

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: Projects/Construction/Transfer Line Installation from 242-A to 241-AW **Date:** 02/11/2022

Area/Building/Location: 200E/241-AW/217-AW(AW Farm Change Tent) **Approximate Time of Event:** 1021

AR Number: WRPS-AR-2022-0812 **Responsible Manager:** [REDACTED]

EIR Number: EIR-2022-013 (Rev.1) **Event Investigator:** [REDACTED]

EVENT SUMMARY PART I

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

Workers were supporting the following work evolutions associated with the transfer line installation from 242-A to 241-AW:

- WO# 628182, Project T1P207: Perform Excavations in 241-AW, South of 4th Street
- WO# 628200, Project T1P207: Perform Installation of Transfer Piping and Partial Backfill

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

- 1 Intermech Laborer
- 1 Intermech Laborer Foreman
- 1 Intermech Pipefitter/Welder

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

On February 11, 2022, at approximately 1021, three individuals performing work activities associated with the transfer line installation from the 242-A Evaporator to the 241-AW Farm had exited AW Farm through the AW Farm Change Tent (217-AW). While inside the AW Farm Change Tent (217-AW), one worker's ToxiRAE personal ammonia monitor alarmed, indicating a 6 part per million (ppm) Response Level. Neither of the other two co-located workers' ToxiRAE personal ammonia monitors alarmed. The initiating ToxiRAE personal ammonia monitor cleared immediately following the alarm activation and all personnel exited the AW Farm Change Tent (217-AW).

The workers reported they did not smell an odor at the time of the ToxiRAE personal ammonia monitor alarm. In addition, they reported experiencing no symptoms and declined precautionary medical surveillance.

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

Workers were inside the AW Farm Change Tent (217-AW), which is located along the northwest 241-AW Tank Farm boundary. Weather conditions inside the AW Farm Change Tent (217-AW) would not be applicable due to being an indoor temperature controlled environment. However, given the close proximity to AW Tank Farm, the outdoor weather details at the approximate time of the ToxiRAE alarm were evaluated utilizing the Hanford Meteorological Station #6 (200E) data at 1015. According to the on-duty forecaster, the weather conditions at 1015 on 02/11/2022 obtained from the Hanford Meteorological Station #6 (200E) indicated the following:

- Wind Speed: 5.0 miles per hour with gusts up to 10.0 miles per hour
- Wind Direction: 340° (out of North/Northwest)
- Mixing Height: 1500 feet above grade

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

Access was restricted to the AW Farm Change Tent (217-AW) for ~35 minutes. All remaining personnel in AW Farm were instructed to utilize the AW Farm Change Trailer when exiting AW Farm. No additional impacts to scheduled 02/11/2022 work evolutions occurred.

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

- 1) Workers notified the Industrial Hygiene Technician (IHT) supporting the work evolution and their Field Work Supervisor (FWS).
- 2) Workers exited the AW Farm Change Tent (217-AW) after the ToxiRAE personal ammonia monitor alarmed.
- 3) IHT contacted the Central Shift Manager (CSM), notifying them of the ToxiRAE personal ammonia monitor alarm.
- 4) CSM offered precautionary medical surveillance to workers. Workers declined medical surveillance.

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Projects/Construction/Transfer Line Installation from 242-A to 241-AW Date: 02/11/2022

Area/Building/Location: 200E/241-AW/217-AW(AW Farm Change Tent) Approximate Time of Event: 1021

AR Number: WRPS-AR-2022-0812 Responsible Manager: [REDACTED]

EIR Number: EIR-2022-013 (Rev.1) Event Investigator: [REDACTED]

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

- 5) CSM entered TF-AOP-015 for the AW Farm Change Tent (217-AW).
- 6) Access was restricted to the AW Farm Change Tent (217-AW).
- 7) CSM made required TF-AOP-015 notifications.
- 8) Production Operations shift IHTs initiated TF-AOP-015 response actions and monitoring per IHP-09001.
- 9) Affected workers' ToxiRAE personal ammonia monitors were sequestered by the IHTs supporting the work evolution and the instrument data-logs were downloaded.
- 10) Event Investigation EIR-2022-013 was initiated.

Notifications Already Made (Time and personnel notified):

02/11/2022

[1037]- Industrial Hygiene Technician (IHT) supporting the work evolution contacted the CSM, providing the following information:

- A workers ToxiRAE personal ammonia monitor alarmed at the 6ppm Response Level while inside the 217-AW Change Tent, however, the alarm activated and then cleared almost immediately.
- At the time of alarm, there were a total of 3 personnel inside of 217-AW Change Tent. There were no additional alarms from the other workers ToxiRAE personal ammonia monitors.
- There were no additional Direct Reading Instrumentation (DRI) equipment inside the 217-AW Change Tent at the time of the ToxiRAE alarm.
- None of the worker detected an odor while in the 217-AW Change Tent or reported exhibiting symptoms.
- All three workers declined medical evaluation.
- Workers had exited the 217-AW change tent after the ToxiRAE personal ammonia monitor alarmed.

[1045]- CSM contacted the on-call Department of Energy (DOE) Office of River Protection (ORP) Facility Representative (FR).

[1045]- CSM provided radio announcement and initiated SOEN "Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm for ToxiRAE alarm with 6 ppm ammonia in 217-AW Change tent. Access to 217-AW change tent is restricted. Personnel may exit AW Farm via AW Change Trailer. CSM."

[1121]- CSM initiated SOEN "Exited TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Response actions for the TF-AOP-015 event have been completed and the results are at or below background levels. Exiting TF-AOP-015. Normal access to 217-AW is restored. CSM." CSM made radio announcement and notified ORP FR.

[1147]- CSM initiated SOEN "Initiated Event Investigation EIR-2022-013, TF-AOP-015 Event at 217-AW Change Tent". POC: [REDACTED], CSM notified ORP FR.

This event does not merit an Event Investigation meeting

This event merits an Event Investigation meeting

Basis for Determination:

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

Responsible Manager:

[REDACTED]
Print First and Last Name

[REDACTED]
Digitally signed by [REDACTED]
Date: 2022.02.14 14:56:46 -08'00'
Signature / Date

CAS Manager:

[REDACTED]
Print First and Last Name

[REDACTED]
Digitally signed by [REDACTED]
Date: 2022.02.14 14:59:50 -08'00'
Signature / Date

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Projects/Construction/Transfer Line Installation from 242-A to 241-AW **Date:** 02/11/2022

Area/Building/Location: 200E/241-AW/217-AW(AW Farm Change Tent) **Approximate Time of Event:** 1021

AR Number: WRPS-AR-2022-0812 **Responsible Manager:** [REDACTED]

EIR Number: EIR-2022-013 (Rev.1) **Event Investigator:** [REDACTED]

EVENT SUMMARY PART II

Key Elements of the Investigation (Key investigation points):

IHIR-00029, "AOP-015 Entry inside of AW Change Tent" concluded the ToxiRAE personnel ammonia monitor 6 ppm Response Level alarm was resultant of sensor drift and increasing sensitivity to external stimuli by the electrochemical sensor, resulting in a false positive bias and alarm, and not an indication of changing Tank Farm conditions related to Tank Farm vapors.

Investigation concluded the following:

(1) Evaluation of the weather details determined the cause of the personal ammonia alarm was unlikely to be resultant of Tank Farms exhauster emissions based on the wind direction, wind speed, and mixing height at the reported time of event. Review of the Data Fusion and Advisor System (DFAS) dashboard application, powered by SmartSite™, was not reporting weather details at the reported time of event, therefore, meteorological conditions were obtained from the Hanford Meteorological on-duty forecaster. Similar wind direction, wind speed, and mixing height was identified as occurring on 02/14/2022 at 1640 thus the DFAS exhaust plume modeling at 1640 on 02/14/2022 can be utilized to estimate the exhaust plumes at the reported time of the event. Attachment A provides a model of the estimated exhaust plumes based on wind speed, wind direction, and mixing height. DFAS modeling shows no exhaust plumes were within the AW Farm Change Tent (217-AW) location at the reported time of the event.

(2) Ammonia is used as a sentinel Tank Waste Chemical Vapor for chemicals of potential concern (COPC), therefore, DRI equipped with an ammonia sensor is utilized at a minimum when monitoring for Tank Waste Chemical Vapors/COPCs. Additional COPC monitoring was conducted concurrently with ammonia monitoring during the TF-AOP-015 event response utilizing a 10.6 electron Volts (eV) photo ionization detector for Volatile Organic Compounds (VOCs). Field response DRI monitoring indicated area readings within the AW Farm Change Tent (217-AW) were below background levels with less than detectable concentrations for ammonia (<1 ppm) and VOCs (<0.010 ppm).

(3) Review of the datalogs associated with the two non-initiating ToxiRAE personnel ammonia monitors worn by individuals that were also within the AW Farm Change Tent (217-AW) at the time of the initiating event indicated peak ammonia readings below the 6 ppm Response Level.

(4) Diagnostic testing of the event initiating ToxiRAE personnel ammonia monitor (ToxiRAE 003054) indicated sensor counts relative to sensor voltage were within Manufacturer's specification. However, review of the datalog associated with the initiating ToxiRAE personnel ammonia monitor (ToxiRAE 003054) indicated concentration fluctuation consistently ranging between 1 ppm to 5 ppm prior to the time of the event. Consistent fluctuation between 1 ppm to 5 ppm is indicative of sensor drift.

(5) Blocking the gas inlet of the ToxiRAE, high humidity, and/or water droplets can disturb diffusion into the ToxiRAE sensor, leading to false readings. Functionality testing indicated the event initiating ToxiRAE personnel ammonia monitor (ToxiRAE 003054) was easily induced to produce false positive ammonia results when the sensor was covered. The personnel ammonia monitor began alarming within 10-15 seconds after the instrument inlet was covered. Rapid alarm response to a non-target chemical stimuli is indicative of a sensor beginning to fail or nearing the end of its useful life.

Investigation noted the associated ammonia sensor of the initiating ToxiRAE 003054 personnel ammonia monitor had been in service for 1075 days. Sensor drift and increasing sensitivity to external stimuli after ~35 months of service life would not be considered abnormal or unexpected.

Washington River Protection Solutions
EVENT SUMMARY (Continued)

Project: Projects/Construction/Transfer Line Installation from 242-A to 241-AW Date: 02/11/2022

Area/Building/Location: 200E/241-AW/217-AW(AW Farm Change Tent) Approximate Time of Event: 1021

AR Number: WRPS-AR-2022-0812 Responsible Manager: [REDACTED]

EIR Number: EIR-2022-013 (Rev.1) Event Investigator: [REDACTED]

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

The event initiating ToxiRAE Pro (003054) was removed from service as a result of concentration fluctuation observed on the ToxiRAE Pro datalog and functionality testing indicating when the sensor was covered, the instrument easily produced false positive ammonia results and initiated an alarm response to non-target chemical stimuli.

Lessons Learned or Information That the Work Force Needs Immediately:

None.

- 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:

Investigation determined the ToxiRAE personnel ammonia monitor alarm was not an indication of an employee chemical exposure event or changing Tank Farm conditions related to Tank Farm vapors, and was resultant of ToxiRAE sensor performance(i.e. sensor drift and increasing sensitivity to external stimuli).

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-00029, AOP-015 Entry inside of AW Change Tent" form the basis that further investigation will provide no additional information or operational benefit. Further actions will be managed under WRPS-AR-2022-0812 in the iCAS system.

Responsible Manager:

[REDACTED]
Print First and Last Name

[REDACTED] Digitally signed by [REDACTED]
Date: 2022.03.10 11:53:51 -08'00'
Signature / Date

CAS Manager:

[REDACTED]
Print First and Last Name

[REDACTED] Digitally signed by [REDACTED]
Date: 2022.03.10 11:51:27 -08'00'
Signature / Date

EIR-2022-013 Attachment 1

Note: DFAS Exhauster Potential Exposure Zone Model Showing Comparable Wind Direction, Wind Speed, and Mixing Height observed on 02/14/2022 @1640

*Indicates actual conditions on 02/11/2022 @1015

- Wind Direction: 330° *(340°)
- Wind Speed: 4.8 mph *(5.0 mph)
- Mixing Height: 1480 feet *(1500 feet)

AW Farm Change Tent
217-AW ★

Estimated AW Exhauster PEZ



Washington River Protection Solutions
INDUSTRIAL HYGIENE EVENT INVESTIGATION REPORT

Event Title: <p style="text-align: center;">AOP-015 Entry Inside of AW Change Tent .</p>	PER Number: <p style="text-align: center;">WRPS-AR-2022-0812</p>
IHIR Number: <p style="text-align: center;">IHIR-00029</p>	

Date: 2/11/2022	Time: ~1020	Location: Inside of 217-AW1 Farm Change Tent
---------------------------	-----------------------	--

Event Summary and Timeline:

Event Summary:

At approximately 1020 on February 11th, 2022, three individuals supporting the AW Transfer Line Installation packages were exiting AW Farm through the 217-AW1 Change Tent when one of the workers' ToxiRAE's alarmed at the instrument response level of 6 parts per million(ppm). Following the alarm, the ToxiRAE quickly fell below the response level. All personnel exited the 217-AW1 Change Tent.

Field Response Timeline:

1037 Industrial Hygiene Technician supporting the work contacted the Central Shift Office of the alarming ToxiRae

1045 Central Shift Office initiated SOEN "Entered TF-AOP-015 Response to Personal Ammonia Monitor Alarm for ToxiRae Alarm with 6 ppm ammonia inside of 217-AW Change Tent. Access to 217-AW Change Tent is Restricted. CSM."

1048 Central Shift Manager calls Tank Farm Project Safety and Health Manager for response actions.

1105 Tank Farm Project Safety and Health Manager briefs the Central Shift Manager and responding IHT's of the response actions.

1121 Central Shift Manager initiated SOEN: "Exiting TF-AOP-015 Response to Personal Ammonia Monitor Alarm. Response actions for the TF-AOP-015 event have been completed and the results are at or below background levels. Exiting TF-AOP-015. Normal access to 217-AW is restored. CSM."

1147 Central Shift Manager initiated SOEN "Initiated Event Investigation EIR-2022-013, "TF-AOP-015 Event at 217-AW Change Tent". POC: [REDACTED]."

Sampling/Monitoring Results:

ToxiRAE 003054 (Event Initiation ToxiRAE):
 Ammonia: Peak of 6 ppm on instrument display
 Ammonia: Peak of 6 ppm on data log at 1021 with variation between 0-5 ppm in the hours leading up

ToxiRAE 003593 (co-located ToxiRAE):
 Ammonia: Peak of 0 ppm on instrument display
 Ammonia: Peak of 0 ppm on data log with no variation in the hours leading up

ToxiRAE 002607 (co-located ToxiRAE):
 Ammonia: Peak of 0 ppm on instrument display
 Ammonia: Peak of 2 ppm on data log at 1231 with variation between 0-1 ppm in the hours leading up

Two Industrial Hygiene Technicians(IHT's) responded to the 217-AW1 Change Tent per verbal direction from the Project IH. DRI monitoring results for Ammonia and VOC's were 0 ppm. No odors were detected.

SWIHD References:

Event Response Site Wide Industrial Hygiene Database Direct Reading Instrument Survey # 22-01344

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

Additional Information:

The ToxiRae response time (t90), the time needed for the ToxiRAE to read 90% full-scale of the true concentration of ammonia, is 60 seconds. Blocking the gas inlet of the ToxiRAE, high humidity, and/or water droplets can disturb diffusion into the sensor, leading to false readings. The Wearable Ammonia Detector Field Trial report (RPP-RPT-61096) stated that false positive concentration readings (positive bias) can be expected up to 4 ppm with the ToxiRAE Pro.

As a follow up to the event, an IHT performed field testing of the event initiating instrument consisting of covering the sensor and monitoring the response. Within 10 seconds of covering the sensor, the instrument alarmed at the low level of 6 ppm. Consistent with previous Industrial Hygiene Event Investigation Reports (IHIR), sensors exhibiting rapid alarm response to non-target chemical stimuli is indicative of a sensor beginning to fail. As a note, a Programs IHT conducted voltage testing of the event initiating ToxiRAE's sensor and were found to be within the manufacturer's specifications. Although the sensor had within range voltage measurements, analysis of the data download of the event initiating ToxiRAE indicated significant drift in instrument response in the hours leading to the event.

Review of the Data Fusion and Advisor System (DFAS) application, powered by SmartSite™, Weather was unavailable for the time of event as the system was non-operational. According to the on-duty forecaster, the weather conditions at 1015 on 2/11/2022 obtained from the Hanford Meteorological Station #6 (200E) indicated the following:

- Stability Class (unknown)
- Atmospheric Mixing Height [1500 feet above grade]
- Wind Direction [West, 340 degrees]
 - Tent is located North of 241-AW Exhauster
- Wind Speed [5.0 to 10.0 miles per hour miles per hour]

Recommendations/Conclusions:

Washington River Protection Solutions (WRPS) Industrial Hygiene Department has established a conservative, reasonable, and data-derived response level of 6 ppm for Personal Ammonia Monitor concentrations associated with tank waste gases/vapors in the Hanford Tank Farms. The intent of this response level is to enhance the safety of Hanford Tank Farm workers by establishing a conservative and timely indicator of potential changing conditions in Tank Farm gas/vapor conditions, at which prudent and protective investigative measures may be taken.

Taking into consideration all of the factors of the incident previously mentioned in this report: the environment the worker(s) were in while the ToxiRAE alarmed (inside 217-AW Change Tent), the co-located ToxiRAE's, all workers reporting no odors or symptoms, the atmospheric data during the event, the proximity of the Change Tent relative to the AW Exhauster, other tank farms and the supplemental follow up testing of the alarming ToxiRAE, it is unlikely this event is an indication of changing Tank Farm conditions related to Tank Farm vapors and likely an artifact of sensor drift and increasing sensitivity to external stimuli by the electrochemical sensor, resulting in a false positive bias and alarm.

Other:

N/A

Industrial Hygienist:

[Redacted]

Print First and Last Name

[Redacted Signature]

Signature / Date

Industrial Hygiene Level 2 Manager:

[Redacted]

Print First and Last Name

[Redacted Signature]

Signature / Date