EVENT INVESTIGATION REPORT

AN Farm AOP-015 Event 04-06-2015


Consisting of 17 pages, including coversheet
EVENT INVESTIGATION REPORT

AN Farm AOP-015 Event 04-06-2015


Event Investigation Team Lead

PER Responsible Manager

PER No. WRPS-PER-2015-0655

Date

4/21/15

4/21/15

Page 2 of 17
Investigation Summary

On Monday, April 6 2015, three workers, two electricians and a Health Physics Technician (HPT) were entering AN Farm to perform Ground Fault Circuit Interrupter (GFCl) Preventative Maintenance (PM). The team met at the AN Farm change trailer at approximately 0730 and proceeded into the Farm. Waste transfer activities were secured earlier in the morning at 0057 so no Personal Protective Equipment (PPE) was required for entry. As the workers walked into the area near the AN-104 vent pit, one smelled an odor described as rotten onions or bad body odor. He asked the other workers if they too were experiencing the odor. One worker thought he could smell a slight odor, the other worker did not smell an odor. Shortly after smelling the odor, the first worker became symptomatic describing the physiological response as “itchy mouth” and “swollen throat” and it was hard to swallow.

The workers exited AN Farm to the change trailer. The workers notified others working in the area and advised them to evacuate the farm. The Central Shift Office Shift Manager was notified as well as the worker’s supervisor. The symptomatic worker was taken to Occupational Medical Services (HPMC) for evaluation and released without restriction.

The conditions at the time of the odor encounter are as follows:

Wind, Strong breeze estimated at 18-25 mph from the Northwest based on ground level observation of local wind sock. Telemetry from the local weather tower indicates prevailing wind at 7 mph with gusts 12-14 mph.

Temperature: 42.5 F

A Temperature inversion was in progress.

Barometric Pressure: 29.03 inches of Mercury

Relative Humidity: 90%

A waste transfer from C-102 to AN-101 was secured at 0057.

The “sluice pit” 106 cover blocks were off. The AN-106 pump had been replaced approximately a week prior to this incident.

Industrial Hygiene Technicians (IHTs) sampled the area with direct reading instruments and found nothing above background levels. “Bag” samples were taken and analyzed with nothing found above action levels.

Event Timeline

Monday, April 6 2015 –
0645  Pre-Job briefing conducted for AN Farm GFCI PMs.
0730  Work team met at the AN Farm change trailer.
0745  First worker encounters odor near AN-101, asks others if they too smell the odor. Odor described as rotten onion or bad body odor.
0750  Workers have exited to the change trailer. First worker experiencing itchy mouth, swollen throat, difficulty swallowing. Other two workers experience no symptoms.
0800  Workers fill out odor response card. Workers notified other work team in area.
0805  Notification to Central Shift Office (CSO) complete.
0808  Maintenance supervisor notified CSO of odor event.
0816  AOP-015 is entered for AN Farm. First worker is reports to HPMC.
0821  Industrial Hygienist (IH) arrives at CSO and is briefed of the AOP-015 event.
0840  IH sampling conducted within AN Farm. No direct readings above action levels reported.
0910  IH arrives back at IH lab.
0915  Bag Samples analyzed with no results above action levels.
1220  HAPSITE Evaluation for AOP-015 event at AN Farm is complete with no results above background levels.
1230  AOP-015 exited for AN Farm.

Tuesday, April 7, 2015

1000  Interviews conducted with the three AN Farm workers.

Compensatory Measures

1. Radio communication of AOP-015 entry at AN-Farm.
2. Shift Office Event Notification (SOEN) sent for Entry into AOP-015 at AN Farm.
3. Safe Evacuation of AN Farm conducted per TF-AOP-015 procedure.
4. IHT response for atmosphere sampling.

**Preliminary Extent of Condition Review**

The AOP-015 entry was specific to the AN Farm with no fugitive emission sources detectible and potential cause being unknown. The preliminary extent of condition is bound to this event at AN Farm.

**Discussion of Potential Causes**

Contributors to the odor may include:

Waste transfer activities from C-102 to AN-101 were secured at 0057 on 04-06-2015.

A Pump change out had occurred the week prior, leaving slurry pit housing pump 106 open with cover block removed.

No vapor producing work was being conducted at the time.

AN Farm ventilation confirmed to be operational and functioning.

**Discussion of Barriers That Could Have Impacted the Cause**

The job, as planned, followed the General Hazards Analysis (GHA) for non-vapor producing activities and did not require respiratory protection. No workers opted for voluntary respiratory protection upgrade.

**Recommendations/Proposed Corrective Actions**

None. The response to this event was conservative, timely, and comprehensive.

**Attachments (as they apply):**

1. List of personnel contacted
2. Logbook Entries
3. Industrial Hygiene Sample Analysis
4. Odor Response Card
5. Weather Data
1. HPT assigned to work team
2. Two work team Electricians
AN Farm AOP-015 Event 04-06-2015

Attachment 2
Logbook Entries

07:27 - Received CSO call from T. Grove
07:27 - Current Operations Team on site to conduct forensics

07:33 - CSO notified CSO of suspicious

08:08 - called CSO, Selections were in AN Farm conducting GFI inspections. They were walking between AN10 and AN10A toward AN10A. 

Indicated that he smelled rotten onions, said he did not have symptoms but his throat was starting to itch and he did not want to go to HPMC.

08:10 - called to notify that he says he has symptoms and is being taken to HPMC.

08:16 - Entered AR - AOP-015 for vapor in AN Farm.

08:17 - AOP-015 radio announcement made.

08:18 - AOP US Seen sent.

08:19 - DOE FR notified of AOP-015 event and employee being sent to HPMC.

08:38 - Seen sent for being taken to HPMC. HR was also notified.
AN Farm AOP-015 Event 04-06-2015

Attachment 2
Logbook Entries

4/7/15

0840 - Sr Mgmt Rep notified of AOP-015 event.

0845 - Late entry for 0825. Received email from DUE FR indicating that during the T-111 job yesterday the vacuum breaker rolled over while it was being lifted from the rusted steel transportation base. After it was rolled it was placed on the riser. CSO was not made aware of the event until this email was sent from DUE FR.

0850 - T-farm PCM is back in service.

0900 - Called projects manager. Sheet metal employee contacted HAMTC Safety Rep this morning when they realized they had been assigned to the same job yesterday that is mentioned in entry 0845. CSO notified around 0845. The event happened yesterday around 1315.

1013 - Initiated an event investigation #617 for T-111 Vacuum Breaker Riser event.

1230 - Exiting AOP-015 for AN Farm. Sample analysis for the AOP-015 event has been completed and the results are at or below background levels. Radio announcement made. Status Sent Notified DUE FR - and Sr Mgmt Rep.
Ladies and Gentlemen,

No Hazardous compounds were identified outside of background materials.

Please find attached an annotated chromatogram showing samples of the general area inside AN Farm, and the inside of the AN 101 tent. Along with this, shown in red, is a bag sample containing high purity nitrogen to depict the normal bag background materials. At these low of concentrations, the bag background becomes significant.

The only observed compounds differing from bag background, were a silicone compound that has been observed many times, and branched chain hydrocarbon of >C12 length. These materials were estimated to have a concentration around 3 ppb.

If you should require further information, please give me a call.

[Signature]

Industrial Hygiene Program
Washington River Protection Solutions, Inc.
Contractor to the U.S. Dept of Energy
Attachment 3
Industrial Hygiene Sample Analysis
AN Farm AOP-015 Event 04-06-2015

Attachment 3
Industrial Hygiene Sample Analysis

<table>
<thead>
<tr>
<th>Washington River Protection Solutions</th>
<th>PER Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>Time/Date &amp; Event location:</td>
<td></td>
</tr>
<tr>
<td>08:00 04/07/2015 AN105, AN104, AN101 AREA.</td>
<td></td>
</tr>
</tbody>
</table>

1. **Event Summary (including number of workers involved and activity in progress):**
   - Was an IHT Present? [ ] Yes [x] No
   - Was Respiratory Protection Being Worn by Affected Worker(s)? [ ] Yes [x] No

2. **Summary of Employee Reported Information (e.g., symptoms):**
   - Attach Completed Odor Response Card

3. **Identification of Source of the Concern:** [ ] Yes [x] No

4. **Time Line of the Event:**

   0818 Shift IHT supervisor notifies PO IHS of AOP-015 entry by phone
   0819 SOEN: "Entering AOP-015 for odors in AN Farm. Stay clear of the area. CSM"
   0821 IHS arrive at CSD and briefed by CSM:
     - 3 electricians performing GFCI inspections (SEG 1) reported rotten onion odor.
     - 1 electrician reported symptom "scratchy throat". Symptomatic electrician reported to HPMC for evaluation.
   0822 Shift IHT supervisor and IHT supervisor arrive at CSD and report that IHTs had been mobilized and are in route to CSD.
   0825 CSM receives phone call from unnamed personnel who clarifies that odor was smelled near AN101.
   0827 IH briefs IHTs on monitoring plan: fill tedlar bag with atmosphere from around AN101 area and one tedlar bag with atmosphere from inside of AN101 pit tent.
   0828 IHTs head to mask station to acquire SCBA
   0829 CSM updated via phone that electrician first smelled odor while traversing from AN105 and AN104 to AN101 area.

   0831 IHT arrives as mask station to update IHTs with new information.

   IHTs notify IH that they had been asked to queue behind RPE delivery personnel after informing mask station personnel that they were requesting SCBA for AOP-015 response.

   Mask station questions various aspects of the AOP-015 RPF's validity before issuing RPE.

   0836 IHTs acquire SCBA and head to IH lab to gather additional equipment
   0844 IHT supervisor leaves CSD in route to IH lab to strategize bag delivery and analysis.
   0905 Shift IHT supervisor leaves CSD in route to IH lab to support bag delivery and analysis and to administratively facilitate timeliness of data acquisition

   0910 IHTs arrive back at IH lab from event scene and report to IH on preliminary readings from DRIs:
   - AN105, AN104, AN101 area:
     - VOCs: ~18ppb
     - NH3: ~20ppb
   - AN101 Tent:
     - VOCs: ~20ppb
     - NH3: ~20ppb
   0915 Tedlar bag contents analyzed with Lumex in IH lab:
   - AN105, AN104, AN101 area:
     - Hg: ~0ng/m^3
   - AN101 Tent:
     - Hg: ~0ng/m^3
   0918 IHT takes remaining tedlar bag contents to 2704HV for GSMS analysis and interpretation by Program Chemist.
   1009 PO IH inquired if the CSM had received the Odor Response Card. The CSM had not received it at this time.
   1051 Shift IHT supervisor delivers Odor Response Card to PO IH.
   1220 Program Chemist releases final report on GCMS analysis of atmosphere from tedlar bags.

Page 1 of 2
AN Farm AOP-015 Event 04-06-2015

Attachment 3

Industrial Hygiene Sample Analysis

Washington River Protection Solutions
TF-AOP-015 INDUSTRIAL HYGIENE INVESTIGATION REPORT

Time/Date & Event location:
0800 04/07/2015 AN104, AN105, AN105 AREA.

5. Summary of IH Monitoring and Sampling Data:
   a. Monitoring DRI survey #5-02417

<table>
<thead>
<tr>
<th>AGENT</th>
<th>@ODOR</th>
<th>@SOURCE</th>
<th>EXPOSURE LIMIT</th>
<th>REPORTING LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>0.0 ppm</td>
<td>N/A ppm</td>
<td>25 ppm OEL/33 ppm STEL</td>
<td>&gt;0 ppm</td>
</tr>
<tr>
<td>Total VOCs</td>
<td>0.018 ppm</td>
<td>N/A ppm</td>
<td>2 ppm AL</td>
<td>&gt;0 ppm</td>
</tr>
<tr>
<td>Mercury</td>
<td>&lt;0.000016 mg/m³</td>
<td>N/A mg/m³</td>
<td>0.025 mg/m³ OEL</td>
<td>0.000016 mg/m³</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>N/A ppm</td>
<td>N/A ppm</td>
<td>25 ppm AL</td>
<td>&gt;0 ppm</td>
</tr>
</tbody>
</table>

b. GCMS Sample Results:
No Hazardous compounds were identified outside of background materials. The only observed compounds differing from bag background were a silicone compound that has been observed many times, and branched chain hydrocarbon of >C12 length. These materials were estimated to have a concentration around 3 ppb. (See attached chromatogram overlay)

c. Sampling:
   - Source [ ] Yes [X] No
   - Area [ ] Yes [X] No
   - Personnel [ ] Yes [X] No

6. Weather Conditions at Time of Event:
   - Wind Direction & Speed: NW at 10MPH
   - Barometric Pressure (steady/rising/falling): 29.2 in Hg and rising very slowly
   - Temperature (°F): 41 °F
   - Humidity: 82%

7. Recommendations/Conclusions: N/A

8. Other: N/A

9. IH Monitoring/Sample Survey Reports:

   IH (Print) __________________________________________________________________________
   Author (Sign) _______________________________________________________________________

   S&H Program (Print) ___________________________________________________________________
   Mgmt. (Sign) ________________________________________________________________________

   Date

PER No. WRPS-PER-2015-0655   Page 12 of 17
Odor Response Card

1. Contact CSM. [Redacted] complete below bulleted information and map.
   - Date and time odor was noticed 4.7.15 0800
   - Your name and the work you were performing [Redacted]
   - Location of odors (mark area on map and wind direction)
   - Name of others in or near the affected area
   - Was an IHT present? [Redacted]
   - Describe the odor [Redacted]
   - Possible source

   - Your symptoms (if any) [Redacted]

2. Send this card to the Central Shift Office.
- Indicates approximate location the odor was encountered.
Tower Information  Sun Apr 05  00:02:20 PST 2015

<table>
<thead>
<tr>
<th>yr</th>
<th>mn</th>
<th>da</th>
<th>hr</th>
<th>Solar</th>
<th>Degrees</th>
<th>Speed</th>
<th>Direction</th>
<th>Degrees</th>
<th>Speed</th>
<th>Time</th>
<th>Stab</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>4</td>
<td>1</td>
<td>0.00</td>
<td>270.0</td>
<td>10.6</td>
<td>W</td>
<td>307.9</td>
<td>22.579</td>
<td>00:02</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>2</td>
<td>0.00</td>
<td>250.0</td>
<td>8.0</td>
<td>WSW</td>
<td>262.2</td>
<td>16.481</td>
<td>01:17</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>3</td>
<td>0.00</td>
<td>250.0</td>
<td>10.2</td>
<td>WSW</td>
<td>240.5</td>
<td>17.743</td>
<td>02:00</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>4</td>
<td>0.00</td>
<td>250.0</td>
<td>7.7</td>
<td>WSW</td>
<td>271.6</td>
<td>15.481</td>
<td>03:47</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>5</td>
<td>0.00</td>
<td>280.0</td>
<td>7.4</td>
<td>W</td>
<td>313.3</td>
<td>16.692</td>
<td>04:08</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>6</td>
<td>0.01</td>
<td>280.0</td>
<td>7.4</td>
<td>W</td>
<td>271.3</td>
<td>12.065</td>
<td>05:55</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>7</td>
<td>0.19</td>
<td>260.0</td>
<td>7.3</td>
<td>W</td>
<td>262.2</td>
<td>12.907</td>
<td>06:57</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>8</td>
<td>0.45</td>
<td>260.0</td>
<td>7.1</td>
<td>W</td>
<td>265.1</td>
<td>14.378</td>
<td>07:53</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>9</td>
<td>0.70</td>
<td>260.0</td>
<td>7.0</td>
<td>W</td>
<td>285.8</td>
<td>13.958</td>
<td>08:37</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>10</td>
<td>0.92</td>
<td>200.0</td>
<td>5.5</td>
<td>SSW</td>
<td>201.0</td>
<td>13.327</td>
<td>09:36</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>11</td>
<td>1.06</td>
<td>160.0</td>
<td>6.8</td>
<td>SSE</td>
<td>164.7</td>
<td>16.902</td>
<td>10:54</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>12</td>
<td>1.14</td>
<td>170.0</td>
<td>5.3</td>
<td>SSE</td>
<td>176.9</td>
<td>16.374</td>
<td>11:37</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>13</td>
<td>1.13</td>
<td>200.0</td>
<td>3.7</td>
<td>SSW</td>
<td>179.5</td>
<td>12.907</td>
<td>12:57</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>14</td>
<td>1.04</td>
<td>30.0</td>
<td>1.0</td>
<td>NNE</td>
<td>79.7</td>
<td>13.537</td>
<td>13:19</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>15</td>
<td>0.61</td>
<td>220.0</td>
<td>3.9</td>
<td>NW</td>
<td>248.1</td>
<td>13.117</td>
<td>14:09</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>16</td>
<td>0.49</td>
<td>10.0</td>
<td>2.6</td>
<td>N</td>
<td>316.1</td>
<td>11.014</td>
<td>15:11</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>17</td>
<td>0.46</td>
<td>50.0</td>
<td>5.2</td>
<td>NE</td>
<td>338.9</td>
<td>10.584</td>
<td>16:47</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>18</td>
<td>0.18</td>
<td>120.0</td>
<td>4.4</td>
<td>ESE</td>
<td>141.1</td>
<td>16.692</td>
<td>17:10</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>19</td>
<td>0.02</td>
<td>140.0</td>
<td>4.2</td>
<td>SE</td>
<td>114.3</td>
<td>9.121</td>
<td>18:53</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>20</td>
<td>0.00</td>
<td>150.0</td>
<td>6.9</td>
<td>SSE</td>
<td>154.8</td>
<td>11.855</td>
<td>19:45</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>21</td>
<td>0.00</td>
<td>160.0</td>
<td>9.2</td>
<td>SSE</td>
<td>155.6</td>
<td>11.855</td>
<td>20:05</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>22</td>
<td>0.00</td>
<td>160.0</td>
<td>9.9</td>
<td>SSE</td>
<td>172.4</td>
<td>9.121</td>
<td>21:00</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>23</td>
<td>0.00</td>
<td>330.0</td>
<td>4.9</td>
<td>NNW</td>
<td>313.8</td>
<td>6.491</td>
<td>22:38</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>24</td>
<td>0.00</td>
<td>320.0</td>
<td>5.0</td>
<td>NW</td>
<td>313.2</td>
<td>7.229</td>
<td>23:57</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>24</td>
<td>520</td>
<td>532</td>
<td>959</td>
<td>357</td>
<td>435</td>
<td>439</td>
<td>445</td>
<td>464</td>
<td>474</td>
</tr>
</tbody>
</table>

Delta T1 = T200 - T3 = 10.7
Delta T2 = T250 - T50 = 3.5
Delta T3 = T200 - T30 = 2.9 (NRC)
Pasquill Category = F
200 ft Winds = 32.9
Least Dilution = 99.9 ALOFT
Areas where the red trace is below the others indicates a temperature inversion.