrees Fahrenheit
  - Wind speed and direction: Out of South South West at four (4) miles per hour
  - Relative Humidity: fifteen (15) percent
  - Barometric Pressure: twenty-nine-point-three-seven (29.37) inches of Mercury and falling
- 1542 Responding Industrial Hygienist contacts Project Industrial Hygienist with field update
- 1544 Tank Farm Projects Level 3 Safety and Health Manager arrives at the Central Shift Office
- 1602 ToxiRAE associated with the event pass post bump
- 1611 Industrial Hygiene Technician informs Production Operation Industrial Hygienist the MultiRAE passed the post use functional testing

**Sampling/Monitoring Results:**

Field Response area readings:

- Ammonia: Less than Detectable [less than one (1) parts per million]
- VOC: 20.9 parts per billion

During the response, the Industrial Hygiene Technician and responding Industrial Hygienist swept the area utilizing a MultiRAE and looked for potential sources of ammonia/tank vapors. The two individuals walked around all sides of the AW-02A pit and found no such source of ammonia/tank vapors.

ToxiRAE 002969 (event initiating ToxiRAE):

- Ammonia: Reported alarm of six (6) parts per million
- Ammonia: Display & Data Log Peak Reading of seven (7) parts per million (Data Log Line 457)
- Ammonia: In the 30 minutes prior to the Peak Reading Event, Readings increased sporadically ranging between 1 parts per million and 7 parts per million (Data Log Lines 428-458)
- Ammonia: In the 30 minutes following the Peak Reading Event, Readings declined from 7 parts per million and 0 parts per million(Data Log Lines 458-488)

ToxiRAE 004045 (present at initiating event):

- Ammonia: Peak of zero (0) parts per million

**SWIHD References:**

- Event Response Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument (DRI) Survey # 21-03786 "TF-AOP-015 AW-02A Pit"
- Work Activity Site Wide Industrial Hygiene Database (SWIHD) Air Survey # 21-03644 "241 AW-02 A Pit (COPC)"
  - o Worn by present at initiating event worker on the job during the time of the Personal Ammonia Monitor alarm
- Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Air Survey

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

**SWIHD References:**

- # 21-03615 "AW Hotel Load Area set FFAPR"
- Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI)Survey # 21-03725 "AAW FFAPR Plan 173 Area Monitoring"
- Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI)Survey # 21-03775 "AW-Farm Hotel Load Stack Readings "
- ToxiRAE Alarm Follow-Up Investigation Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI)Survey # 21-03816 "AW02A DRI/ ToxiRAE"

**Additional Information:**

At the time of the initiating event the Affected Workers were 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).

**Additional Information on the Personal Ammonia Monitors (ToxiRAEs):**

**ToxiRAE 002969 (event initiating ToxiRAE):**

- Put into service on 10/01/2018
- Unit Name: ToxiRAE Pro (PGM-1860)
- Unit Serial Number (SN): G024009505
- User ID: TOXI2969
- Measure Type: Max
- Datalog Mode: Continuous
- Datalog Type: Auto
- Sample Period: sixty (60) seconds
- Calibration Time: 3/3/2021 @ 15:59
- NOTE: Instrument was not adjusted for daylight savings time
- Passed bump test 04/05/2021 @ 1602

**ToxiRAE 00405 (present at initiating event):**

- Put into service on 01/27/2020
- Calibration Time: 1/5/2021 @ 13:41

At the time of the event, the individual whose ToxiRAE alarmed was surveying dirt inside of Georgia Buggy. Performing radiological surveys of the dirt required the individual to come in close contact of all sides of the Georgia Buggy, which was idling awaiting clearance from the Health Physics Technician(HPT). The Field Work Supervisor(FWS) and Health Physics Technician(HPT) noticed the ToxiRAE alarming when the surveyor was closest to the exhaust of the Georgia Buggy. With this information, Industrial Hygiene personnel conducted a follow-up investigation of the possibility the Georgia Buggy exhaust having caused the ToxiRAE alarm(ref. SWIHD# 21-03816). This investigation was performed using a ToxiRAE and MultiRAE. The Industrial Hygiene Technician held the ToxiRAE and MultiRAE side by side directly in the exhaust stream of the Georgia Buggy at a distance of approximately 3-4 feet. Results of the investigation are summarized below.

Functionality Test	Ammonia (ppm)	Readings	
		VOC (ppb)	Carbon Monoxide (ppm)
<b>ToxiRAE</b>			
• Test 1	5 ppm	N/A	N/A
• Test 2	6 ppm	N/A	N/A
• Test 3	3 ppm	N/A	N/A
<b>MultiRAE:</b>			
• Test 1	0 ppm	30570 ppb	321
• Test 2	0 ppm	1370 ppb	109
• Test 3	0 ppm	1700 ppb	43

As shown above, in all three testing events detectable ammonia readings were observed on the ToxiRAE unit while the MultiRAE detected 0 ppm. Additionally, in all three testing events where detectable ammonia readings were observed on the ToxiRAE, substantial readings for both VOC's and carbon monoxide were observed. Based on these data, it can be concluded that an interference phenomenon is occurring. No direct correlation between the magnitude of the VOC or carbon monoxide reading to the magnitude of the ammonia reading can be drawn.

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

**Additional Information:**

At this time, the direct cause for the interference is unclear but could be a result of the presence of a VOC generated in the combustion process, interference resulting from elevated carbon monoxide or a combination of both previous factors. Alternatively, the elevated ammonia readings in the ToxiRAE could have been created by the physical movement of gases across the sensor as a result of being placed directly into the exhaust stream of the equipment causing an impingement of the passive ammonia sensor of the ToxiRAE.

Atmospheric conditions outside of affected area during event provided by On-Duty Forecaster:

Weather Station six (6) 1430 04/05/2021:

- At Weather Station six (6) 1430 04/05/2021
- Temperature: fifty-nine (59) degrees Fahrenheit
- Wind speed and direction: Out of South South West at four (4) miles per hour
- Relative Humidity: fifteen (15) percent
- Barometric Pressure: twenty-nine-point-three-seven (29.37) inches of Mercury and falling

Review of preliminary (field information verified but awaiting responsible Industrial Hygienist approval) Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI) survey readings:

- Survey # 21-03775 "AW-Farm Hotel Load Stack Readings " :
  - 04/05/2021 @ 1300 POR518 Source Ammonia Reading: 8.0 parts per million

Review of the Data Fusion and Advisor System (DFAS) application, powered by SmartSite™, Weather Details dashboard for the reported time of the Event indicate the cause of the Personal Ammonia Monitor alarm is unlikely to be from 241-AW Exhauster emissions based on:

- Stability Class
- Atmospheric Mixing Height [1500 feet above grade]
- Wind Direction [West North West, 287 degrees]
  - AW-02A Pit is located North of 241-AW Exhauster
- Wind Speed [5.9 miles per hour miles per hour]

Therefore, there was a very low potential for ground level exposure from 241-AW Farm Exhauster.

**Recommendations/Conclusions:**

**Recommendations:**

Communicate results of the Industrial Hygiene Event Investigation to the Affected Workers. Additional communication of the findings of this investigation should be made to the Industrial Hygiene team to further understand the behavior of ToxiRAE units in the field.

**Conclusions:**

Given the review of the Data Fusion and Advisor System (DFAS) application data for the given time period, the comprehensive source survey conducted by the Industrial Hygiene team and the follow-up investigation of the equipment being used it is unlikely that this ToxiRAE alarm was caused by a tank vapor associated event. A possibility of interference/false readings above the 6ppm and 12ppm ammonia thresholds of the ToxiRAE unit exist. The direct cause for this phenomenon is unknown at this time. It appears that either a bi-product of combustion engine exhaust or proximity of the unit to the equipment exhaust stream causing an impingement of the passive ammonia sensor are likely explanations.

**Other:**

All Affected Personnel were offered voluntary medical examination, but declined.  
EIR(Event Investigation Report)# 2021-022.

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

Industrial Hygienist:

[Redacted]

*Print First and Last Name*

[Redacted]

*Signature / Date*

4/8/2021

Industrial Hygiene Level 2 Manager:

[Redacted]

*Print First and Last Name*

[Redacted]

*Signature / Date*

Digitally signed by [Redacted]  
Date: 2021.04.12 14:03:10 -07'00'



## ODOR/VAPOR RESPONSE CARD - 241-AW FARM

### 1. Contact CSM, Complete below bulleted information and map.

- Date and time of event: 4-5-21 02:30 pm
- Check Applicable:  Odor  Alarm 6 ppm  Alarm 12 ppm  Alarm Other: \_\_\_\_\_
- Your name and the work you were performing: HPT was surveying dirt in mud buggy
- Location of event (mark area on map and wind direction): \_\_\_\_\_
- Name(s) of others in or near the affected area: [REDACTED] FWS
- Was an IHT present? no
- Describe the Odor:  Sweet  Sour  Musty  Earthy  Metallic  Smoky  Rotten  Onion  
 Septic  Ammonia  Cleaning Solution  Other: no odor
- Possible Source: exhaust from Mud Buggy we believe
- Your Symptoms (if any):  Headache  Dizziness/Light-Headed  Nausea  Cough  
 Fatigue/Drowsiness/Weakness  Sore/Burning Throat  Difficulty Breathing  
 Watery/Irritated Eyes/Trouble with Vision  Tingling/Numbness/Paralysis  Rash/Itching  
 Other: no symptoms at all.

### 2. Send this card to the Central Shift Office.

# ODOR/VAPOR RESPONSE CARD - 241-AW FARM

## ODOR OR VAPOR ALARM EVENT

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager (CSM), [REDACTED] complete below bulleted information and map.
  - Your name and the work you were performing
  - Your symptoms (if any)
  - Date and time of event
  - Location of event (mark area on map and the wind direction)
  - Describe the odor, if applicable
  - Name of others in or near the affected area
  - Was an IHT present?
  - Possible source
3. Complete map.
4. Complete the back of card.
5. **Send this card immediately to the Central Shift Office.**

