Title: *"TF-AOP-015 Entry for ToxiRAE Alarm at AW Farm"* *EIR-2021-031/WRPS-CR-2021-3081*		
Date: 04/26/2021	**Time:** 1300 hours	**Location:** 241-AW-Farm/241-AW-102 (East of 241-AW02A Valve Pit)
Number of Workers Involved: 10	**Odor Response Card filled out:** Yes ☒ No ☐ How many? 3	
Symptoms: Yes ☐ No ☒	**Sampling Results #:** 21-04453	
Medical Evaluation Offered: Yes ☒ No ☐	**Medical Evaluation Declined:** Yes ☒ No ☐ Annotate as appropriate (i.e., 1 of 3, 4 of 4)	

Return to Work Status	
Number of workers returned to work without restriction	N/A
Number of workers returned to work with restriction	N/A
Number of workers referred for further evaluation	N/A

Transported to Site Occupational Medical Services (HPMC) Yes ☐No ☒	**Odor Description:** None. No odors were smelled.
HMIS Activities: Biological/Herbicide ☐ Septic Service ☒ Other:_____	**Waste disturbing activities or Tank work in adjacent area:** Yes ☒ Activity or work released: WO#570171, 241-AW02A Valve Pit - To Remove Jumpers and Install New Nozzles in Pit No ☐

Meteorological Data:

Time:	Weather Station #:	Speed: (MPH)	Direction: (N/S/E/W)	Temperature: F/C	Barometric Pressure (steady/rising/falling):
1300	6 (200E)	5 MPH	From the N/NE	64 °F	29.07" steady

Event Summary & Timeline

On 4/26/21 at 1300 hours a worker's Personal Ammonia Monitor (ToxiRAE) alarmed at 6 parts per million (ppm). The worker was hand digging inside of an excavation on the east side of tank 241-AW-102 at the time of the ToxiRAE alarm. Ten individuals were working in the immediate area. All the workers exited the farm after placing work in a safe configuration. The Central Shift Manager (CSM) declared TF-AOP-015, "Response to Personal Ammonia Monitor Alarm" and restricted access to 241-AW-Farm. All of the ToxiRAE units from the work crew were quarantined and their data logs were downloaded.

At the time of the event the 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 (FFAPR) with gas/vapor cartridges.

Industrial Hygiene Technicians (IHTs) responded to the area and took Direct Reading Instrument (DRI) readings. DRI instrument readings were below action levels.

An Event Investigation Meeting wasn't held. Odor Response Cards, logbook entries, interviews, and document reviews provided sufficient information about the event.

Event Timeline:

1300 – The event initiating ToxiRAE (002651) alarmed at six (6) parts per million (ppm).

Approved for Public Release;
Further Dissemination Unlimited

1300 - The Tank Farm Projects Industrial Hygiene Technician (IHT) notified the Tank Farm Projects Industrial Hygienist (IH) of the ToxiRAE alarm.

1313 – The Production Operations (PO) IH arrived at the Central Shift Office

1315 – The PO IH reviewed the Data Fusion and Advisor System (DFAS) application, powered by SmartSite™, Weather Details Dashboard for current conditions.

1316 – The CSM briefed the PO IHs on the location of the ToxiRAE alarm.

1316 – The CSM declared TF-AOP-015, "Response to Personal Ammonia Monitor Alarm" and restricted access to 241-AW-Farm.

1317 - The Field Work Supervisor (FWS) notified WRPS Construction Manager of the ToxiRAE alarm.

1321 - The FWS notified the CSM of the ToxiRAE alarm.

1321 – The PO Shift IHT Supervisor and PO Shift IHT arrived at the Central Shift Office to support the response actions.

1322 – The Projects IHTs were told to discontinue farm sweeps and report to the Central Shift Office.

1326 – the CSM directed the FWS to sequester all worker ToxiRAEs.

~1340 - The CSM notified the DOE Facility Representative of the TF-AOP-015.

1342 – The event initiating ToxiRAE (002651) arrived at the Central Shift Office.

1348 – The remaining nine (9) worker ToxiRAEs utilized by the field crew arrived at the Central Shift Office.

1352 – The PO IH briefed the PO IHT on the field response.

1353 – The PO IH and PO IHT departed to the field. The IHT utilized a MultiRAE to look for potential sources of ammonia/tank vapors around all sides of the AW-02A pit. No sources of ammonia/tank vapors were detected.

1356 – The PO IHT Supervisor initiated the download and post-use function testing of the ToxiRAEs.

1400 – The workers and the FWS arrived at the Central Shift Office and were requested to complete Odor Response Cards.

1432 – All MultiRAE readings during the field response were less than the limit of detection.

1442 – The responding PO IHT informed the CSM of the field response readings. All readings were below actions levels.

1449 - Event Investigation EIR-2021-031 was initiated.

1451 - The CSM exited TF-AOP-015 and the access restriction to 241-AW-Farm was lifted.

Immediate Actions Taken:

- All the workers exited the farm after placing work in a safe configuration. Access to 241-AW-Farm was restricted.
- The workers were directed to fill out odor response cards. No workers reported smelling any odors and no workers reported any symptoms. Three workers identified the possible source of the ammonia to be from a Tracked Power Buggy (Georgia Buggy).
- Industrial Hygiene Technicians (IHTs) responded to the area and took Direct Reading Instrument (DRI) readings. DRI instrument readings were below action levels.
- The ToxiRAE instrument's (002651) post-use function test was satisfactory.
- Event Investigation EIR-2021-031 was initiated.
- The CSM exited TF-AOP-015 and the access restriction to 241-AW-Farm was lifted.

Compensatory Measures:

None.

Readings from Sampling and/or Monitoring:

• ToxiRAE 002651 (the event initiating ToxiRAE) reported the following data:
- Ammonia: Reported alarm of six (6) parts per million (ppm)
- Ammonia: Display and data log peak reading of six (6) ppm
- Ammonia: In the 20 minutes prior to the peak reading event, readings varied between zero (0) ppm and three (3) ppm
- Ammonia: Immediately after the peak reading of six (6) parts per million, the Personal Ammonia Monitor recorded four (4) ppm and recorded zero (0) ppm within nine minutes of the peak reading.

• ToxiRAE 003202
- Ammonia: Reported peak of two (2) ppm

• All other Personal Ammonia Alarms associated with this work activity either had peak readings of zero (0) or one (1) ppm.

• On 4/26/21 at 1300 hours the POR518 exhauster source ammonia reading was 12 ppm (Survey # 21-04587).

Site Wide Industrial Hygiene Database (SWHID) References:

- Event Response SWHID Direct Reading Instrument (DRI) Survey # 21-04581 "TF-AOP-015 Entry at 241-AW-Farm"
- Work Activity SWHID Air Survey # "AW-02A Pit (COPC)"
- Management Directed TFC-PLN-173 SWHID DRI Survey # 21-04545 "AW Hotel Load Area RAE"
- Management Direct TFC-PLN-173 SWHID DRI Survey # 21-04587 "AW Stack Readings"

Listing of IH Program(s) to Consider:

Data Fusion and Advisor System (DFAS) application, powered by SmartSite™

Facility Impact:

No impact to a facility occurred.

Discussion of Potential Source(s):

Per the Industrial Hygiene Investigation Report (IHIR-00014), at the time of the event, the worker whose ToxiRAE alarmed, was hand excavating inside of an excavation and the work crew was utilizing two Tracked Power Buggies (Georgia Buggy) to assist in moving the dirt from the excavation to the spoil pile area. When the ToxiRAE (002651) alarmed, one of the Georgia Buggy's had been started to move the dirt at the same time as the other Georgia Buggy arriving back to the excavation area from the spoil pile. The individual whose ToxiRAE alarmed had heard what he thought was the alarm and reached down to check his ToxiRAE. The worker had noted the ToxiRAE's concentration reading at five (5) parts per million at 1258 hours. The highest reading recorded of the other nine (9) ToxiRAE units was two (2) ppm at 1256 hours (003202).

On 4/5/21 IH conducted additional testing on the possibility of Georgia Buggy exhaust having caused the ToxiRAE alarm (IHIR-00009). Using a ToxiRAE and a MultiRAE IH tested the exhaust stream of the Georgia Buggy three (3) times. 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. No direct correlation between the magnitude of the VOC or carbon monoxide reading to the magnitude of the ammonia reading can be drawn.

A previous theory for the ToxiRAE alarm could have been caused by a cross interference of vapors or gasses released in the exhaust stream of the combustion engine. Further investigation into the electrochemical ammonia sensor utilized in the ToxiRAE units was performed. Technical Note 114, published by the ToxiRAE manufacturer, references common industrial gases cross interference signal of the ammonia electrochemical sensor. Carbon monoxide, carbon dioxide and hydrocarbons, the most prevalent constituents of combustion engine exhaust gas, were reported to have no cross interference with the sensor; lending the theory of cross interference to become decreasingly likely.

Alternatively, the ToxiRAE alarm could have been caused by physical impingement of the passive ammonia sensor as a result of being placed into the exhaust stream or other physical activities (i.e., covering the sensor with the workers' body part or clothing) required of the workers during the excavation activities.

IH's review of the DFAS application concluded the cause of the ToxiRAE alarm is unlikely to be from the 241-AW Exhauster emissions based on:

- Stability Class (C – Slightly unstable)
- Atmospheric Mixing Height (1300 feet above grade)
- Wind direction (West, 266 degrees). The AW-02A pit is located North of the 241-AW Exhauster
- Wind speed (6.4 miles per hour)

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

Given the review of the DFAS application data for the given time period, the comprehensive survey conducted by IH and the follow-up investigation of the equipment being used, it's unlikely that the ToxiRAE alarm was caused by a tank vapor associated event.

The likely cause of the 6 ppm alarm is a physical impingement of the passive ammonia sensor as a result of being placed into the exhaust stream or other physical activities. IH is working with the manufacturer of the ToxiRAE units to evaluate the potential causes of such events.

Corrective Actions:

- The IH and the Event Investigator will communicate the results of the investigation to the affected worker. [This is documented in action WRPS-CR-2021-3081-01]
- Communication of the findings of IHIR-00014 should be communicated to IH to further understand the behavior of the ToxiRAE units in the field. [This is documented in WRPS-CR-2021-3081-02]
- IH to complete its evaluation of the potential causes for physical impingement of the passive ammonia sensor with the ToxiRAE manufacturer. [WRPS-CR-2021-3081-03]

Condition(s) Adverse to Quality:

None were identified.

Discussion of Positive Aspects of the Event:

The IH field response was quickly initiated and implemented.

Attachments (as they apply):

1. Redacted Odor Response Cards (6 pages)
2. WRPS TF-AOP-015 Industrial Hygiene Investigation Report, IHIR-00014 (4 pages)
3. Industrial Hygiene Sample Plan (IHP-09001 R7) for TF-AOP-015 (1 page)
4. TF-AOP-015 Rev H-1, pages 10, 11, & 12 (3 pages)
5. Redacted CSM Log Book Entries (1 page)

Personnel Contacted:

[redacted] – Intermech
[redacted] – Intermech
[redacted] – WRPS, Safety Program Services RC/P
[redacted] – IH Program Subject Matter Experts

Responsible Manager:	[redacted] / Print (Fist and Last)	[redacted] / Signature	6-22-21 Date
Event Investigato	[redacted] Print (Fist and Last)	[redacted] Signature	6/22/21 Date

ODOR/VAPOR RESPONSE CARD - 241-AW FARM

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

- Date and time of event: 4-26-21 1:15 pm
- Check Applicable: ☐ Odor ☒ Alarm 6 ppm ☐ Alarm 12 ppm ☐ Alarm Other: _____
- Your name and the work your were performing: [redacted] Field Work Supervisor.
- Location of event *(mark area on map and wind direction)*: 102 east side of AW-02A pit
- Name(s) of others in or near the affected area: [redacted]
- Was an IHT present? Yes
- Describe the Odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☐ Rotten ☐ Onion ☐ Septic ☐ Ammonia ☐ Cleaning Solution ☐ Other: none
- Possible Source: Mud buggy
- 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: none

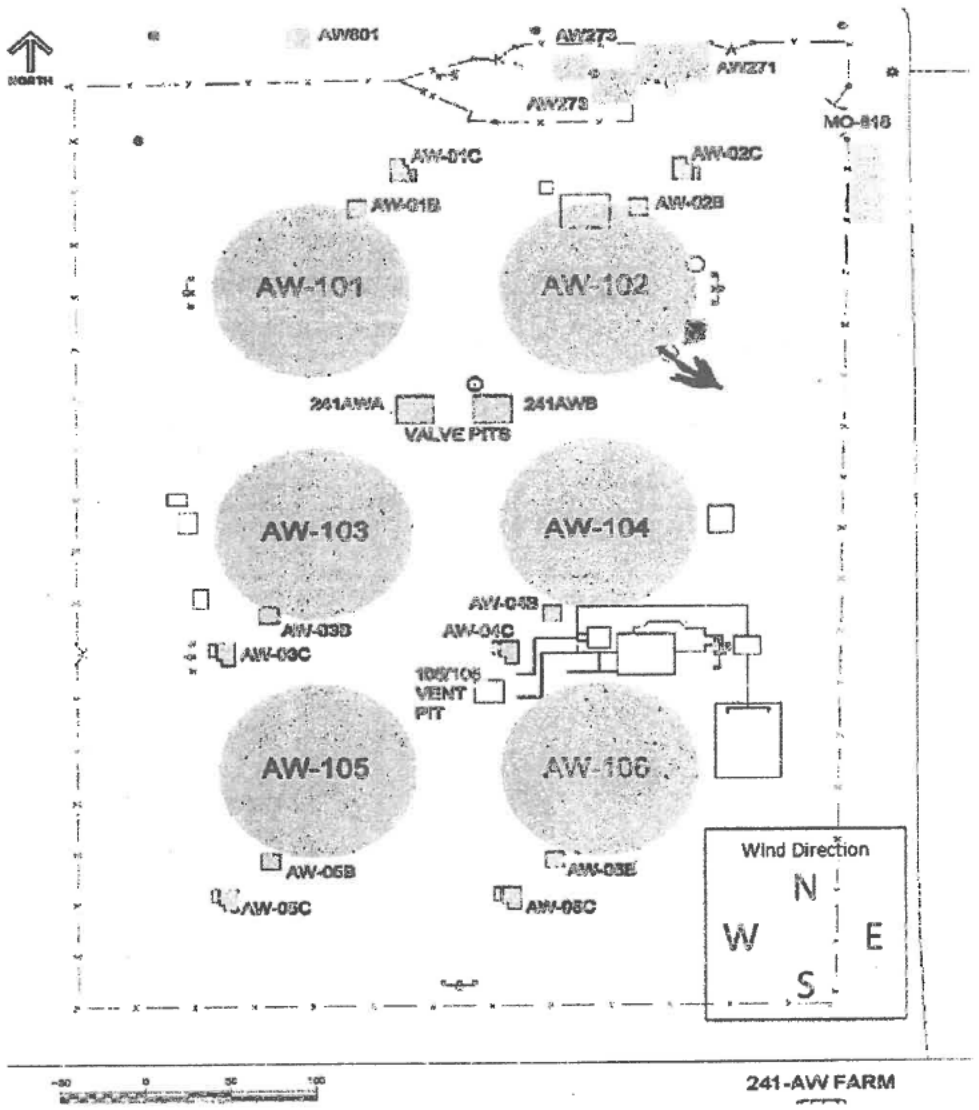
2. **Send this card to the Central Shift Office.**

[redacted]

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.**



[redacted]

ODOR/VAPOR RESPONSE CARD - 241-AW FARM

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

- Date and time of event: 4-26-21 1:15 pm
- Check Applicable: ☐ Odor ☒ Alarm 6 ppm ☐ Alarm 12 ppm ☐ Alarm Other: _____
- Your name and the work your were performing: [redacted] Laborer Foreman
- Location of event *(mark area on map and wind direction)*: 102 E Side of A-Pit
- Name(s) of others in or near the affected area: [redacted]
- Was an IHT present? Yes
- Describe the Odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☐ Rotten ☐ Onion ☐ Septic ☐ Ammonia ☐ Cleaning Solution ☒ Other: none
- Possible Source: Tow Mud Buggy
- 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: none

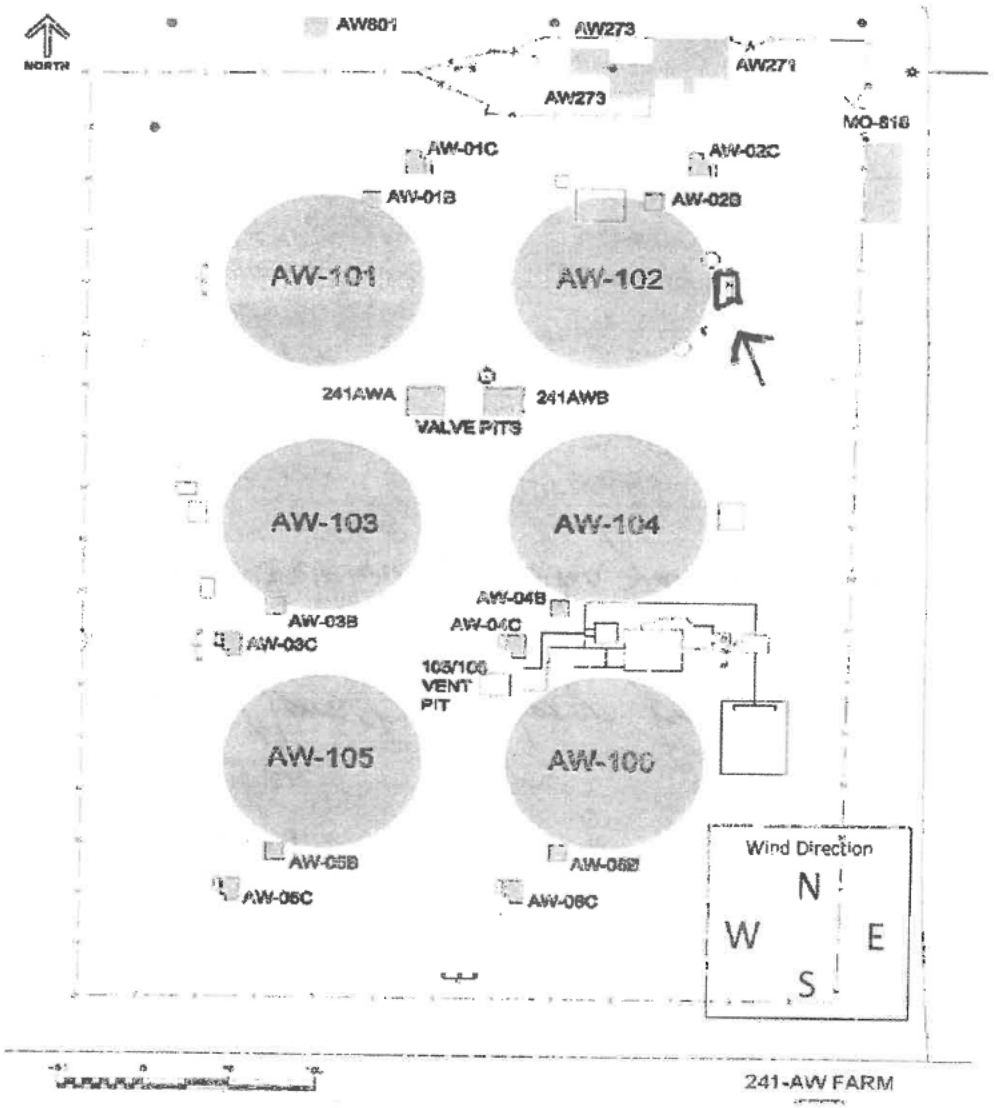
2. Send this card to the Central Shift Office.

[redacted]

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.**



[redacted]

ODOR/VAPOR RESPONSE CARD - 241-AW FARM

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

- Date and time of event: 26/Apr/21 13:15
- Check Applicable: ☐ Odor ☑ Alarm 6 ppm ☐ Alarm 12 ppm ☐ Alarm Other: _____
- Your name and the work your were performing: [redacted] Excavating / Laborer
- Location of event *(mark area on map and wind direction)*: 102 East side of 241AW A pit
- Name(s) of others in or near the affected area: [redacted]
- Was an IHT present? yes
- Describe the Odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☐ Rotten ☐ Onion ☐ Septic ☐ Ammonia ☐ Cleaning Solution ☑ Other: none
- Possible Source: Mud Buggy
- 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: None

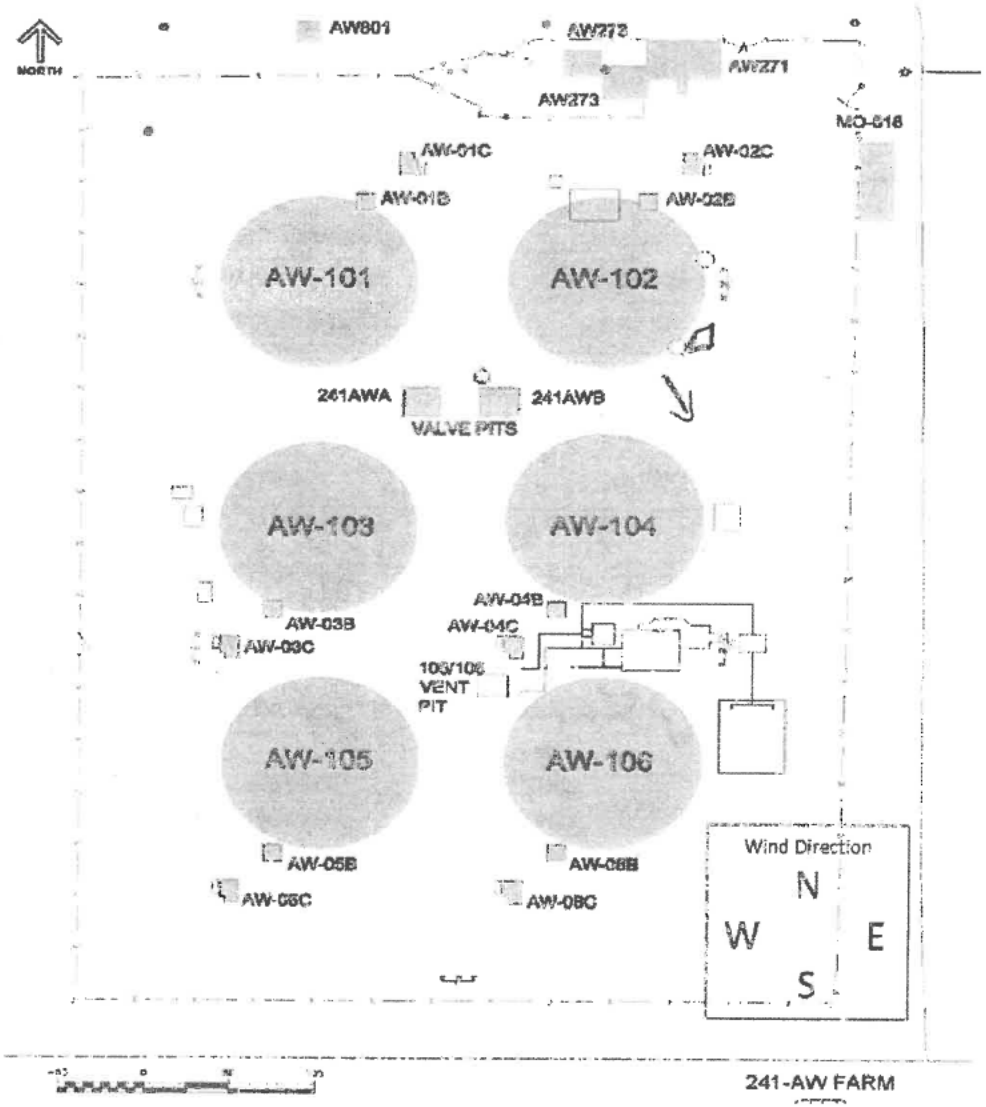
2. **Send this card to the Central Shift Office.**

[redacted]

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.**



[redacted]

INDUSTRIAL HYGIENE SAMPLE PLAN	Contractor:	IHSP Number
Exposure Assessment: [X] Job Specific: [ ]	Washington River Protection Solutions	IHP-09001 R7

Brief Job Description and Type of Area:
Response to ammonia monitor alarm.

INSTRUCTIONS

1. **Action Limits**
   Action Limit (Direct Reading Instrument)
   - Ammonia: 12 ppm

2. **Monitoring**
   - Source: Monitor possible source(s) to detect if there may be a noticeable increase in intensity or positive reading
   - Area: General area where employees/ammonia monitor identified the source

   If source is readily apparent, e.g. vehicle exhaust, septic systems, animal odors, inform shift office that source has been identified and await direction.

3. **Sampling**
   N/A

4. **Pre-Job Briefing Information**
   N/A

5. **Other**
   - An ammonia monitor that has alarmed will be documented in the appropriate database, detailing the alarmed event.
   - Industrial Hygiene Technician to monitor their way in using handheld direct reading instrument, moving from an upwind location if possible.
   - Additional direction for access control may be provided by the Shift Manager based upon monitoring results
   - An exclusion zone may be established or farm access restricted if air monitoring levels reach and remain above an action level.
   - This sample plan may be modified or increased based on direction from the Industrial Hygienist.

Did IHT Lead Review? Yes [ ] No [X]	If Yes, Lead IHT INITIAL	& DATE:

	IH Author	Print: [redacted] Sign:	Phone: [redacted]	Date: 11/30/20
N/A [ ]	IH Peer Review	Print: [redacted] Sign:	Phone: [redacted]	Date: 11/30/20
N/A [X]	IH Mgmt.	Print: Sign:	Phone:	Date:

Washington River Protection Solutions

INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT

Event Title:	PER Number:
TF-AOP-015 Entry at 241-AW Farm	N/A
	IHIR Number: IHIR-00014

Date:	Time:	Location:
04/26/2021	1300	241-AW Farm

Event Summary and Timeline:

Event Summary:

A Personal Ammonia Monitor alarmed and indicated 6 (six) parts per million ammonia inside 241-AW Farm near 241-AW-102.

Ten (10) workers were present at the time of Personal Ammonia Monitor alarm. Workers immediately exited and Projects Industrial Hygiene Technician notified Projects Industrial Hygienist.

Field Response Timeline:

1300 Approximate time of the Event

1300 Projects Industrial Hygiene Technician notifies Projects Industrial Hygienist a Personal Ammonia Monitor alarmed

1313 Production Operations Industrial Hygienists arrive at Central Shift Office

1315 Production Operations Industrial Hygienist reviews the Data Fusion and Advisor System (DFAS) application, powered by SmartSite™, Weather Details dashboard for current conditions:

- Stability Class: C (slightly unstable conditions)
- Mixing Height: thirteen-hundred (1300) feet above grade
- Wind Speed: six-point-four (6.4) miles per hour
- Wind Direction: two-hundred-sixty-six (266°) degrees (out of West)
- Production Operations Industrial Hygienist determines no additional restricted assess required beyond Affected Area

1316 Central Shift Manager briefs Production Operations Industrial Hygienists that Affected Area is in 241-AW Farm

1316 SOEN: "Entering TF-AOP-015 Response to Personal Ammonia Monitor Alarm for ToxiRAE alarm in AW Farm. Access to AW Farm is restricted. CSM."

1317 Additional Production Operations Industrial Hygienist arrives at Central Shift Office

1318 Production Operations Safety and Health Manager contacts Production Operations Industrial Hygienist:

- Projects Industrial Hygienist en-route to Central Shift Office to support field response actions

1321 Central Shift Manager contacts Projects Field Work Supervisor:

- Ten (10) personnel
- Operating "Georgia Buggy"

1321 Production Operations Shift Industrial Hygiene Technician Supervisor and Production Operations Shift Industrial Hygiene Technician arrive at Central Shift Office to support response actions

1322 Projects Field Work Supervisor contacts Central Shift Manager:

- Projects Industrial Hygiene Technicians currently in affected area performing sweep

1322 Production Operations Industrial Hygienists directs Central Shift Manager to direct Projects Field Work Supervisor for Projects Industrial Hygiene Technician to discontinue sweep and report to Central Shift Office

1325 Production Operations Shift Industrial Hygiene Technician departs Central Shift Office to acquire Direct Reading Instrumentation

1326 Central Shift Manager contacts Projects Field Work Supervisor

- Request sequestration of all Personal Ammonia Monitors present in the field at the time of Initiating Event
- Medical surveillance offered and declined

1342 Production Operations Industrial Hygiene Technician arrives at the Central Shift Office with Direct Reading Instrumentation

Field Response Timeline continued on next page

Event Summary and Timeline:

Field Response Timeline (continued):

1342 Project Industrial Hygienist and Industrial Hygiene Technician arrive at the Central Shift Office with Personal Ammonia Monitor that alarmed

1348 Remainder of the Personal Ammonia Monitors utilized by the field crew arrive at the Central Shift Office

1352 Initial briefing for field response from Production Operations Industrial Hygienist to the Production Operations Industrial Hygiene Technician

1353 Project Industrial Hygienist and Production Operations Industrial Hygiene Technician depart to the field

1356 Production Operations Industrial Hygiene Technician Supervisor initiates download and post-use function testing of the Personal Ammonia Monitors

1400 Affected personnel and Project Field Work Supervisor arrive at the Central Shift Office and populate the Odor Response Cards

1432 All MultiRAE readings during the field response were less than the limit of detection

1442 Responding Production Operations Industrial Hygiene Technician informs the Central Shift Manager the readings of the field response

Sampling/Monitoring Results:

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 002651 (event initiating ToxiRAE):
- Ammonia: Reported alarm of six (6) parts per million
- Ammonia: Display & Data Log Peak Reading of six (6) parts per million (Data Log Line 418 @ 12:58)
- Ammonia: In the 20 minutes prior to the Peak Reading Event, Readings varied between zero (0) parts per million and three (3) parts per million (Data Log Lines 398-417)
- Ammonia: Immediately after the peak reading of six (6) parts per million, the Personal Ammonia Monitor recorded four (4) parts per million (Data Log Line 419) and recorded zero (0) parts per million within nine minutes of the peak reading (Data Log Line 427).

ToxiRAE 003202
- Ammonia: Reported peak of two (2) parts per million (Data Log Line 366 @ 12:56)

All other Personal Ammonia Monitors associated with this work activity either had peak recordings of zero (0) or one (1) parts per million.

SWIHD References:

- Event Response Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument (DRI) Survey # 21-04581 "TF-AOP-015 entry at 241-AW Farm"
- Work Activity Site Wide Industrial Hygiene Database (SWIHD) Air Survey # 21-04453 "AW-02 A Pit(COPC)"
- Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI) Survey # 21-04545 "AW Hotel Load Area RAE"
- Management Directed TFC-PLN-173 Site Wide Industrial Hygiene Database (SWIHD) Direct Reading Instrument(DRI) Survey # 21-04587 "AW stack readings" (Stack Readings)

Additional Information:

At the time of the initiating event the Affected Workers were wearing Respiratory Protection

Additional Information:

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 002651 (event initiating ToxiRAE):
- Unit Name: ToxiRAE Pro (PGM-1860)
- Unit Serial Number (SN): G024009081
- User ID: TOXI2651
- Measure Type: Max
- Datalog Mode: Continuous
- Datalog Type: Auto
- Sample Period: sixty (60) seconds
- Calibration Time: 2/9/2021 @ 14:21
- Passed bump test 4/26/2021 @ 14:30

ToxiRAE 003202 (present at initiating event, peak reading of two (2) parts per million):
- Calibration Time: 3/8/2021 @ 07:04

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 # 21-04587 "AW stack readings":
  - 04/26/2021 @ 1300 POR518 Source Ammonia Reading: 12.0 parts per million

At the time of the event, the individual whose ToxiRAE alarmed was hand excavating inside of an excavation along the east side of the AW-102A pit. The crew was utilizing two Georgia Buggy's to assist in moving the dirt from the excavation to the spoil pile area. When the ToxiRAE alarmed(ID# 002651), one of the Buggy's had been started to move the dirt at the same time as the other Buggy arriving back to the excavation from the spoil pile. The individual whose ToxiRAE alarmed had heard what he thought was the alarm, reached down to check his ToxiRAE and noted the concentration reading five (5) parts per million at approximately 12:58 pm. At that time, the work crew proceeded to place the work into a safe configuration. All ToxiRAE units from the crew were quarantined and their data logs were downloaded. The highest reading recorded of the other nine units was two (2) parts per million at 12:56 pm (ID#003202). IHIR-00009 references a similar event occurring three weeks prior on 4/5/2021. Below is a summary of the follow-up investigation pertaining to that event.

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.

	Readings		
Functionality Test	Ammonia (ppm)	VOC (ppb)	Carbon Monoxide (ppm)
ToxiRAE			
• Test 1	5 ppm	N/A	N/A
• Test 2	6 ppm	N/A	N/A
• Test 3	3 ppm	N/A	N/A
MultiRAE:			
• 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.

A previous theory for the ToxiRAE alarm could have been caused by a cross interference of vapors or gases released in the exhaust stream of the combustion engine. Further investigation into the electrochemical ammonia sensor utilized in the ToxiRAE units was performed. Technical Note 114, published by Honeywell, references common industrial gases cross interference signal of the ammonia electrochemical sensor. Carbon monoxide, carbon dioxide and hydrocarbons, the most prevalent constituents of combustion engine exhaust gas, were reported to have no cross interference with the sensor; lending the theory of cross interference to become decreasingly likely.

Alternatively, the ToxiRAE alarm could have been caused by a physical impingement of the passive ammonia sensor as a result of being placed into the exhaust stream or other physical activities(i.e. covering the sensor with the workers' body part or clothing) required of the workers during excavation activities. Further investigation of this possibility needs to be performed by the Industrial Hygiene Department.

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 [1300 feet above grade]
- Wind Direction [West, 266 degrees]
  - o AW-02A Pit is located North of 241-AW Exhauster
- Wind Speed [6.4 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.

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. Previous work with ToxiRAE units(ref. IHIR-00009) indicated the potential for false readings above the 6 ppm and 12 ppm ammonia thresholds. The likely cause of the 6 ppm alarm is a physical impingement of the passive ammonia sensor as a result of being placed into the exhaust stream or other physical activities. Industrial Hygiene is working with Honeywell and investigating the potential causes of such events.

Other:

N/A

Industrial Hygienist:

[redacted] [redacted]

Print First and Last Name *Signature / Date*

Industrial Hygiene Level 2 Manager:

[redacted] [redacted]

Print First and Last Name *Signature / Date*

5.0 RECORDS

5.1.1 **PERFORM** the following for records identified within this procedure.

5.1.1.1 **RECORD** the number of times the record was generated in applicable column

OR

PLACE a check mark (✓) in the N/A column.

5.1.1.2 **SUBMIT** the package for verification of completed records.

Records Submittal Checklist	Number of times completed	N/A (✓)
Attachments		
Attachment 1 – Initial Communication Template (Printed copy of electronic version)	2	
Attachment 2 - Follow-Up Event Summary (Printed copy of electronic version)	2	
FWS/OE/Shift Manager **SEND** the completed records to the Central Shift Office for records retention.		
[redacted] / [redacted] / 4/26/21 Signature FWS/OE/Shift Manager — Print (First & Last) — Date		

The record custodian identified in the company-level Records Retention and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

Attachment 2 - Follow-Up Event Summary

The following is example of detail to provide in the electronic form of Follow-Up Event Summary.

TF-AOP-015 Initial Report		
Date: 4/26/2021	Time: 1300 hours	Location: AW Farm
Number of Workers Involved: 10	Sampling Results #: 21-04581	

Event Summary

At approximately 1300 hours 10 workers were performing excavation in AW Farm when one of the worker's ToxiRAE alarmed at 6ppm. The workers placed their work in a safe configuration and left the Farm. Initially no workers reported symptoms and declined medical evaluations.

At the time the change in vapor condition was reported, the individuals were working in an area requiring use of respiratory protection, and were wearing FFAPRs. All workers were instructed to leave the area. Access to the area was restricted.

IHTs responded to the area and took DRI readings. DRI instrument readings were below action levels. The instrument post-use function test was satisfactory and access was restored.

An event investigation has been initiated.

Return to Work Status

Number of workers returned to work without restriction	N/A
Number of workers returned to work with restriction	N/A
Number of workers referred for further evaluation	N/A

NOTE - Form is to be completed once event is stabilized and all details are known.
- To learn more about chemical exposure evaluations see http://hanfordvapors.com/wp-content/uploads/2016/09/2a-HPMC-procedure.pdf

[redacted] / [redacted] / 4/26/21

Signature
Central Shift Manager

Print (First & Last)

Date

Attachment 1 – Initial Communication Template

The following is example of detail to provide in the electronic form of Communication Template.

One Hanford workers has declined precautionary medical evaluation after reporting unexpected changes to vapor conditions at AW Farm. No workers reported symptoms.

The employee was digging in a trench at the time of reported personal ammonia monitor alarm and was in an area that requires use of respiratory protection.

Workers were instructed to leave the area, and access to the area has been restricted.

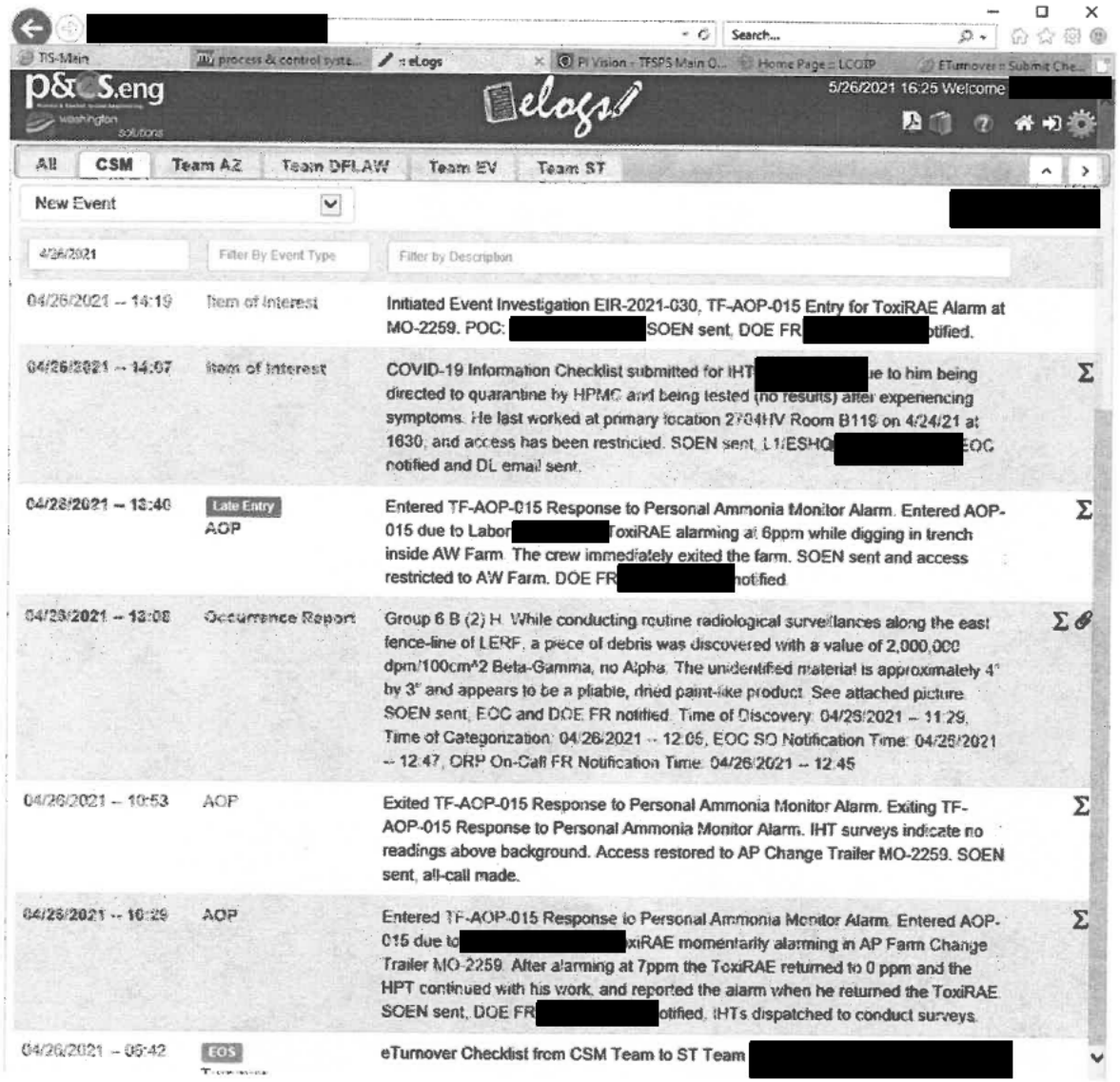
NOTE - This communication template is to be completed as soon as enough information is available.

[redacted] / [redacted] / 4/26/21

Signature
Central Shift Manager

Print (First & Last)

Date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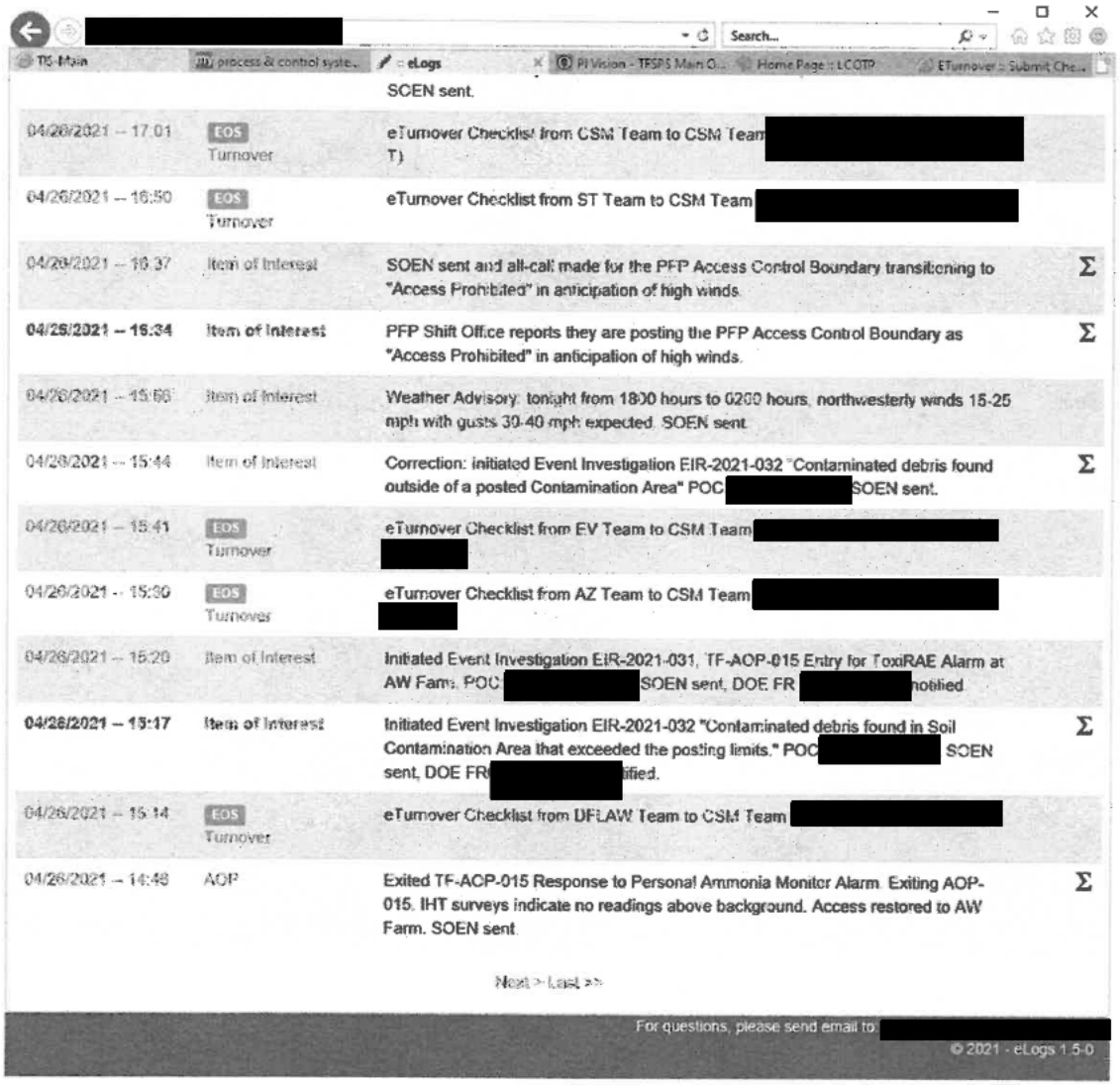
5/26/2021 16:25 Welcome
All
CSM
Team AZ
Team DFLAW
Team EV
Team ST
New Event
4/26/2021
Filter By Event Type
Filter by Description
04/26/2021 -- 14:19
Item of Interest
Initiated Event Investigation EIR-2021-030, TF-AOP-015 Entry for ToxiRAE Alarm at MO-2259. POC: [redacted] SOEN sent, DOE FR[redacted]otified.
04/26/2021 -- 14:07
Item of Interest
COVID-19 Information Checklist submitted for IHT[redacted]e to him being directed to quarantine by HPMC and being tested (no results) after experiencing symptoms. He last worked at primary location 2704HV Room B119 on 4/24/21 at 1630, and access has been restricted. SOEN sent, L1/ESHQ[redacted]EOC notified and DL email sent.
04/26/2021 -- 13:40
Late Entry
AOP
Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Entered AOP-015 due to Labor[redacted]ToxiRAE alarming at 6ppm while digging in trench inside AW Farm. The crew immediately exited the farm. SOEN sent and access restricted to AW Farm. DOE FR[redacted]notified.
04/26/2021 -- 13:08
Occurrence Report
Group 6 B (2) H. While conducting routine radiological surveillances along the east fence-line of LERF, a piece of debris was discovered with a value of 2,000,000 dpm/100cm^2 Beta-Gamma, no Alpha. The unidentified material is approximately 4" by 3" and appears to be a pliable, dried paint-like product. See attached picture. SOEN sent, EOC and DOE FR notified. Time of Discovery: 04/26/2021 -- 11:29, Time of Categorization: 04/26/2021 -- 12:05, EOC SO Notification Time: 04/26/2021 -- 12:47, ORP On-Call FR Notification Time: 04/26/2021 -- 12:45
04/26/2021 -- 10:53
AOP
Exited TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Exiting TF-AOP-015 Response to Personal Ammonia Monitor Alarm. IHT surveys indicate no readings above background. Access restored to AP Change Trailer MO-2259. SOEN sent, all-call made.
04/26/2021 -- 10:29
AOP
Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Entered AOP-015 due to [redacted]oxiRAE momentarily alarming in AP Farm Change Trailer MO-2259. After alarming at 7ppm the ToxiRAE returned to 0 ppm and the HPT continued with his work, and reported the alarm when he returned the ToxiRAE. SOEN sent, DOE FR[redacted]otified. IHTs dispatched to conduct surveys.
04/26/2021 -- 05:42
EOS
eTurnover Checklist from CSM Team to ST Team [redacted]



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		SCEN sent.	
04/26/2021 -- 17:01	EOS Turnover	eTurnover Checklist from CSM Team to CSM Team [redacted] T)	
04/26/2021 -- 16:50	EOS Turnover	eTurnover Checklist from ST Team to CSM Team [redacted]	
04/26/2021 -- 16:37	Item of Interest	SOEN sent and all-call made for the PFP Access Control Boundary transitioning to "Access Prohibited" in anticipation of high winds.	Σ
04/26/2021 -- 16:34	**Item of Interest**	PFP Shift Office reports they are posting the PFP Access Control Boundary as "Access Prohibited" in anticipation of high winds.	Σ
04/26/2021 -- 15:56	Item of Interest	Weather Advisory: tonight from 1800 hours to 0200 hours, northwesterly winds 15-25 mph with gusts 30-40 mph expected. SOEN sent.	
04/26/2021 -- 15:44	Item of Interest	Correction: initiated Event Investigation EIR-2021-032 "Contaminated debris found outside of a posted Contamination Area" POC [redacted] SOEN sent.	Σ
04/26/2021 -- 15:41	EOS Turnover	eTurnover Checklist from EV Team to CSM Team [redacted]	
04/26/2021 -- 15:39	EOS Turnover	eTurnover Checklist from AZ Team to CSM Team [redacted]	
04/26/2021 -- 15:20	Item of Interest	Initiated Event Investigation EIR-2021-031, TF-AOP-015 Entry for ToxiRAE Alarm at AW Farm. POC [redacted] SOEN sent, DOE FR [redacted] notified.	
04/26/2021 -- 15:17	**Item of Interest**	Initiated Event Investigation EIR-2021-032 "Contaminated debris found in Soil Contamination Area that exceeded the posting limits." POC [redacted] SOEN sent, DOE FR [redacted] ified.	Σ
04/26/2021 -- 15:14	EOS Turnover	eTurnover Checklist from DFLAW Team to CSM Team [redacted]	
04/26/2021 -- 14:48	AOP	Exited TF-ACP-015 Response to Personal Ammonia Monitor Alarm. Exiting AOP-015. IHT surveys indicate no readings above background. Access restored to AW Farm. SOEN sent.	Σ

Next > Last >>

For questions, please send email to [redacted]

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