

EVENT INVESTIGATION REPORT

SX Farm AOP-015 Event
Event Investigation Report 2018-033



SX Farm – Pre-Asphalt

<div></div>	<div></div>	10/25/2018
<div></div>	Event Investigation	Date
<div></div>	<div></div>	10/25/2018
<div></div>	Responsible Manager	Date

Executive Summary

At approximately 1015 on September 18, 2018, a laborer performing spotter duties for asphalt work inside SX Farm reported a strange taste in their mouth along with slight dizziness. The worker was wearing a Full-Face Powered Air Purifying Respirator (FFPAPR) at the time. The laborer left the farm, removed their FFPAPR, and was transported to HPMC for medical evaluation. Following testing by HPMC, the laborer was released back to work with no restrictions.

Investigation Summary

Laborer reported for work at 0530 and was in the pre-job brief for the day's work. At 0700, the Laborer was re-tasked to be a spotter inside SX Farm for asphalt paving equipment. Prior to assuming their spotter duties, the laborer retrieved their FFPAPR from their vehicle. The laborer confirmed receiving all required training in the use of this kind of Respiratory Protection Equipment (RPE), but this was the first time using it in the field.

After 30 minutes of spotter duty in SX farm, the laborer started to notice an unidentified taste and slight dizziness. The Laborer was the only individual in the area that reported symptoms. The Laborer went to the farm entrance, removed their hood, and verified it was in working order. While the individual was checking the gear, the taste and dizziness abated. The Laborer put the FFPAPR back on and went back into the field to continue their duties. The Laborer reported that over the next 30 minutes, the taste started to build back up. The dizziness had also returned. At this point, the Laborer returned to the farm entrance and was going to use duct tape seal the hose to the blower unit, suspecting a leak. The laborer got some water and attempted to spit out the taste, then notified their supervisor of the taste and dizziness. During the interview, the laborer indicated that the taste was like having penny in their mouth; slightly metallic. The supervisor issued a stop-work and notified the Central Shift Office. The laborer requested evaluation at HPMC. The CSO dispatched Industrial Hygiene to take samples in SX Farm. All sampling results were below detectable limits. Members of the Industrial Hygiene Programs Group came to the farm to retrieve the FFPAPR. While there, the Laborer mentioned recovering from a recent head cold and still had some very mild symptoms. The group took the hood, tamper-sealed it in a bag, and took it to their lab for testing in accordance with TFC-OPS-AOP-015. The group conducted testing on the hood and compared the results with test results from a new, used hood. There was nothing in the test results to explain the "metallic" taste. This ruled out a malfunction of the blower motor as a possible cause. The attached chromatograph shows testing results from the new hood and the hood received from SX farm. The red and black peak patterns correlate to the plastic smell associated with Tyvek products. Tyvek is the manufacturer of the FFPAPR hood. (See attachment 2) The taste the laborer described was not plastic.

In addition to the IH testing, the Terra Graphics Mobile Lab was monitoring at SX Farm that morning. The mobile lab personnel were aware of the AOP-015 entry via radio and noted the AOP entry in their daily lab report. At the request of the investigator, Terra Graphics provided their report for review. 53005-81-RPT-015 is available upon request

from Terra Graphics. The report concludes there was no detectable constituents that correlate to tank vapors at any time during the event. However, the report did indicate there were constituents of asphalt and exhaust throughout the morning. In addition, raw diesel fuel vapors minutes after the declaration of the AOP-015. The raw diesel fuel was attributed to a container of diesel fuel used to clean asphalt from tools and boots. Asphalt and exhaust are expected during asphalt work. The laborer, during the interview, confirmed that the taste he experienced was neither asphalt nor diesel fuel.

The Laborer was evaluated at HPMC. The laborer was released back to work with no restrictions. At 1324, an Event Investigation was initiated in response to an entry into TF-AOP-015 *Response to Reported Odors or Unexpected Changes to Vapor Conditions* in SX Farm.

Due to the limited number of affected personnel, an Event Investigation Meeting was NOT held. Instead, the event investigator conducted an interview with the laborer, along with an Industrial Hygienist (IH), a Building Trades Safety Representative, and the Respiratory Equipment Subject Matter Expert. This approach was decidedly more productive and efficient considering the limited number of individuals involved in the event.

Event Timeline

09/18/2018

- 0700 Pre-Job Brief conducted for asphalt work planned for the day
- 0830 Laborer is reassigned to perform work as a spotter for paving equipment moving inside SX Farm.
- 0845 Laborer dons RPE and proceeds into SX Farm to assume spotter duties
- 1015 Laborer starts to taste something unidentified in mouth, and experiences some slight dizziness. Laborer turns over spotter duties and moves to the entrance gate of the farm.
- 1025 Laborer doffs his RPE, checks the operation and condition of it, re-dons it, and returns to the farm to continue spotter duties.
- 1055 The taste returns and gets stronger, and his dizziness returns and is more severe.
- 1100 Laborer turns over spotter duties again and exits the farm expecting to duct tape the hose on the blower unit, suspecting the cause is a loose connection.
- 1117 Laborer reports symptoms to supervisor who calls a stop work and notifies the Central Shift Office (CSO). Laborer is transported to HPMC for evaluation. On-site IH monitors DRI (Direct Reading Instrument) for Ammonia and VOC's. Results are below detectable limits.
- 1132* CSO enters AOP-015 for *Response to Reported Odors*.

1153 IH response team report to SX farm to take further samples. All results were below detectable limits.

1221 Facility Representative (FacRep) notified.

1239 Laborer released from HPMC without restriction

1324 Initiated Event Investigation WRPS-EIR-2018-033

*Time taken from shift log entry

Event	SX Farm AOP-015 Event					
Date/time of event	September 18, 2018 10:30am					
Location	SX Farm					
Odor/taste	Non-descript taste, "Kind of like a penny in my mouth, slightly metallic"					
Symptoms	Slight Dizziness					
DRI results during event	Less than the Level of Detection (LOD) for ammonia (NH3) and Volatile Organic Compounds (VOCs) on sweep of reported odor location					
IH investigative monitoring/sampling	Readings from bag samples were at or below background levels.					
Possible source(s)	Physiological					
Weather conditions on September 18, 2018 at Station 6	Time	Wind Dir (From)	Wind Speed	Ave Temp	Bar	RH
	10:00	341	4.1	61.4F	29.35	42.3
	10:15	024	3.3	62.4 F	29.340	39.5
	10:30	079	3.0	63.0 F	29.361	38.0
	10:45	135	3.4	64.3 F	29.357	36.1
Waste disturbing or tank work in adjacent area	No waste disturbing activities or tank work was occurring in SX or adjacent areas.					

Compensatory Measures

- The FWS issued a stop-work and IH was sent to sample to area. All samples were below detectable levels.

Preliminary Extent of Condition Review

- No extent of condition exists for this investigation.

Discussion of Potential Causes

- Laborer reported recently recovering from a respiratory illness; as a result, there could have been a physiological cause.

Discussion of Barriers That Could Have Impacted the Cause

- There were no barriers that could have impacted the cause.

Recommendations/Proposed Corrective Actions

- No recommendations or proposed corrective actions.

References:

1. Terra Graphics 53005-81-RPT-015 September 18, 2018, AOP-15, Revision B

Attachments:

1. Odor Response Card – 241-SX Farm
2. IHSP-CMHZ-81 R2 Sample Plan (3 Pages)
3. Chromatograph from FFPAPR testing
4. Industrial Hygiene Incident Report (IHIR) (6 Pages)
(Odor response card omitted from IHIR)

ODOR RESPONSE CARD - 241-SX FARM

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

- Date and time odor was noticed 9-18-2018 at Around 10:30 AM
- Your name and the work you were performing Spotting Equipment
- Location of odors (mark area on map and wind direction) SX-108 Tank
- Name(s) of others in or near the affected area _____
- Was an IHT present? yes
- Describe the odor ☐ Sweet ☐ Sour ☒ Musty ☐ Earthy ☒ Metallic ☒ Smoky ☒ Rotten ☐ Onion
☐ Cleaning Solution ☐ Ammonia ☐ Other: _____
- Possible Source unknown / not sure
- 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/^{Tongue} Numbness/Paralysis ☐ Rash/Itching
☐ Other: _____

2. Send this card to the Central Shift Office.

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ODOR RESPONSE CARD - 241-SX FARM

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager, [REDACTED]. Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM, [REDACTED], complete below bulleted information and map.
 - Your name and the work you were performing
 - Your symptoms (if any)
 - Date and time odor was noticed
 - Location of odors (mark area on map and the wind direction)
 - Describe the odor
 - Name of other in or near the affected area
 - Was an IHT present?
 - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

241-SX FARM

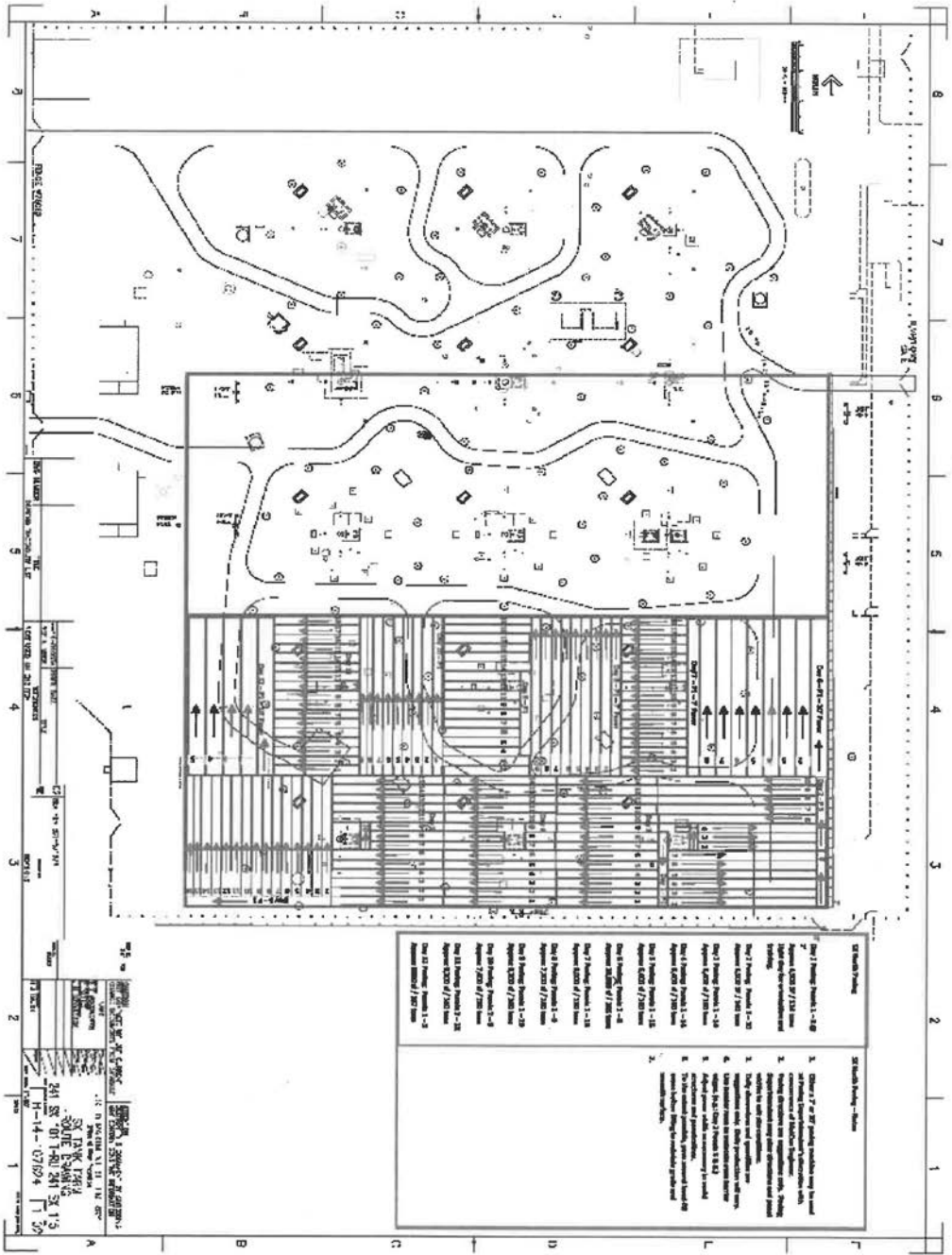
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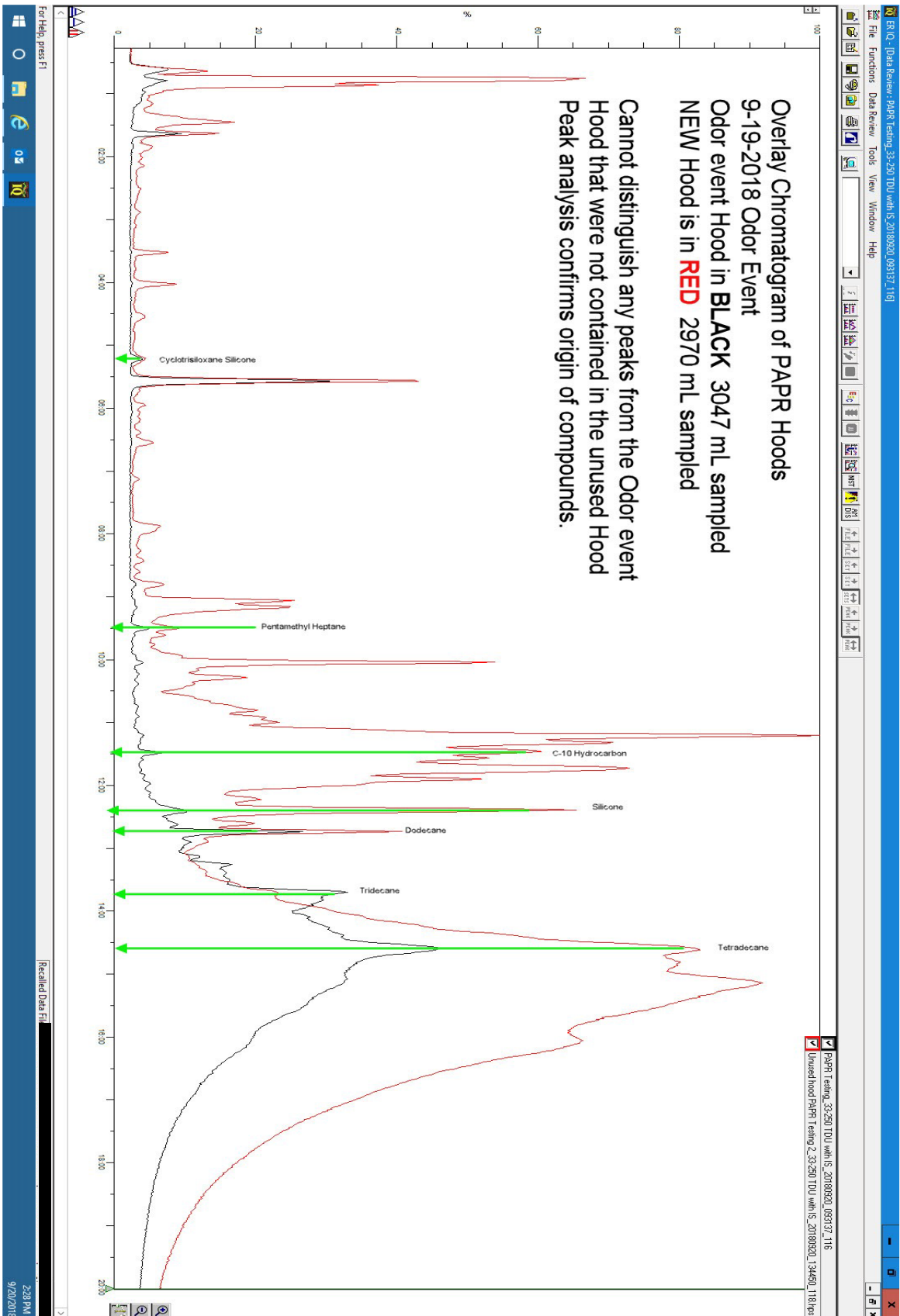
Attachment 1 -Odor Response Card (Front and Back)

INDUSTRIAL HYGIENE SAMPLE PLAN		Contractor:	IHSP Number	
Exposure Assessment: <input type="checkbox"/>	Job Specific: <input checked="" type="checkbox"/>	Washington River Protection Solutions	IHSP-CMHZ-81 R2	
Brief Job Description and Type of Area: Installation of MatCon (modified asphalt) barrier in the SX Tank Farm. This work includes the operation of asphalt equipment (trucks, pavers, forklifts, etc.), hand application of asphalt material, and the use of portable equipment (including IHT and HPT instrumentation) during paving operations.				
INSTRUCTIONS <u>Action Limit</u> Action levels to be applied to work area monitoring with direct read instruments are as follows: <ul style="list-style-type: none"> - Ammonia (NH3): 6 ppm - Volatile Organic Compounds (VOC): 2 ppm. - Hydrogen Sulfide (H2S): 2.5 ppm If area monitoring results reach or exceed the specified action levels the IHT is to make notification to the FWS and facilitate the orderly evacuation of the work area. Following the evacuation, the IH will work with the FWS to develop a response plan.				
<u>Monitoring</u> Direct read instruments will be configured at a minimum to monitor for NH3, VOCs and where feasible H2S. <ul style="list-style-type: none"> - Prior to beginning the day's activities, an IHT shall perform a roaming sweep for fugitive emissions inside the ARPA respiratory protection boundary. - An Industrial Hygiene Technician (IHT) will be assigned to accompany the work crew to intermittently monitor the work area and breathing zones with a hand-held direct read instrument. - An AreaRae will be placed at the base of a breather filter inside the ARPA respiratory protection boundary each day during paving activities and set to alarm at the action limits referenced above. The AreaRae shall be placed as far away as possible from the day's paving activities to reduce potential interference from paving equipment. 				
<u>Sampling</u> <u>Area</u> <ul style="list-style-type: none"> - Intermittent IHT coverage is required to check on sampling equipment and for the creation of field notes. - Area sampling will be performed for constituents listed on the SX-Farm Tank Vapor Information Sheet (TVIS), TVIS-SX-001, as well as H2S. - Collection of area samples will consist of at a minimum one set in the immediate area of the work activity, so that it is representative of the ambient air. - Samples shall be collected and notes created until the completion of the daily activity or scope of work, whichever occurs first. <u>Personal</u> <ul style="list-style-type: none"> - Continuous IHT coverage is required to check on sampling equipment and for the creation of field notes. - Personal air sampling will be performed for the constituents listed on the SX-Farm TVIS, TVIS-SX-001, in addition to H2S. - Collection will consist of a minimum of one set of personal samples, representative of the worst case exposure for the work crew. - When requested by the project IH personal Short Term Exposure Limit (STEL), Ceiling (C), and/or Excursion (EXC) samples are to be collected in addition to the Time Weighted Average (TWA). - The sample set may be distributed among several employees in a representative work crew. - Samples shall be collected until completion of the daily activity or scope of work, whichever occurs first. - Sampling methods, recommended sampling flow rates, and target sample times are listed below for reference and may be adjusted per written direction of the project IH. 				
Contaminant	Analytical Method	Media	Approx. Flow Rate	Minimum Sample Time (min)
Acetonitrile	NIOSH 1606	SKC-226-09	200 mL/min	30
Ammonia	OSHA ID-188	SKC-226-29	500 mL/min	30
Formaldehyde	NIOSH 2016	SKC-226-119	50 mL/min	15
Hydrogen Sulfide	OSHA 1008/1011	SKC-226-177	50 mL/min	20
Nitrosamines	NIOSH 2522	Thermosorb/N	2 L/min	150
VOC	NIOSH 2549/TO-17	TDU Carbotrap 300	50 mL/min	30
SVOC	NIOSH 2549	TDU Carbotrap 150	50 mL/min	30
** H2S sample media cannot exceed 20 Liters in low humidity. Sample media must be changed out every 100 minutes.				
*When collecting personal samples, if the work activity duration is anticipated to be less than the minimum sample times specified by the accepted sampling method, with direction from the project IH, samples may not be required. Where sample durations for samples collected are less than the minimum sample time, samples may be declared invalid and/or voided at the discretion of the project IH.				
*When collecting area samples, if the work activity duration is anticipated to be less than the minimum sample times specified by the accepted sampling method, the sample pump may be left at the area until the minimum sample time has been reached.				

INDUSTRIAL HYGIENE SAMPLE PLAN		Contractor:		IHSP Number	
Exposure Assessment: <input type="checkbox"/>		Job Specific: <input checked="" type="checkbox"/>		Washington River Protection Solutions	
IHSP Number		IHSP-CMHZ-81 R2			
Brief Job Description and Type of Area: Installation of MatCon (modified asphalt) barrier in the SX Tank Farm. This work includes the operation of asphalt equipment (trucks, pavers, forklifts, etc.), hand application of asphalt material, and the use of portable equipment (including IHT and HPT instrumentation) during paving operations.					
<u>Pre-Job Briefing Information</u> <ul style="list-style-type: none"> - Selection of employees for personal sampling will be dependent on the anticipated length of time required in the farm and the task they will be assigned/performing during the daily work activity. 					
<u>Other</u> <ul style="list-style-type: none"> - This sampling plan may be modified per written direction from the project IH in accordance with the air sampling guidelines outlined in TFC-PLN-34. - Record applicable personal samples, area samples, and source sample readings in SWIHD. Make sure to clearly distinguish breather filter valve monitoring readings in the survey. - Record all comments and field notes in SWIHD comments field or as attachments. 					
Did IHT Lead Review? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, Lead IHT INITIAL [REDACTED] & DATE: 08-29-2018					
IH Author	Print: [REDACTED] Sign: [REDACTED]	Phone: [REDACTED]	Date: 8/29/18		
N/A [] IH Peer Review	Print: [REDACTED] Sign: [REDACTED]	Phone: [REDACTED]	Date: 8/29/18		
N/A [X] IH Mgmt.	Print: [REDACTED] Sign: [REDACTED]	Phone: [REDACTED]	Date: [REDACTED]		

Attachment A - MatCon Paving Plan





Attachment 3 – FFPAPR Chromatograph

Washington River Protection Solutions		PER Number: N/A
TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT		
Time/Date & Event location: 1030 09/18/2018 SX farm		EIR Number: EIR-2018-033

1. **Event Summary** (including number of workers involved and activity in progress):

12 workers were performing asphaltting activities under ARPA wearing MSA PAPR Hoods utilizing GME cartridges. 1 employee reported a "musty, metallic, smoky, rotten" smell and symptoms of "Bad metallic taste/numb tongue/dizziness/eye irritation". Reportedly paving activities had completed and workers were exiting farm at the time of event. Employee was transported to HPMC for evaluation.

- Was an IHT Present during initiating event? ☒ Yes ☐ No

The work activity was supported by one IHT with Direct Reading Instrumentation, as well as AreaRAEs.

IH Monitoring/ Sample Survey Reports:

18-08964: Work Activity "SX Paving"

18-01163: Event Response Survey "SX-108 AOP-015 Response"

Weather Conditions at Time of Event:

- Weather station: 19
- Wind Direction and Speed: NE 4mph
- Barometric Pressure (steady/rising/falling): 29.4 steady, but falling soon after 1100
- Temperature (F°): 66.5
- Humidity: 38%

Washington River Protection Solutions TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT	PER Number: N/A
Time/Date & Event location: 1030 09/18/2018 SX farm	EIR Number: EIR-2018-033

Field Response Timeline:

1133: SQEN – Entering AOP-015 for odors causing symptoms in SX Farm. Exit SX Farm in an orderly fashion and report to your supervisor. CSM

1139: AN IH contacts Shift IHT Supervisor to request Shift IHT support

1140: AN IH, EV IH, ETF IH, AYAZ IH, AN IHT Supervisor and PO Shift IHT Supervisor arrive at CSO

1142: PO Shift IHTs arrive at CSO

1148: Projects IH arrives at CSO

1150: IH Programs Manager arrives at CSO

1151: Shift IHTs briefed on response actions:

- SCBA as per RPF AOP-015 R.4 Task 1
- 10.6 eV PID and 11.7 eV PID sweep
- Collect grab sample if source found
- Collect grab sample of general area
- MIRAN SapphiRe and Ohio Lumex readings of grab sample(s) collected
- HAPSITE analysis of grab sample(s)

1153: PO Shift IHTs deployed to perform response actions

1200: ESH&Q manager arrives at CSO

1211: CSM 1 Confirms asphaltting activities occurred at the time of event

1213: Additional IHTs deployed to 2704 HV to prep MIRAN SapphiRe, Ohio Lumex, and HAPSITE instruments

1214: RPPA arrives at CSO to acquire Projects IH to assist in retrieval of affected RPE

1307: PO Shift IHT Supervisor notifies PO IHs that Event Response DRI readings are less than detectable. Grab samples are at 2704HV for additional analysis

1310: AN IH notifies CSM 2 of Event Response DRI readings

1351: Projects IH notifies AN IH about inspection of RPE and notes from interview of affected employee.

1412: Odor Response Card from affected individual arrives at CSO

1413: AY/AZ IH contacts PO Shift IHTs for SWIHDS survey number and initial instrument readings from grab sample:

- Hg: 5 ng/m³
- N2O: 0 ppm

1415: AN IH notifies CSM 2 of initial instrument readings from grab sample.

1832: SOEN – Sample analysis for the SX TF-AOP-015 event has been completed and the results are below action limits. Exiting TF-AOP-015. CSM

Field IH Author:

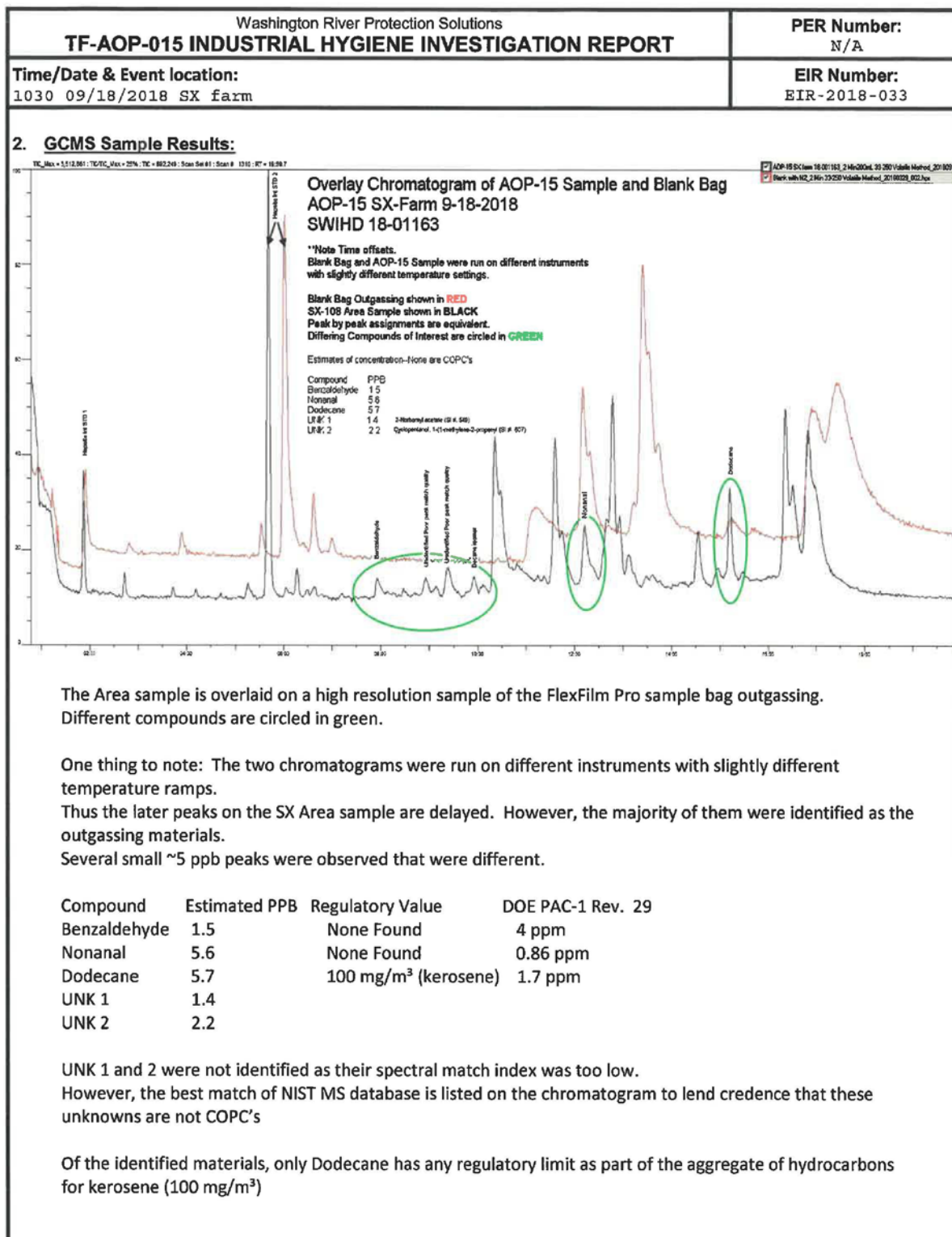
Print First and Last Name

Signature

Phone No.

10/24/2018

Date



Washington River Protection Solutions TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT		PER Number: N/A
Time/Date & Event location: 1030 09/18/2018 SX farm		EIR Number: EIR-2018-033

The DOE PAC-1 levels are listed, where: (From: *Emergency Preparedness. The Emergency Management Issues Special Interest Group (EMI SIG)*)

There are three levels of PAC value (1 to 3) where each successive value is associated with an increasingly severe effect from a higher level of exposure.
Each level is defined as follows:

- PAC-1 : Mild, transient health effects.
- PAC-2 : Irreversible or other serious health effects that could impair the ability to take protective action.
- PAC-3 : Life-threatening health effects.^[1]

All materials are well below their corresponding transient irritation effect levels.
Indeed, Benzaldehyde and Nonanal when purified, are food additives.
Dodecane is a common component in cosmetic emollients such as sunburn cream, lipstick, etc.

Programs IH Author:

Print First and Last Name

Signature

Phone No.

Date

Washington River Protection Solutions TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT	PER Number: N/A
Time/Date & Event location: 1030 09/18/2018 SX farm	EIR Number: EIR-2018-033

- Summary of IH Monitoring and Sampling Data:
 - a. Monitoring:

Work Activity "SX Paving" 18-08964:

DRI:

NH3: 0 ppm

H2S: 0 ppm

VOC 10.6 eV: 1100 ppb

AreaRAE:

NH3: 0 ppm

VOC 10.6 eV: 0 ppb

Event Response 18-01163

NH3: 0 ppm

VOC 10.6 eV PID: 0 ppb

VOC 11.7 eV PID: 0 ppb

Hg: 5 ng/m³

N2O: 0 ppm
 - b. Sampling:

HAPSITE analysis and interpretation from Grab Sample collected as part of response actions indicated about 16.4 ppb VOCs. Speciation of the identified VOCs and their respective found concentrations were well below any applicable OELs.

4. Summary of Employee Reported Information (e.g., symptoms)

Employee reported "Bad metallic taste, dizziness, tongue numbness, eye irritation" symptoms and "musty, metallic, smoky" odor.

5. Recommendations/Conclusions:

Identification of Source of the Concern: [] Yes [X] No

No recommendations at this time.

Washington River Protection Solutions		PER Number: N/A	
TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT		EIR Number: EIR-2018-033	
Time/Date & Event location: 1030 09/18/2018 SX farm			

6. Other:

All (15) Radial Breather Filter isolation valves in SX farm had been closed in support of ARPA activities for about 5 days prior to the event taking place making the engineered emission points highly unlikely to be the source of the odor.

The tanks in SX farm were built with an engineered passive flam gas safe configuration in which the concrete of the dome space structure is permeable to gases such as diatomic Hydrogen and allows these gases to passively permeate into the surrounding soil thereby negating the possibility that flammable gases could build up to LFL levels.

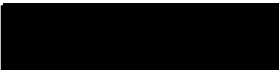
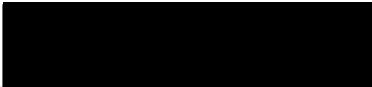

The asphaltting activities ongoing in SX farm at the time of the event were being performed in order to create a water impermeable membrane to redirect meteoric water from leaking into the tanks through permeations in the tank and connected structures, and instead be released into a settling basin to be evaporated to atmosphere.

The PAPR cartridge in use at the time of the event was the MSA GME/HE cartridge which is certified by NIOSH to be protective against Ammonia, Chlorine, Chlorine Dioxide, Formaldehyde, Hydrogen Chloride, Methylamine, Sulfur Dioxide, and Particulates. But is also certified to be protective against Hydrogen Sulfide in escape scenarios. This cartridge is not certified by NIOSH to be protective against Organic Vapors or Mercury vapor, both of which are listed as COPCs on the SX farm TVIS. However, an informational letter from MSA to WRPS received June 5th 2008 indicates that MSA has studied the effectiveness of said cartridge against organic vapor and determined that it is, in fact, effective, however MSA was unable to receive NIOSH approval due to nuisances in the approving organization's testing process.

Examination of the RPE involved in the event by the RPPA and the Projects IH indicate that the equipment was in working order, the cartridges were installed properly, the hood did not have any leaks, and the low flow and battery alarms had been confirmed to be functional. The battery had a usable charge at the time the hood was doffed.

In an interview of the effected employee, the employee indicated that they were recovering from a respiratory illness during the time of the event. The symptoms of the respiratory illness admittedly limited the employee's sense of smell.

S&H Program Management:

			10/24/18
<small>Print First and Last Name</small>	<small>Signature</small>	<small>Phone No.</small>	<small>Date</small>