

EVENT INVESTIGATION REPORT

AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors

Event Investigation Report Number: EIR-2016-019

Event Investigation Team Lead

7/26/16
Date

PER Responsible Manager - U - U

07/26/2016
Date

WRPS-PER-2016-0796

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”

Investigation Summary

On Thursday 4/28/16 retrieval operations from AY-102 to AP-102 were ongoing. At 1150 hours, two Industrial Hygiene Technicians (IHT) entered AP Change Trailer to perform IH Monitoring sweeps per IHSP-RETR-AY-23R2, “Ammonia Monitoring and Sample Collection during AY-102 Retrieval Activities at 702AZ and AP Exhauster.” One of the IHTs was wearing an IH personal monitor (Attachment 5). They put their Self-Contained Breathing Apparatus (SCBA) pack on their backs, entered AP Farm and approached the Vapor Control Zone (VCZ) around the AP Exhaust stack (approximately 30 feet in diameter). Prior to entering the VCZ, they put their masks on and then approached the stack. They completed their task and after exiting the VCZ, the IHTs removed their regulators from their masks and proceeded to exit the farm. While walking through the farm, between Tanks AP-103 and AP-104, they experienced a “musty, metallic, onion” odor. The IHTs were transported to Hanford Primary Medical Clinic (HPMC) for evaluation. At 1200 hours, the Central Shift Manager (CSM) entered AOP-015 due to reported odors that caused symptoms of exposure (e.g. headaches, irritation of the skin, eyes, nose, or lungs, nausea, difficulty breathing, metallic taste in mouth). The AP Tank Farm was cleared and posted access restricted. From 1130 to 1230 hours, the winds were “swirling” at 4-6 mph (gusts to 12 mph) from a North to Northeast (N-NE) direction per the Hanford Meteorological (MET) station. At 1359 hours, one grab bag sample was taken from AP Farm.

At approximately 1330 hours, two Retrieval/Closure (R/C) Health Physics Technicians (HPTs) were performing radiological monitoring for the AY-102 to AP-102 transfer per RPP PLAN-60643, “Radiological Monitoring Plan for Tank 241-AY-102 to 241-AP-102 Waste Transfer.” Neither of the HPTs were wearing an IH personal monitor. They started walking the transfer line berm, on one side of the concrete hose barns, from the AX Farm fence line towards AP Farm. They completed their monitoring inside AP Farm, with support of an IHT, and started back towards AX Farm fence line along the transfer line berm. They walked on the opposite side of the concrete hose barns and when they got to the 45° bend, east of AX Farm, they experienced odors and notified the R/C Transfer Operations Engineer (OE). The HPTs were transported to HPMC for evaluation. The CSM then expanded the AOP-015 response to include the area outside AX Farm along the transfer route towards AP Farm. Road blocks were being set up on 4th east of Canton on 4th Street loop east of AP Farm and 4th and Canton Ave towards the Effluent Treatment Facility (ETF). Personnel at the AX Tent began responding to the AOP-015 expanded event notification. While exiting the AX Tent, six R/C HPTs experienced an ammonia odor with no initial symptoms and requested evaluation at HPMC. However, after about five minutes they started to get headaches. Some of the HPTs went to the 200W HPMC and some were directed to 1979 Snyder HPMC. The AY-102 slurry pump was shutdown at 1519 hours and the AP-102 supernate pump was shutdown at 1523 hours. Winds were again “swirling” at 5-7 mph (gusts to 15 mph) from a North to Northwest (N-NW) direction per the Hanford MET station. At 1535 hours, one grab sample was taken along the transfer line and two grab samples were taken at the AX Change Tent.

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Investigation Summary (continued)

At 2100 hours, following sample results being at or below background, the CSM exited AOP-015 entries for both the 1150 hour and 1330 hour events. As shown in Attachment 5, “Personal Monitoring Results (inside AP Farm),” four chemicals were detected in the personal sample. They were Acetone, Ethanol, Formaldehyde and Methylene Chloride. All were well below the Occupational Exposure Limit (OEL) and the published odor thresholds for the air concentrations detected in the personal sample. However, the grab bag sample from AP Farm and the three grab bag samples from the transfer line and AX Change Tent revealed total aldehydes, which commonly create a musty smell consistent with reports from employees. Also, analysis indicated levels of light hydrocarbons and heavy hydrocarbons were above expected odor thresholds. While detectable as odors, these low levels were also below action levels. As a result of this event, a total of twenty-three people have been evaluated at HPMC and/or Kadlec Medical Center (KMC) in Richland. All have been released to return to work.

An event investigation meeting was held on May 3, 2016 at 0700 hours.

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”**Weather Information**

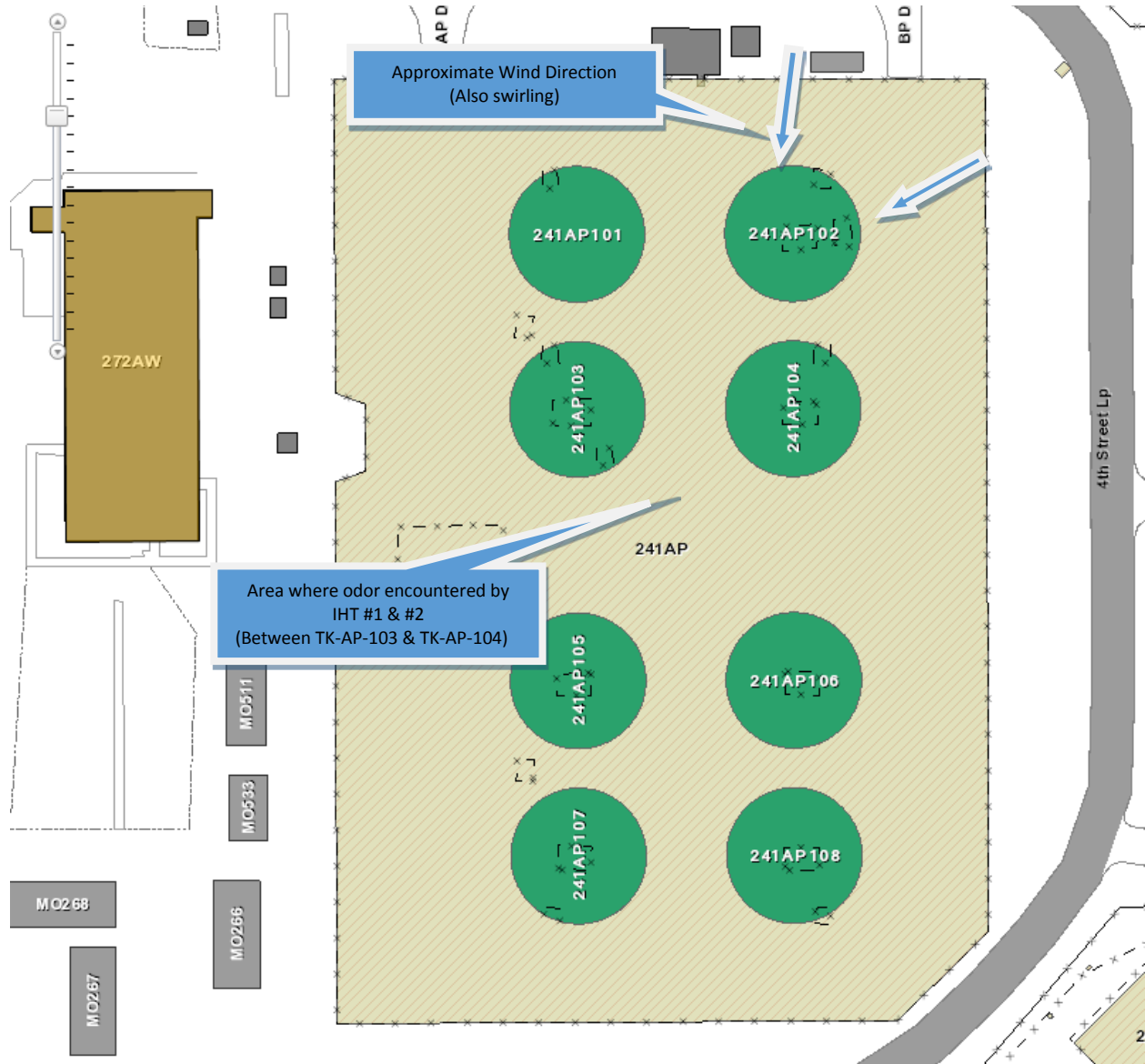
When odors were detected at AP Tank Farm (~1150 hours), winds were “swirling” at speeds of approximately 4-6 mph (gusts to 12 mph) blowing from the North to Northeast (N-NE) direction. When odors were detected along the AY-102 to AP-102 Transfer line (~1330 hours) and subsequently near the AX Tent, winds were “swirling” at speeds of approximately 5-7 mph (gusts to 15 mph) from a North to Northwest (N-NW) direction. The following data was provided by the Hanford Weather Station for Thursday, April 28, 2016:

200E/Station 6 Weather Data for April 28, 2016

Time (PDT)	Direction (degrees)	Speed (mph)	Gust (mph)
9:30	314	4.9	9.3
10:00	324	4.5	10.4
10:30	352	4.6	8.1
11:00	122	5.5	9.1
11:15	107	3.8	8.7
11:30	60	4.9	12.5
11:45	357	5.6	10
12:00	77	4.8	9.3
12:15	49	5.8	11.2
12:30	28	5.6	10.2
12:45	54	5.3	10.4
13:00	35	5.0	10.8
13:15	323	4.7	8.3
13:30	315	6.4	15.6
13:45	347	5.2	12.5
14:00	51	6.6	12.3
14:15	41	6.0	11.9
14:30	121	5.3	10.2
14:45	165	4.5	10.8
15:00	158	3.4	8.5
15:15	246	5.0	10.6
15:30	241	3.4	7.9
15:45	232	2.8	6.8
16:00	163	2.5	8.5

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Map of Area
241-AP Tank Farm



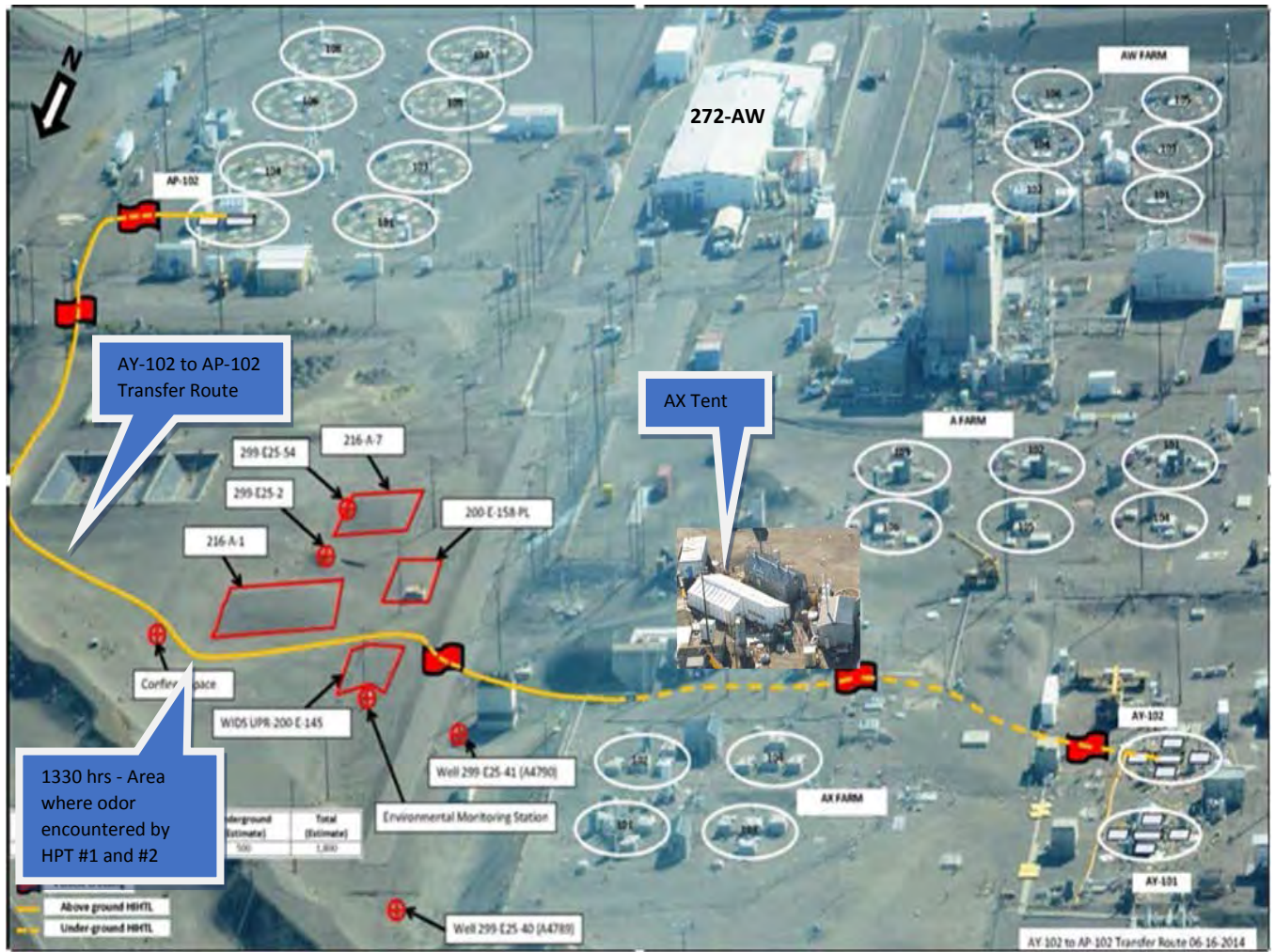
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**Photo of Areas
Photo 1 – 241-AP Farm**



EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Photo of Areas
 Photo 2 – AY-102 to AP-102 Transfer Route and AX Tent



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Event Timeline

‘NOTE:’ – Additional clarification and/or comment to the specific timeline entry.

‘FF’ – From Fact Finding Meeting held at 0700 hours on 5/3/16.

‘IH Report #1’ – From IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)

‘IH Report #2’ – From IH Report along AY-102 to AP-102 Transfer Route (2016-04-28_AOP-015_AY-102_AP-102 Transfer Line)

‘Shift Manager (SM) Logbook’ – From Central Shift Manager Logbook

4/25/16

(Daily Report) – 242-A Evaporator campaign complete. 242-A is in SHUTDOWN Mode.

4/26/16

2048 (SM Logbook) – AY-102 to AP-102 retrieval has begun. SOEN sent.

2119 (SM Logbook) – Slurry pump started and NCO is on station monitoring AY02A Pit.

2135 (SM Logbook) – AY-102 annulus pump administrative lock removed.

4/28/16

1150 (FF; Odor Response Cards, IHT #1, IHT #2) – IHT #1 and IHT #2 entered AP Change Trailer to perform IH Monitoring sweeps per IHSP-RETR-AY-23R2, “Ammonia Monitoring and Sample Collection during AY-102 Retrieval Activities at 702AZ and AP Exhauster.” They put their SCBA pack on their backs and put on their masks without the regulator. They entered AP Farm and approached the Vapor Control Zone (VCZ) around the AP Exhaust stack (approximately 30 feet in diameter). Prior to entering the VCZ, they installed the regulator into their masks and then approached the stack. The AP Exhaust stack readings were noted as: 89 ppm NH₃; 9.8 ppm VOCs; 9 ng/m³ Hg. After exiting the VCZ, the IHTs removed their regulators from their masks and proceeded to exit the farm. While walking through the farm, between Tanks AP-103 and AP-104, they experienced a “musty, metallic, onion” odor. Both experienced symptoms in the form of headaches, dizziness/light-headed, nausea and sore/burning throat. (NOTE: The IHTs stated that the wind was coming out of the North and then about 30 minutes later the wind was out of the South. Odor Response card indicates wind from the NE direction.)

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Event Timeline - 4/28/16 (continued)

- 1200 (SM Logbook) – Notified by Retrieval/Closure (R/C) Industrial Hygiene (IH) Supervisor (R/C IH Supervisor #1) that 2 IH Technicians (IHT #1, IHT #2) are being taken to HPMC for symptoms (musty smell, onion, metallic taste, headache, and nausea) due to odors in AP-Farm by AP Farm primary exhausters. Employees were on mask to get sample off exhauster, after exiting VCZ (Vapor Control Zone) area doffed mask and got uptake, exited farm and taken to HPMC for evaluation.
- 1210 (SM Logbook) – Entered AOP-015 for odors in AP Farm, personnel cleared from farm, Radio announcement completed and Shift Office Event Notification (SOEN) sent. (*NOTE*: IHT #1 and #2 were on their way to 200W HPMC when they heard entrance into AOP-015 announcement.)
- 1215 (IH Report #1) –CSM briefs AN Team Field IH, AY/AZ Team Field IH, EV Team Field IH, PO H&S Manager and PO IHT Supervisor on situation. Readings at time of odor (in farm and parking lot): 80 ppb VOCs; 1 ppm NH₃
- 1220 (SM Logbook) – Entry @ 1210; DOE Facility Representative (FR), Production Operations Manager, Senior Management Representative, Case Management, employee’s managers notified.
- 1225 (IH Report #1) – Response plan is drafted.
- 1228 (IH Report #1) – AY/AZ Team Field IH contacts Programs IH to prepare to run grab bags through the Hapsite.
- 1234 (SM Logbook) – AP Farm posted restricted access.
- 1303 (IH Report #1) – PO IHT Supervisor reports that RC IHTs measured N. parking lot vapor conditions: 2 ng/m³ Hg; 30 ppb VOCs; 0 ppm NH₃
- 1305 (IH Report #1) – RC IHTs contact PO IHT Supervisor with change trailer readings: 3 ng/m³ Hg; 40 ppb VOCs; 0 ppm NH₃
- 1318 (IH Report #1) – IHT readings taken from farm perimeter; PO IHT Supervisor reports RC IHT readings from 241-AP Farm perimeter sweep: 2-3 ng/m³ Hg; 30-40 ppb VOCs; 0 ppm NH₃

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Event Timeline - 4/28/16 (continued)

- 1330 (FF) – R/C HPTs #1 and #2 were performing radiological monitoring of the AY-102 to AP-102 transfer line per RPP-PLAN-60643, “Radiological Monitoring Plan for Tank 241-AY-102 to 241-AP-102 Waste Transfer.” Prior to walking the transfer line from AX Farm to AP Farm, the HPTs had put their SCBAs on, without their masks. They started walking the transfer line berm, on one side of the concrete hose barns, from the AX Farm fence line towards AP Farm. They got to the AP Farm fence line and requested an IHT to support them since there was an ongoing AOP-015 event. They put on their masks and entered the farm. They completed their transfer line surveys within AP Farm and then exited the farm. They removed their masks and proceeded to walk the transfer line back towards AX Farm with their SCBA packs still on their backs. They started walking the transfer line berm, on the opposite side of the concrete hose barns, back towards the AX Farm fence line. When they got to the area note on Photo 2, page 7 they experienced odors and notified the R/C Transfer Operations Engineer (OE). [*NOTE*: The HPTs stated that when they smelled the odor, they looked back towards AP Farm, and noticed the wind was directly in their face and the flag was blowing directly towards them (e.g., from the S-SE). They then continued towards AX Farm where their vehicle was parked.]
- 1334 (SM Logbook) – Readings (IHT) around AP Farm below background, 2-3 mg/m³, 30-40 ppb VOCs, 0 ppm NH₃. (*NOTE*: These readings were from IHTs that were responding to the AOP-015 event.)
- 1349 (SM Logbook) – Entry @ 1200; Notified Senior Management Level 1 (ESH&Q Field Integration Manager).
- 1359 (IH Report #1) – IHT readings taken within farm; PO IHT Supervisor contacts EV Team Field IH with Direct Reading Instruments (DRI) readings from farm sweep: 8 ng/m³ Hg; 0 ppb VOCs; 0 ppm NH₃; 1 Grab bag sample (AP Farm) acquired from area sweep inside of farm: N/A ng/m³ Hg; 60 ppb VOCs; 0 ppm NH₃. (*NOTE*: One grab bag sample from inside AP Farm. Documented in IH Report #1, “1200 04/28/2016 AP Farm.”)

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Event Timeline - 4/28/16 (continued)

- 1420 (SM Logbook) – Notified by R/C Transfer OE that two R/C HPTs (HPT #1, HPT #2) being taken to HPMC for odors with symptoms, dry throat, headache; they were walking down (surveying) transfer route between AX & AP Farm by 45° bend, east of AX Farm. Individuals taken to HPMC for evaluation by R/C HPT Supervisor #1. (*NOTE*: R/C Transfer OE notified R/C Management of odor event along the transfer line and discussed shutdown of the transfer. At this time, a determination was made to continue retrieval activities.)
- 1441 (SM Logbook) – Expanded AOP-015 to include area outside AX Farm by AP Farm; road blocks being setup on 4th east of Canton, on 4th Street loop east of AP Farm, and 4th and Canton Ave towards ETF; Notified ETF to leave North of facility when they go home.
- (IH Report #2) – SOEN: “Entering AOP-015 for odors between AX-Farm AP-Farm along transfer rout, access restricted, all personal exit area no entry unless authorized. CSM.”
- (FF) – Personnel inside the AX Tent communicated with their supervisor using a cell phone and were directed to exit the AX Tent due to the expanded AOP-015 notifications. They tried to direct personnel inside the farm to exit towards the AY Change trailer, using a bullhorn, with limited success. American Electrical (AMEC) Pipefitter #1 exited AX Farm because his SCBA was alarming. They helped Pipefitter #1 and once personnel were out of the farm they exited the AX Tent. The other pipefitters and their supervisor, who were in AX Farm, exited through the AY Change Trailer.
- 1454 (SM Logbook) – Six Tank Farm Project (TFP) HPTs were exiting AX Tent and experienced an ammonia odor with no symptoms and requested to be evaluated at HPMC. Individuals were HPT #3, HPT #4, HPT #5, HPT #6, HPT #7, and HPT #8. R/C HPT Supervisor #1 is with HPT #6 and HPT #8 at 200W HPMC. R/C HPT Supervisor #2 is with HPT #3, HPT #4, HPT #5 and HPT #7 at 1979 Snyder HPMC. DOE FR and Case Management notified. (*NOTE*: The six HPTs were R/C HPTs and they experienced no initial symptoms. However, after about five minutes they started to get headaches. Also, four HPTs were directed to 1979 Snyder HPMC because there were too many people at the 200W HPMC. No one at 200W HPMC asked if anyone needed “immediate” help and no vitals were taken prior to proceeding to 1979 Snyder HPMC.)

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Event Timeline - 4/28/16 (continued)

- 1458 (SM Logbook) – Spare IHTs being sent to respond per IHT Lead.
- 1503 (SM Logbook) – Shift IHTs and Production Operations IH staged in the Central Shift Office (CSO) ready to deploy.
- 1519 (R/C Transfer OE Logbook) – Shutdown the Slurry Pump (AY102).
- 1523 (R/C Transfer OE Logbook) – Shutdown the Supernate Pump (AP102).
- 1534 (IH Report #2) – RC Field IH reports that 702AZ stack NH3 readings have been steady at 100 ppm all day and the AP stack NH3 reading at 1145 was 150 ppm.
- 1535 (IH Report #2) – AN Team Field IH, EV Team Field IH, COMS Field IH, RC Field IH draft response actions:
- Perform continuous DRI survey along transfer line starting at 241-AP to 241-AX;
 - Acquire grab bag sample (Bag 1) at location where HPTs encountered odor;
 - Perform DRI monitoring and acquire grab bag sample (Bags 2 & 3) from AX change tent.
- (NOTE: Three grab bag samples taken – Bag 1 from West Side of AY-AP transfer line; Bag 2 from inside AX Change Tent; Bag 3 from outside AX Change Tent. Documented in IH Report #2, “1430 04/28/2016 AY-AP Retrieval Line.”)*
- 1557 (SM Logbook) – AMEC Safety & Health (S&H) Supervisor reports that AMEC Electrician #1 was walking to the AX egress tent and experienced an onion odor. AMEC Electrician #1 is experiencing “pain in his nostrils” and is being taken to HPMC for evaluation by AMEC Supervisor #1. *(NOTE: AMEC Electrician #1 experienced the odor around 1454 hours. He noted odor while walking down the hill from the AX Tent.)*
- 1615 (SM Logbook) – SOEN complete for all individuals that have gone to HPMC for AOP-015 evaluation in 1420, 1454 and 1557 entries.
- 1607 (FF) – Analysis of three grab bag samples collected at 1535 hours was initiated.

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Event Timeline - 4/28/16 (continued)

- 1643 (SM Logbook) – AMEC Supervisor #2 reports that AMEC Pipefitter #1 experienced an “onion/body” odors while driving at the corner of Canton and 4th. AMEC Pipefitter #1 doesn’t not have any symptoms, but has requested evaluation at HPMC. AMEC Supervisor #1 is also with AMEC Pipefitter #1 at HPMC. SOEN complete. Notified Case Management and DOE FR. (NOTE: AMEC Pipefitter #1 was exiting AX Farm due to his SCBA low-air alarm. After undressing, he experienced the odor around 1454 hours. He was driving from AX Farm towards AP Farm on Canton and 4th when he experienced the odor.)
- 1645 (IH Report #2) – Shift IHTs reported collecting three grab bag samples total: One from transfer line, one from inside AX change tent and one from outside perimeter of AX change trailer. No detectable VOCs, HG, or Ammonia on DRI instrumentation.
- 1657 (SM Logbook) – S&H Specialist #1 reports that HPT #6, HPT #8, HPT #2, HPT #1, IHT #1 and IHT #2 have been released to return to work with no restriction.
- 1741 (SM Logbook) – S&H Specialist #1 reports that HPT #7, HPT #3, HPT #4, HPT #5 were released to return to work without restrictions.
- 1936 (SM Logbook) – AMEC Supervisor #2 reports that AMEC Pipefitter #2 exited AX Farm today due to the AOP-015 entry and while walking with a co-worker between the AX Tent and Evaporator the co-worker smelled odors and AMEC Pipefitter #2 did not. On AMEC Pipefitter #2’s way home he became dizzy and had a headache. He reported his symptoms as being due to AOP-015 entry and is being picked up at his home and taken to KMC for evaluation by his AMEC Supervisor. SOEN sent, Case Management, DOE FR, TFP Manager, EOC notified. (NOTE: On 4/28/16, AMEC Pipefitter #2 had been performing work between AX-101 and AX-102 tanks and then exited through the AX Tent and did not smell any odors. It was reported that it took about 45 minutes for KMC to get/locate the procedure for dealing with vapor exposures.)
- 1955 (SM Logbook) – R/C OE reports that AY-102 to AP-102 administrative locks have been applied at 1918 hours. SOEN sent.
- 2046 (SM Logbook) – R/C Transfer OE reports AY-102 Annulus Pump administrative lock installed. SOEN sent.

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Event Timeline - 4/28/16 (continued)

- 2048 (SM Logbook) – AMEC Supervisor #2 reports AMEC Laborer #1 exited AX Farm due to AOP-015 entry today and boarded the AMEC bus to go to his trailer. While on the bus he had a bloody nose and headache but did not report it. He notified his AMEC Supervisor at ~2030 hours and reported symptoms and is being picked up by AMEC Supervisor #2 at his home and taken to KMC. SOEN sent, DOE FR, EOC, Case Management, and TFP Manager notified. (*NOTE*: AMEC Laborer #1 experience the odor around 1454 hours while outside the AX Tent near the safety shower. Instead of riding the AMEC bus, he drove a company vehicle from the parking lot east of AX Farm Tent to AY Farm Change Trailers to meet up with his crew who had been directed to exit through AY Tank Farm. He had a bloody nose and headache later that evening and that’s when he called his supervisor at home. His supervisor then called the CSM at 2048 hours to report the event and then took the Laborer to KMC.)
- 2100 (SM Logbook) – Exited AOP-015’s entered at 1210 and 1441 expansion. Sample results were at or below background. SOEN sent, All-Call, DOE FR notified.
- 2208 (SM Logbook) – Late Entry: At 1745 AMEC Supervisor #2 reports that AMEC Pipefitter #1 and AMEC Electrician #1 have been released from HPMC with no restriction. 1557 and 1643 initial entries.

4/29/16

- 0050 (SM Logbook) – Administrative lock to AP-102 supernate pump removed. SOEN sent.
- 0126 (SM Logbook) – AMEC Supervisor #2 reports that individuals from 1936 and 2048 entries on 4/28/16 were released to return to work. SOEN sent.
- 0319 (SM Logbook) – AP-102 supernate pump administrative lock installed. Pump down not happening tonight due to unsuccessful ENRAF calibration. SOEN sent.
- 0530 (FF) – Washington River Protection Solutions (WRPS) S&H Manager and Construction Supervisor performed a walkdown of the area where the Construction personnel would be working today and no odors were noted.

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Event Timeline - 4/29/16 (continued)

- 0600 (FF) – Construction personnel attend the Pre-Job safety meeting. The WRPS S&H Manager presents a safety briefing of the AOP-015 Event from the previous day. It was noted that an AreaRAE Multi-Gas Monitor was placed in the AX Tent and the grab bag sample analysis and direct reading instrument DRI readings, that were used to exit the AOP-015 event, were discussed. Construction Supervisors reiterated that any workers that had experienced symptoms should come forward and determine if a medical evaluation was necessary.
- 0620 (SM Logbook) – Notified DOE FR of entries @ 0319 and 0126 hours. Administrative locks installed and individual that reported to KMC for possible odors. Release to work, no restrictions. EOC notified.
- 0632 (SM Logbook) – Initiated Event Investigation EIR-2016-019, “AOP-015 Entry from East of AX Farm to AP Farm.” POC [REDACTED]. Notified DOE FR and SOEN sent. (*NOTE*: EIR-2016-019 title was later changed to “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors” to match WRPS-PER-2016-0769).
- 0730 (FF, Approximate time) – Construction Supervisor and Office of River Protection FRs performed a walkdown around AP Farm and around the AX Tent. Some odors (i.e., musty, oniony) were noted during the walkdown.
- 0800 (SM Logbook) – Notified by AMEC S&H Supervisor that four AMEC employees are being taken to HPMC for evaluation for odors (AOP-015) event on 4/28/16. AMEC Carpenter #1, AMEC Pipefitter #3, AMEC Operator #1, and AMEC Laborer #2. AMEC Carpenter #1 went to 200W HPMC, all others to 1979 Snyder HPMC. (*NOTE*: AMEC Operator #1 was servicing a generator located east of AX Farm, outside the tank farm fence line. AMEC Laborer #2 was performing bottle change-outs in the AX Tent and did not smell anything. AMEC Carpenter #1 was down the hill from AX Tent using the porta-potties and did not smell any odors. AMEC Pipefitter #3 was performing exhaust stack installation work inside AX Tank Farm on SCBA. After leaving the site, he experienced headaches and nausea.)
- 0805 (SM Logbook) – Notified by R/C S&H Supervisor that (R/C) HPT #9 taken to HPMC for evaluation from AOP-015 incident on 4/28/16 for irritated eye, sore throat but did not smell anything. Employee was around AX Farm, eastside on stairs by POR-126, outside farm. (*NOTE*: HPT #9 went to 200W HPMC.)

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Event Timeline - 4/29/16 (continued)

- 0815 (SM Logbook) – Entry @0800, AMEC Carpenter #1 (headache, did not smell anything), AMEC Pipefitter #3 (went to KMC last night with health issue, not reported as odor concern, report concern today 4/29/16), AMEC Operator #1 (nausea, headache), AMEC Laborer #2 (headache).
- 0830 (SM Logbook) – Entry @0800 & 0805, Notified DOE FR, Case Management, ESH&Q Field Integration Manager, Chief Operating Officer, Production Operations Manager, SST Retrieval Deputy Manager.
- 0920 (SM Logbook) – SOEN sent for entry @0800 and 0815 hours.
- 0930 (FF, Approximate time) – WRPS Management decided to cancel construction activities that were planned for the areas in and around AP and AX Tank Farms.
- 0958 (SM Logbook) – Notified by AMEC S&H Supervisor that AMEC Employee #1 reported concern from AOP-015 odor incident on 4/28/16 and is reporting to HPMC @ Snyder. Employee did not smell anything but has flu like symptoms. (*NOTE*: AMEC Employee #1 was part of the construction crew that attended the 0600 hours Pre-Job Briefing on 4/29/16. On 4/28/16, AMEC Employee #1 had been performing work between AX-101 and AX-102 tanks and then exited through the AX Tent and did not smell any odors.)
- 1025 (SM Logbook) – Entry 0958 hours, Notified DOE FR, Case Management (S&H Specialist #1 took over for previous Case Management representative), ESH&Q Field Integration Manager, and Chief Operating Officer.
- 1049 (SM Logbook) – Entry 0958 hours, SOEN sent.
- 1100 (SM Logbook) – R/C S&H Supervisor reports that HPT #9 and AMEC Carpenter #1 released without restrictions but had blood taken.
- 1202 (SM Logbook) – Entry @0805, Employee returned to work, no restrictions.
- 1207 (SM Logbook) – Entry @0800, Employees returned to work, no restrictions.
- 1452 (SM Logbook) – Entry @0958, Employee returned to work with no restrictions. Notified DOE FR, ESH&Q Field Integration Manager, Shift Operations Manager, Case Management (S&H Specialist #1), SOEN sent.

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Event Timeline - 4/29/16 (continued)

- 2141 (SM Logbook) – Granted permission to R/C OE to remove administrative lock condition for AY-102 retrieval operations. SOEN sent.
- 2143 (SM Logbook) – Administrative lock removed from AY-102 slurry pump. SOEN sent.

4/30/16

- 0056 (SM Logbook) – Administrative lock applied to AY-102 slurry pump. Pump down complete. SOEN sent.
- 2020 (SM Logbook) – AY-102 to AP-102 transfer line flush complete. SOEN sent.

5/1/16

- 1103 (SM Logbook) – Notified by AMEC S&H Supervisor that AMEC Laborer #2 that went to HPMC on Friday morning due to vapor event on 4/28/16 is feeling ill & going to KMC for evaluation. AMEC S&H Supervisor is going to meet him at KMC. (NOTE: Laborer #2 was not at work Friday morning. He went from his home to HPMC.)
- 1120 (SM Logbook) – Notified DOE FR, ESH&Q Field Integration Manager, Chief Operating Officer and SOEN sent.
- 1402 (SM Logbook) – Reported that AMEC Laborer #2 was released to return to work thru HPMC in the morning. Notified DOE FR, ESH&Q Field Integration Manager, Chief Operating Officer. SOEN sent.
- 2038 (SM Logbook) – AP Farm Primary exhauster VCZ has been down posted, normal access restored.
- 2045 (SM Logbook) – Down post AP Farm, restricted access due to exiting AOP-015 on 4/28/16 @ 2100.

5/2/16

- 0814 (SM Logbook) – FE&C FWS (Field Work Supervisor) reports that FE&C Safety notified him of a Weld Inspector that was supporting the New AP Primary (VTP) Exhauster installation last Thursday and was seen at KMC on Saturday for potential vapor exposure associated with Thursdays AOP-015 event. Weld Inspector reported to FE&C Safety on Friday that he smelled vapors on Thursday and went to KMC for evaluation on Saturday.

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”

Event Timeline - 5/2/16 (continued)

0859 (SM Logbook) – AMEC S&H Supervisor reports that two AMEC employees have requested medical evaluation at HPMC for symptoms they had last Thursday afternoon during the AOP-015 event. AMEC Employee #2 and AMEC Employee #3 had headaches, metallic taste, nausea, burning in nostril, runny nose, sore throat, and swollen throats. AMEC Employees #2 and #3 did not smell any odors, but experienced the symptoms. Construction FWS is taking them to HPMC. AMEC Employee #2 was near the NW corner of AP Farm and also working outside AX Farm on Canton. AMEC Employee #3 was in the AX Tent and exited to vehicle through the courtyard.

Immediate Actions Taken

1. IHT #1 and IHT #2, who experienced symptoms due to odors in AP Farm, were taken to HPMC for evaluation.
2. The SM entered AOP-015 for odors in AP Farm, the farm was cleared and access was restricted.
3. HPT #1 and HPT #2, who experienced symptoms due to odors along the AY-102 to AP-102 transfer route, were taken to HPMC for evaluation.
4. The SM expanded AOP-015 response and access restrictions to include the area outside AX Farm by AP Farm, road blocks being setup on 4th east of Canton, on 4th Street loop east of AP Farm, and 4th and Canton Ave towards ETF; Notified ETF to leave North of facility when they go home.
5. Additional personnel who experience symptoms or requested medical evaluation were taken to HPMC and/or KMC for evaluation.
6. Notifications were made to Senior Management and DOE Facility Representatives.
7. Initiated EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors.”
8. All readings from DRI instruments for VOC’s or Ammonia, VOCs, Mercury and Nitrous Oxide were as follows:

From IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)

Summary of IH Monitoring and Sampling Data:

SEE DRI SURVEY# 16-03324; 16-03325; 16-03295 (Area RAE)
SEE PERSONAL SURVEY# 16-03261 (results appended to report)

a. Monitoring - Readings below are from the time the odors were detected. Readings from response actions are listed in section 4.

AGENT	@ODOR	@SOURCE	EXPOSURE LIMIT	REPORTING LIMIT
Ammonia	1.0 ppm	N/A ppm	25 ppm OEL/35ppm STEL	>0 ppm
Total VOCs	0.080 ppm	N/A ppm	2 ppm AL	>0 ppm
Mercury	N/A mg/m ³	N/A mg/m ³	0.025 mg/m ³ OEL	0.000016 mg/m ³
Nitrous Oxide	N/A ppm	N/A ppm	25 ppm AL	>0 ppm

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”**From IH Report #2 – IH Report along AY-102 to AP-102 Transfer Route (2016-04-28_AOP-015_AY-102_AP-102 Transfer Line)**Summary of IH Monitoring and Sampling Data:**SEE DRI SURVEY# 16-03342****SEE DRI SURVEY# 16-03295 for AreaRAE**

a. Monitoring – Readings below are from response actions. IHT monitoring was not being performed at the time odors were detected.

AGENT	@ODOR	@SOURCE	EXPOSURE LIMIT	REPORTING LIMIT
Ammonia	0 ppm	N/A ppm	25 ppm OEL/35ppm STEL	>0 ppm
Total VOCs	0 ppm	N/A ppm	2 ppm AL	>0 ppm
Mercury	0 mg/m ³	N/A mg/m ³	0.025 mg/m ³ OEL	0.000016 mg/m ³
Nitrous Oxide	n/a ppm	N/A ppm	25 ppm AL	>0 ppm

Compensatory Measures

1. Prior to exiting AOP-015, the CSM validated that the readings were at or below background.
2. AP Tank Farm was later down-posted following final Tank AY-102 pump down.

Discussion of Potential Causes

Based on a review of the following, the source of the odors encountered by the two IHTs, the two HPTs and personnel exiting the AX Tent, a cause was not able to be definitively determined. However, it is highly likely, based on wind direction and the location of the odors, that the 241-AP Primary Exhaust stack may have been a potential source of the odors.

1. Review of information and investigative IH monitoring and sampling of the area. All samples came back at or below background.
2. No fugitive emissions were identified.
3. Input from affected workers described the odor as “musty – body odor; oniony,” and “metallic” in general.
4. The AY-102 to AP-102 Retrieval transfer was in progress during this event which elevated readings from the 241-AP Primary Exhaust stack. In addition, vapor monitoring was ongoing in AP Tank Farm as part of this evolution and radiological surveys were being performed along the AY-102 to AP-102 Transfer Route.

Preliminary Extent of Condition Review

The AOP-015 entry was specific to the areas just West, North and Northwest of the 241-AP Primary Ventilation Exhauster and ongoing vapor monitoring was in progress. However, odors, depending on wind direction and speed, have the potential to be detected anywhere downwind of the primary ventilation exhauster.

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”

Discussion of Barriers That Could Have Impacted the Cause

Impacting barriers are an unknown because the cause of the odors was not able to be definitively determined. However, continuing activity-specific (e.g., 242-A Evaporator campaigns, transfers, etc.) vapor monitoring may mitigate potential future exposure consequences.

Conditions Adverse to Quality

None.

Recommendations/Proposed Corrective Actions

There are no proposed corrective actions as the cause of the odors was not able to be definitively determined. However, continued activity-specific vapor monitoring in support of transfers and 242-A Evaporator campaigns is recommended.

Attachments (As they apply):

1. Attachment 1
 - Photo 1 – 241-AP Farm, page 21
 - Photo 2 – AY-102 to AP-102 Transfer Route and AX Tent, page 22
2. Attachment 2 - Odor Response Cards (With Personal Identifiable Information Redacted) 13 sets, pages 23-34
3. Attachment 3 - Industrial Hygiene Gas Chromatograph/Mass Spectrometer Sample Results, IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm) page 35
4. Attachment 4 – IH Report #2 – IH Report along AY-102 to AP-102 Transfer Route (2016-04-28_AOP-015_AY-102_AP-102 Transfer Line), page 36
5. Attachment 5 - Personal Monitoring Results (Survey # 16-03261) [IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)], pages 37-38
6. Attachment 6 - Fact Finding Attendance Roster (5/3/2016), pages 39-41

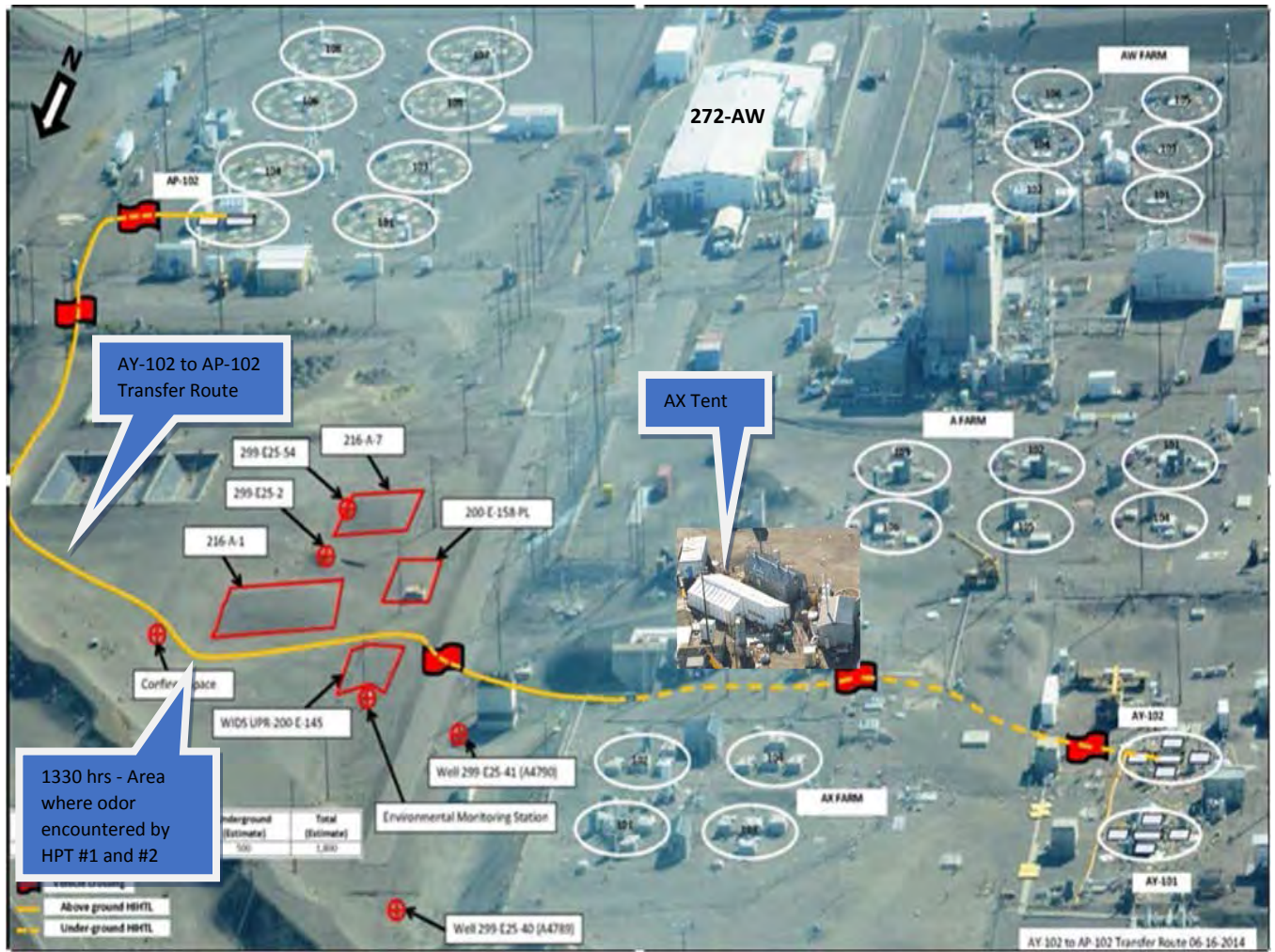
EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 1
Photo 1 – 241-AP Farm



EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 1
 Photo 2 – AY-102 to AP-102 Transfer Route and AX Tent



EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

**Attachment 2
Odor Response Cards (1)**

ODOR RESPONSE CARD - 241-AP 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-AP FARM

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ODOR RESPONSE CARD - 241-AP FARM

1. **Contact CSM, Complete below bulleted information and map.**
 - Date and time odor was noticed 4-28-16
 - Your name and the work your were performing Farm Sweeps
 - Location of odors (mark area on map and wind direction) Towards middle of farm
 - Name(s) of others in or near the affected area _____
 - Was an IHT present?
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion
 Cleaning Solution Ammonia Other: _____
 - Possible Source _____
 - 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: _____
2. **Send this card to the Central Shift Office.**

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

**Attachment 2
Odor Response Cards (2)**

ODOR RESPONSE CARD - 241-AP 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.

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ODOR RESPONSE CARD - 241-AP FARM

1. **Contact CSM, Complete below bulleted information and map.**
 - Date and time odor was noticed 4/28/16 @ 11:50am
 - Your name and the work you were performing AP sweep
 - Location of odors (mark area on map and wind direction) _____
 - Name(s) of others in or near the affected area _____
 - Was an IHT present? _____
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion
 Cleaning Solution Ammonia Other: _____
 - Possible Source _____
 - 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: _____
2. **Send this card to the Central Shift Office.**

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

**Attachment 2
Odor Response Cards (3)**

4/19

ODOR RESPONSE CARD - 241-AX 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-AX FARM (FEET)

Wind Direction

N
W E
S

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ODOR RESPONSE CARD - 241-AX FARM

1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed 04-28-16, no odor detected
 - Your name and the work your were performing Ventilation Coverage HPT
 - Location of odors (mark area on map and wind direction) N/A
 - Name(s) of others in or near the affected area N/A
 - Was an IHT present? Yes, just below fence line
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion
 Cleaning Solution Ammonia Other: N/A
 - Possible Source Waste transfer
 - 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: hoarseness
2. Send this card to the Central Shift Office.

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (4)

476

ODOR RESPONSE CARD - 241-AX FARM

Odors Detected with NO Immediate symptoms

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

Odors Detected WITH Symptoms

- Notify Immediate Supervisor.
- 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
- Provide information on the back of card.
- Send this card immediately to the Central Shift Office.

241-AX FARM (FEET)

Wind Direction

N

W E

S

Page 1 of 2

A-6006-936 (REV 0)

ODOR RESPONSE CARD - 241-AX FARM

- Contact CSM, Complete below bulleted information and map.**
 - Date and time odor was noticed no odor noticed 2pm
 - Your name and the work your were performing excavator stack install
 - Location of odors (mark area on map and wind direction) none
 - 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 _____
 - 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: after left the sight
- Send this card to the Central Shift Office.**

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

**Attachment 2
Odor Response Cards (5)**

ODOR RESPONSE CARD - 241-AX 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-AX FARM (FEET)

Wind Direction

N
W E
S

ODOR RESPONSE CARD - 241-AX FARM

1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed 4:30 pm headache started
 - Your name and the work you were performing _____
 - Location of odors (mark area on map and wind direction) N/A
 - Name(s) of others in or near the affected area N/A
 - Was an IHT present? N/A
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion Cleaning Solution Ammonia Other: did not smell anything
 - Possible Source _____
 - 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: _____
2. Send this card to the Central Shift Office.

EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (6)

ODOR RESPONSE CARD - 241-AX 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-AX FARM (FEET)

Wind Direction

N	E
W	S

EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (7)

ODOR RESPONSE CARD - 241-AX 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-AX FARM (FEET)

Wind Direction	
N	E
W	S

EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (8)

4/28/16

ODOR RESPONSE CARD - 241-AX 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-AX FARM (FEET)

Wind Direction
N
W E
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4/28/16

ODOR RESPONSE CARD - 241-AX FARM

1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed 4/28/16 14:40
 - Your name and the work you were performing outside AX-Tent
 - Location of odors (mark area on map and wind direction) see Map
 - Name(s) of others in or near the affected area Not sure
 - Was an IHT present? NO
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion Cleaning Solution Ammonia Other: rotten foot / boot / dirty socks
 - Possible Source No idea
 - 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: Bloody nose (left nos)
weird taste in mouth (like penny in mouth)
2. Send this card to the Central Shift Office.

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (9)

4/28/16

ODOR RESPONSE CARD - 241-AX F

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], and 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-AX FARM (FEET)

Wind Direction
 N
 W E
 S

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4/28/16

ODOR RESPONSE CARD - 241-AX FARM

1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed did not smell odor
 - Your name and the work you were pe Bottle change out AX-T
 - Location of odors (mark area on map and wind direction) Didn't smell any odors
 - Name(s) of others in or near the affecte idley
 - Was an IHT present? No
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion Cleaning Solution Ammonia Other: Didn't smell any odor
 - Possible Source _____
 - 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: Just right after they called us out
2. Send this card to the Central Shift Office.

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (10)

4/28/16

ODOR RESPONSE CARD - 241-AX FARM

Odors Detected with *NO* Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager. 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. 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-AX FARM (FEET)

Wind Direction

N

W E

S

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4/28/16

ODOR RESPONSE CARD - 241-AX FARM

1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed N/A
 - Your name and the work you were performing Servicing Generator behind AX
 - Location of odors (mark area on map and wind direction) _____
 - Name(s) of others in or near the affected area N/A
 - Was an IHT present? N/A
 - Describe the odor Sweet Sour Musty Earthy Metallic Smoky Rotten Onion Cleaning Solution Ammonia Other: N/A
 - Possible Source N/A
 - 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: _____
2. Send this card to the Central Shift Office.

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EIR-2016-019, "AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors"

Attachment 2
Odor Response Cards (12)

ODOR RESPONSE CARD - 241-AX 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], and 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-AX FARM (FEET)

SCALE IN FEET

Wind Direction

N
W E
S

* I DID NOT NOTICE AN ODOOR *

Work logs show No odor

ODOR RESPONSE CARD - 241-AX FARM

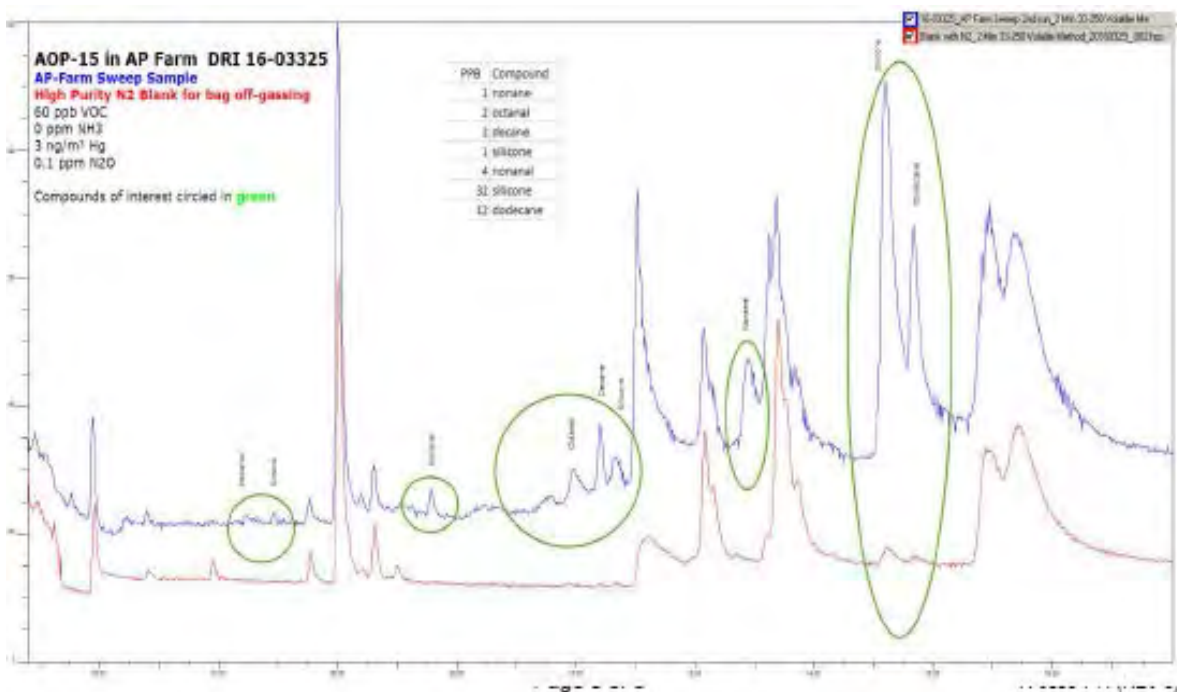
1. Contact CSM, Complete below bulleted information and map.
 - Date and time odor was noticed * I did not notice an odor *
4/28/16 ~ 2:45 WE GOT AOP15 AX TANK
 - Your name and the work you were performing Torque observation
 - Location of odors (mark area on map and wind direction) I was in AX change tent; did not smell
 - 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: I DID NOT NOTICE AN ODOOR.
 - Possible Source I WAS TOLD AFTER AOP15 - AP/AX AREA
 - 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: COLD SWAGERS, CHILLS - flu like symptoms
2. Send this card to the Central Shift Office.

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”

**Attachment 3
Industrial Hygiene Gas Chromatograph/Mass Spectrometer Sample Results**

IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)

Grab bag samples revealed total aldehydes, which commonly create a musty smell consistent with reports from employees. Also, analysis indicated levels of light hydrocarbons and heavy hydrocarbons were above expected odor thresholds. While detectable as odors, these low levels are also below action levels.



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Attachment 5
Personal Monitoring Results (Survey # 16-03261)
[IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)]

IH Personal Air Sampling Summary Data As
 Counts by Limit Type Of: 05/25/2016,
 Farm(s): AP FARM 08:07 PM
 From Date: 04/28/2016 To
 Date: 04/28/2016
 Percent of OEL: Include All

AP FARM TWA								
Agent	COPC	Date Range	# Taken	# Above Detection Limit	Highest TWA	UOM	OEL	OEL UOM
1, 4-Dichlorobenzene		4/28/2016	1	0	ND		10	ppm
1,1,2,2-Tetrachloroethane		4/28/2016	1	0	ND		1	ppm
1,1,2-Trichloroethane		4/28/2016	1	0	ND		10	ppm
1,1-Dichloroethane		4/28/2016	1	0	ND		100	ppm
1,1-Dichloroethene		4/28/2016	1	0	ND		5	ppm
1,2-Dichloroethane		4/28/2016	1	0	ND		10	ppm
1,3-Butadiene	X	4/28/2016	2	0	ND		1	ppm
1,3-Dichloropropene		4/28/2016	1	0	ND		1	ppm
1,4-Dioxane		4/28/2016	1	0	ND		20	ppm
1-Butanol	X	4/28/2016	1	0	ND		20	ppm
1-Propanol		4/28/2016	1	0	ND		100	ppm
2, 4-Dimethylpyridine	X	4/28/2016	1	0	ND		0.5	ppm
2,3-Dihydrofuran	X	4/28/2016	1	0	ND		1	ppb
2,5-Dihydrofuran	X	4/28/2016	1	0	ND		1	ppb
2,5-Dimethylfuran	X	4/28/2016	1	0	ND		1	ppb
2-Butanone		4/28/2016	1	0	ND		200	ppm
2-Heptanone		4/28/2016	1	0	ND		50	ppm
2-heptylfuran	X	4/28/2016	1	0	ND		1	ppb
2-Hexanone	X	4/28/2016	1	0	ND		5	ppm
2-Methylfuran	X	4/28/2016	1	0	ND		1	ppb
2-Pentylfuran	X	4/28/2016	1	0	ND		1	ppb
2-Propenenitrile		4/28/2016	1	0	ND		2	ppm
2-propylfuran	X	4/28/2016	1	0	ND		1	ppb
3-Buten-2-one	X	4/28/2016	1	0	ND		0.2	ppm
3-Heptanone		4/28/2016	1	0	ND		50	ppm
4-Methyl-2-hexanone	X	4/28/2016	1	0	ND		0.5	ppm
Acetone		4/28/2016	1	1	0.0005	ppm	500	ppm
Acetophenone		4/28/2016	1	0	ND		10	ppm
Allyl Alcohol		4/28/2016	1	0	ND		0.5	ppm
Allyl Chloride		4/28/2016	1	0	ND		1	ppm
Ammonia	X	4/28/2016	1	0	ND		25	ppm
Benzene	X	4/28/2016	1	0	ND		0.5	ppm
Butanal	X	4/28/2016	1	0	ND		25	ppm
Butanenitrile	X	4/28/2016	1	0	ND		8	ppm
Carbon Tetrachloride		4/28/2016	1	0	ND		5	ppm

EIR-2016-019, “AOP-015 Entry for AP Farm and AY102 Retrieval Transfer Line Odors”

Attachment 5 (continued)
Personal Monitoring Results (Survey # 16-03261)
[IH Report #1 – IH Report inside AP Farm (2016-04-28_AOP-015_AP Farm)]

Chlorobenzene		4/28/2016	1	0	ND		10	ppm
Chloroform		4/28/2016	1	0	ND		10	ppm
cis-1,3-Dichloropropene		4/28/2016	1	0	ND		1	ppm
Cyclohexane		4/28/2016	1	0	ND		100	ppm
Decane		4/28/2016	1	0	ND		200	ppm
Dimethylamine		4/28/2016	1	0	ND		5	ppm
Ethanol		4/28/2016	1	1	0.015	ppm	100	0 ppm
Ethyl acetate		4/28/2016	1	0	ND		400	ppm
Ethyl Benzene		4/28/2016	1	0	ND		20	ppm
Ethyl Chloride		4/28/2016	1	0	ND		100	ppm
Ethylamine	X	4/28/2016	1	0	ND		5	ppm
Formaldehyde	X	4/28/2016	1	1	0.0007	ppm	0.75	ppm
Furan	X	4/28/2016	1	0	ND		1	ppb
Hexanenitrile	X	4/28/2016	1	0	ND		6	ppm
Mercury	X	4/28/2016	1	0	ND		0.02	mg/m ³
Methyl Acrylonitrile		4/28/2016	1	0	ND		5	ppm
Methyl isobutyl ketone		4/28/2016	1	0	ND		1	ppm
Methylamine		4/28/2016	1	0	ND		50	ppm
Methylene Chloride		4/28/2016	1	1	0.0004	ppm	5	ppm
n-Butyl acetate		4/28/2016	1	0	ND		25	ppm
n-Heptane		4/28/2016	1	0	ND		150	ppm
n-Heptane		4/28/2016	1	0	ND		400	ppm
n-Hexane		4/28/2016	1	0	ND		50	ppm
n-Nitrosodibutylamine		4/28/2016	1	0	ND		4	ppb
n-Nitrosodiethylamine	X	4/28/2016	1	0	ND		0.1	ppb
N-Nitrosodimethylamine	X	4/28/2016	1	0	ND		0.3	ppb
n-Nitrosodipropylamine		4/28/2016	1	0	ND		1	ppb
N-Nitrosomethylethylamine	X	4/28/2016	1	0	ND		0.3	ppb
n-Nitrosomorpholine	X	4/28/2016	1	0	ND		0.6	ppb
n-Nitrosopiperidine		4/28/2016	1	0	ND		8	ppb
n-Nitrosopyrrolidine		4/28/2016	1	0	ND		4	ppb
Naphthalene		4/28/2016	1	0	ND		10	ppm
Nitrobenzene		4/28/2016	1	0	ND		1	ppm
Nitrous Oxide	X	4/28/2016	1	0	ND		50	ppm
Pentanenitrile	X	4/28/2016	1	0	ND		5	ppm
Propanenitrile	X	4/28/2016	1	0	ND		6	ppm
Pyridine	X	4/28/2016	1	0	ND		1	ppm
Styrene		4/28/2016	1	0	ND		20	ppm
Tetrachloroethylene		4/28/2016	1	0	ND		25	ppm
Tetrahydrofuran		4/28/2016	1	0	ND		50	ppm
Toluene		4/28/2016	1	0	ND		20	ppm
trans-1,3-Dichloropropene		4/28/2016	1	0	ND		1	ppm
Trichloroethylene		4/28/2016	1	0	ND		10	ppm
Trichlorofluoromethane		4/28/2016	1	0	ND		100	0 ppm

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**Attachment 6
Fact Finding Attendance Rosters (5/3/2016)**

Date: <u>5/3/16</u>		EVENT INVESTIGATION ATTENDANCE FORM		
Event Title: <u>AOP-015 Entry for AP Farm and AY-AP Transfer Line Odors</u>				
Event Number: <u>EIR-2016-019</u>				
Print Name	Signature	HID	Job Position	Organization
			Support	Perf. Ass.
			HAMTC	Safety
			BUILDTRADES	SAFETY
			OPS SUPP. SPEC.	PROD. OPS.
			ops sup spec.	Prod. Ops.
			MGR.	PERF. ASSUR.
			FR	ORP
			TOD DIRECTOR	ORP
			Site Rep	DNFB
			SAFETY	IND SAFETY PROG.
			Const Supt.	AEI
			Supk	AEI
			FWS	AEI
			IH	ORP
			IHT	WRPS
			IHT	WRPS
			IAFLM	WRPS
			LAB	AEI
			IS/IH	AEI
			HPT	WRPS
			Mgr. ESHA	WRPS
			Dep. Mgr. STB	WRPS
			FWS	AEI

A-6003-100 (REV 2)

