EVENT INVESTIGATION REPORT

SY Farm AOP-015 Event

Event Investigation Report Number: EIR-2014-033

Event Investigation Team Lead

PER Responsible Manager

PER No. WRPS-PER-2014-1782

Date 12/3/14

Date 12/2/14

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Investigation Summary

At 0943, Instrument technicians working in SY Farm performing sump levels at SY101 and SY102 noticed stronger than normal odors inside the farm and reported them to management. No symptoms were reported by the workers. Another work crew working inside and outside of SY Farm processing concrete for the pump pad removal also smelled the odors but reported that they were not stronger than normal. Central Shift Manager (CSM) entered AOP-015 and secured and restricted access to the tank farm.

The ventilation system in SY Farm was operating during the event.

All Employees from both work crews experiencing odors were asked if they were experiencing symptoms and each responded that they were not. The Employees were also asked if anyone needed to go to the site medical provider (HPMC) for evaluation. The employees agreed that there was no need to be evaluated. However, the two Health physics technician (HPTs) and one Industrial Hygiene Technician (IHT), that had been supporting the pump pad removal efforts and were retrieving air sample media from air samplers located outside of the tank farm when they smelled the odors, decided when relocating to the C-Farm, MO 1149 lunch trailer, to stop at HPMC for evaluation and blood tests. The workers were later released back to work without restrictions (restrictions were imposed by WRPS for the evaluated workers while waiting for blood test results).

During interviews with the instrument technicians, the technicians noted that although two of the three thought the odors were stronger than normal, the third thought the odor level was similar to that encountered routinely in SY Farm. Also, one of the instrument technicians noted that he believed that in the past, the odor encountered in SY Farm was more of a musty smell but that following the last transfer of waste into SY Farm from 219-S that the odor characteristics changed to more of a body odor type smell. The technicians noted that while in the farm that day they periodically checked the wind sock for wind direction and noted that there was a sort of a swirling effect and that the wind direction kept changing as many as five times during the time they were in the tank farm.

A Fact Finding Meeting was not held, but rather interviews and review of completed odor response cards was conducted.

Event Timeline

0910  Slight vapor smell in SY Farm reported by Instrument Technicians to SY Farm Area Day Shift Manager (ADM). Workers requested to fill out odor response cards.

0940  SY ADM logged “CSM entered AOP-015 for SY Farm due to multiple personnel smelling odor.”

0943  CSM logged “Entered AOP-015 for stronger than normal odors inside SY farm, [redacted names], were performing sump levels @ SY101 & SY102. No Symptoms & declined medical. Shift Office Event Notification (SOEN) & Radio announcement complete.”

0948  AOP-015 was called out over the radio and the Laborer General Foreman (GF) on the pump pad removal work called the crew out of the farm and made notification to the Field Work Supervisor (FWS).
FWS notified SY farm shift manager that the crew was coming out of the farm and FWS would call back once all personnel were accounted for.

FWS waited for the crew to exit the change trailer and all personnel were accounted for.

Industrial hygienist (IH) arrive at shift office for AOP-15 at SY Farm

FWS asked if any personnel smelled any unusual odors or symptoms. Two HPT's and two IHTs said they smelled odors but nothing unusual, the IHT had done sampling in the farm per the work package and did not have indications on the direct reading instruments (DRIs) when in the farm. FWS asked if anybody needed to go to HPMC for blood work, all agreed that there was no need for blood work due to no symptoms or unusual odors.

IH texted on scene at SY farm change trailer.

IH went to inform mask station of SCBA needed for IHTs responding to Abnormal Operating Procedure (AOP).

IH received odor response card at shift office.

IHTs report to shift office.

CSM notified DOE Facility Representative and Senior Management

IH leave shift office to help respond.

CSM logged “Initiated an event investigation for SY AOP-015. POC SOEN & DOE FR Complete.”

FWS notified shift manager that all personnel were accounted for and four crew members smelled odors but exhibited no symptoms and opted not to get blood work at HPMC.

IHTs Get Self-contained breathing apparatus (SCBA) from mask station

CSM logged “American Electric crew was working inside SY Farm and also smelt odors, but not stronger than normal. Two HPTs [names redacted] being taken to HPMC w/no symptoms. 2 IHTs, 3 laborers, 1 operator & 1 teamster all had no symptoms. IHTs were performing sampling & had no detectables.”

IH leave mask station in route to SY Farm.

CSM notified Safety & DOE FR of HPTs taken to HPMC.

The wind shifted and put the crew downwind of SY Farm so FWS and American Electric Inc.(AEI) safety representative instructed the crew to move to a different location so the crew was instructed to report to the lunch trailer at C-farm MO 1149 for precaution.

IH arrives at SY change trailer and gives instruction to responding IHTs.

IHTs enter SY Farm to start sampling and pulling bag samples.

The crew then relocated at MO 1149 and FWS was told that that two HPTs decided they wanted blood work so they were dropped off at HPMC. AEI safety rep notified a WRPS Safety Representative that two HPTs were at HPMC. The two IHTs filled out the odor response cards and the crews were released to their managers.

IHTs finish second bag
IHTs are finding trace amounts of volatile organic compounds (VOC’s) instructed to continue investigative sampling.

IHTs exit farm.

HPTs clear instrumentation and bags from SY Farm.

Leave SY change trailer to take bags to 2704HV.

Arrive at 2704HV with bag samples.

Bags turned over with DRI # and readings on the bag.

Ran lumex and miran on the three bags taken in the field.

The following excerpts taken from IH Report TF-AOP-015 dated 0952/9-24-14, “South of SY Change Trailer, Inside Farm”

Summary of IH Monitoring and Sampling Data:

a. Monitoring

<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>0,0,0 ppm</td>
<td>N/A ppm</td>
<td>25 ppm OEL/35ppm STEL</td>
<td>&gt;0 ppm</td>
</tr>
<tr>
<td>Total VOCs</td>
<td>3,6,7 ppm</td>
<td>N/A ppm</td>
<td>2 ppm AL</td>
<td>&gt;0 ppm</td>
</tr>
<tr>
<td>Mercury</td>
<td>≤0.005 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>&lt;det ppm</td>
<td>N/A ppm</td>
<td>25 ppm AL</td>
<td>&gt;0 ppm</td>
</tr>
</tbody>
</table>

b. GCMS Sample Results: Pending, but verbal that not much above background

c. Sampling:

- Source [ ] Yes [X] No
- Area [X] Yes [ ] No
- Personal [ ] Yes [X] No

Weather Conditions at Time of Event:

- Wind Direction & Speed: Light and variable, shifting 0-3 mph
- Barometric Pressure (steady/rising/falling): Rising from 0600-1200, leveled off
- Temperature (°F): 68

Other:

Survey #14-06367 was from Co-located work in SY Farm. Core sampling was taking place with IHT support. Less than detectable for both VOC’s and NH3.

Survey #14-06389 was from Co-located work just East of SY Farm in construction area. Unknown of the exact location of the IHT from the HPT’s from above. Less than detectable for both VOC’s and NH3.
Bag #1 starts to be run on hapsite

**Additionally, the following information provided by IH following HAPSITE Evaluation:**

Three bag samples were brought from the AOP-15 event in SY Farm.
These came from:
10 feet S of SY Change Trailer 0.35 ppm VOC's
Pump pit SY-01A 0.57 ppm
Cabinet SY026 0.7 ppm

All chromatograms were very similar, and an overlay was generated and attached.
The highest concentration sample, the cabinet was estimated for individual concentration.

The identifications of peaks was quite typical for background samples in the Tank Farms.
While several aldehydes were identified, the majority of the concentration was in the heavier, long chain aldehydes which have a less unpleasant odor.

There was an unidentified peak at the front of the chromatograms.
This may have been a merged peak of ethylamine + something.
The small total quantity makes separation of peaks difficult, if not impossible.

There is an interesting difference in the reported VOC via ppbRAE and the amounts observed by GC-MS. In the case of the estimated Cabinet sample, a factor of 10X.
Normally, the match-up is much closer, perhaps only twice or triple.
This may indicate significant quantities of highly volatile short chain such as butane and isobutane
I cannot be certain that I separate all of these compounds from the air, CO2, argon complex at the front.
These two chemicals have response factors of 67 and 100 relative to isobutylene function check gas.
IH leaves 2704HV to return to 200 east and complete DRI paper work.

HPTs that reported to HPMC were released to work. Restrictions in place until blood work results are completed. No other work restrictions reported.

Compensatory Measures

1. Entered AOP-015.
2. Restricted access to SY Farm.
3. IH planned and executed IH sample plan.

Preliminary Extent of Condition Review

Prior SY Tank Farm AOP-015 Event Investigation reports were reviewed to identify potential commonalities with this event. The following reports were reviewed:

- Draft EIR-2014-030, SY Farm TF-AOP-015 Response

Additionally, discussions with two WRPS Hanford Atomic Metal Trades Council (HAMTC) Safety Representatives raised two items of interest. Item one was pursued as part of this review:

1. SY Farm Tank Levels during the event to look for potential gas release event
2. Potential impact to HEPA filters on SY-102 ventilation system due to moisture in the head space and resulting ventilated tank air through the air abatement system
SY Farm AOP-015 Event

Item two was not pursued but a review will be recommended as part of follow on corrective actions that may come out of the resolution of WRPS-PER-2014-1782.

As a result, the following table provides the potential common factors reviewed and the results of that review including the items of interest noted above. Other factors may contribute such as barometric pressures but were not reviewed as part of this report.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notable Tank Level Change during event</td>
<td>No notable tank level change</td>
<td>No notable tank level change</td>
<td>No notable tank level change</td>
<td>No notable tank level change</td>
<td>No notable tank level change</td>
</tr>
<tr>
<td>Wind Speed and Direction Reported</td>
<td>5-13 mph W/SW</td>
<td>4.7-8.1 mph SSW</td>
<td>12-20 mph SW</td>
<td>5-15 mph SW</td>
<td>3-5 mph N/NW</td>
</tr>
<tr>
<td>Stack Operational and Flow Rate (Range: 950 to 1050 scfm)</td>
<td>Operational 951 scfm</td>
<td>Operational 970 scfm</td>
<td>Operational 953 scfm</td>
<td>Operational 974 scfm</td>
<td>Operational 958 scfm</td>
</tr>
<tr>
<td>Odor Location Reported</td>
<td>North of Annulus Pump Pits 02B and 01B and Change Trailer Platform</td>
<td>Outside of Tank Farm near Change Trailer Platform</td>
<td>Near SY102 near Core Sample Platform</td>
<td>Outside of tank farm near pump laydown area and within tank farm near change trailer</td>
<td></td>
</tr>
<tr>
<td>Odor Reported</td>
<td>Sweet Mothball, Sweet Chemical Smell, Onion, Body Odor</td>
<td>Onion</td>
<td>Onion</td>
<td>Odor &quot;type&quot; not recorded</td>
<td>Sweet, Mothball, Onion</td>
</tr>
<tr>
<td>Commonalities Noted</td>
<td>No notable tank level change in SY Farm that would indicate a potential gas release event during the AOP-015 events</td>
<td>Wind directions out of S/SW with one exception</td>
<td>SY Farm Ventilation Operational and within specification</td>
<td>Onion type odor reported</td>
<td></td>
</tr>
</tbody>
</table>

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Discussion of Potential Causes

Based on interviews with workers and review of information provided on odor response cards by workers, the assumed source of the odors is from the SY Farm exhaust stack.

Recommendations/Proposed Corrective Actions

No additional corrective actions are proposed or recommended as a result of this event investigation.

Further corrective actions will be evaluated as a result of resolution of WRPS-PER-2014-1782. As part of the evaluation of corrective actions it is recommended that the RM consider an action for engineering to evaluate potential impact to HEPA filters on SY-102 ventilation system due to moisture in the head space and resulting ventilated tank air through the air abatement system

Lessons Learned

To be addressed, if required, by the causal analysis via a corrective action under WRPS-PER-2014-1782.

Attachments (as they apply):

1. List of personnel contacted and/or Odor Response Cards or Email Statements Provided.
2. Log Book Entries
Attachment 1
List of personnel contacted and/or Odor Response Cards or Email Statements Provided

- John Doe (Interview and Odor Response Card)
- Jane Smith (Interview and Odor Response Card)
- Mary Johnson (Interview and Odor Response Card)
- Sam Brown
- Emily Davis
- Tom Williams (Interview and Odor Response Card)
- Anna Lee
- John Smith (email dated 09/25/14)
- Jane Doe (email dated 09/25/14)
- Mary Brown (email dated 09/25/14)
- Susan Johnson (email dated 09/24/14)
- John Doe (Odor Response Card)
- Jane Smith (Odor Response Card)
- Mary Johnson (Odor Response Card)
D-Shift

9:14:14

9/24/14

0913 Entered AOP-015 for Stranger than normal colors inside SP Farm.

0913 (1HTR)? were performing Sump levels @ SP101 & Sp102. No sample & declined medical. SOEO & Radio Am. Complete.

0959 NOTIFIED DOE FR & Sr. Mgt.

1009 Initiated an Event Investigation for Sp. AOP-015.

1015 American Electric crew was working inside Sp. Farm and also smell colors, but not stranger than normal. Two HPTS & 1 being taken to HPMC w/ no symptoms. 2 HTRs, 3 Operators, 1 operator & 1 teamster all had no symptoms. HTRs were performing sampling & had least no detectables.

1020 NOTIFIED Safety & DOE FR.

1057 1HTR taken to HPMC.

1057 It was released to return to work w/o restriction.

1110 TRACs reports 702-AC Stack HI Temp alarm notified

1137 API107 to API102 transfer Secured

1154 API107 Admin Lock Installed

1231 Initiated temp round CSG-TR-70 for PORCLE seal pot level checks.

1312 API107 to API102 flush & drain about to be

1332 Late Entry ~1230 The two HPTS were released to return to work w/o restriction. SOEO complete.
SY Farm AOP-015 Event

9-22-14 0940 LOW truck exited SY farm
1016 Cask truck exited SY farm with final sample out of SY/192 River 02
1223 Secured under instruction
1315 Review of rounds indicate that SY Farm Change Trailer PCM are out of service
1318 LOW truck enter TX Farm
1321 SY Farm PCM back in service
1445 LOW exiting TX Farm
1544 Relieved by CSM

9-23-14 0510 Assumed ST ADM Duties
0530 Assumed ADM under instruction
0530 T.E. PCM 16 returned to service
1452 BOT crane has exited SY Farm
1452 Secured under instruction
1610 Relieved by CSM

9-24-14 0515 Assumed ST ADM
0530 Assumed ADM under instruction
0815 SY Construction forces 1 is posting SY change trailer
for lifting debris. Need to be on Construction 1/4A to use SY change trailer
0910 Slight vapor smell in SY farm. Filled out Vapor card.
No symptoms or issues with workers involved
0915 SY supervisor sampling work in SY farm fall and
is being taken to AMC by Sampling Fowl 1
Some hip pain associated with the fall
0940 Upon further review, CSM entered AOP 15 for SY
farm because of multiple personnel smelling the odors.
1630 Secured under instruction
1655 Relieved by CSM

9-25-14 0510 Assumed ST ADM Duties
0530 Assumed ADM under instruction
1240 Mr. lift another SY Farm