
Initial report for air release of an "unknown hydrocarbon that was released to the air after an explosion during the shutdown of equipment".
Incident Report #: 1210367

INCIDENT DESCRIPTION

*Report taken by NRC at 11:20 on 26-APR-18
Incident Type: FIXED
Incident Cause: UNKNOWN
Affected Area:
Incident occurred on 26-APR-18 at 10:00 local incident time.
Affected Medium: AIR

REPORTING PARTY

Name: DAVID BEATTIE
Organization: SUPERIOR REFINING COMPANY
Address: 2407 STINSON AVE
SUPERIOR, WI 54880
Email Address: david.beattie@ashlyenergy.com

PRIMARY Phone: (218)3480051
Type of Organization: PRIVATE ENTERPRISE

SUSPECTED RESPONSIBLE PARTY

Name: DAVID BEATTIE
Organization: SUPERIOR REFINING COMPANY
Address: 2407 STINSON AVE
SUPERIOR, WI 54880

PRIMARY Phone: (218)3480051
Type of Organization: PRIVATE ENTERPRISE

INCIDENT LOCATION

2407 STINSON AVE County: DOUGLAS
City: SUPERIOR State: WI Zip: 54880

RELEASED MATERIAL(S)

CRIS Code: UNK
Official Material Name: UNKNOWN MATERIAL
Also Known As: UNKNOWN MATERIAL (HYDRO CARBON)
Qty Released: 0 UNKNOWN AMOUNT

DESCRIPTION OF INCIDENT

CALLER STATED THAT AN UNKNOWN HYDROCARBON WAS RELEASED TO THE AIR AFTER AN EXPLOSION DURING THE SHUT DOWN OF EQUIPMENT. EXACT MATERIAL IS UNKNOWN, CAUSE IS UNKNOWN.

INCIDENT DETAILS

Package: N/A
Building ID: Type of Fixed Object: REFINERY
Power Generating Facility: NO
Generating Capacity:
Type of Fuel: N/A
Timeline

- 1000 CST: initial explosion occurred; shrapnel damaged tank 101 asphalt (50,400 barrels)
- 1100 CST: small initial fire extinguished
- 1200 CST: second fire began in breached tank 101
  - Refinery evacuated
  - Fire later spread to process units, ground fires, a vac tower, a crude unit, multiple tanks
- 1300 CST: community evacuation ordered
  - Concern over HF tank
- 1842 CST: bulk of fire extinguished
- 2355 CST: hot spots extinguished
- Community evacuation lifted next morning at 6 am
Chemical Safety Board Review

- [Link](https://www.youtube.com/watch?v=OU0dIK5EjYI)

- To date the CSB has determined the following:
  - The explosion took place during a planned maintenance shutdown of the refinery FCCU.
  - The incident occurred during a scheduled break time and many workers previously in the unit before the explosion had moved either into blast resistant buildings or away from the process unit.
  - One piece of debris from the explosion flew about 200 feet, and struck a large, nearby, aboveground storage tank containing about 50,000 barrels of asphalt. The side of the tank was punctured, resulting in the release of over 15,000 barrels of hot asphalt into the refinery.
  - Approximately two hours after the release, the asphalt ignited, resulting in a large fire.
  - As a result of the explosion, thirty-six people sought medical attention, including eleven refinery and contract workers who sustained OSHA recordable injuries. In addition, a large portion of Superior, Wisconsin was evacuated.
Initial Actions

- EPA Morrison mobilized to scene.
- Request IMAAC Model Run
  - Initial and revised model
- Ensure Notifications
  - Tribal, state, trustees
- Contact ATSDR, going to need assistance.
- Coast Guard
  - MSU Duluth mobilized
- Additional OSCs mobilized (Miller, Mitchell, Hassan)
- First day: EPA deployed 4 OSCs, 1 ERT member, 2 SERAS personnel, and 7 START to the incident.
• Early in the response, EPA requested air plume modeling analysis support from the Inter-Agency Modeling and Atmospheric Assessment Center (IMAAC).
  • The first model run was to determine plume and likely soot deposition.
  • The second run was to include the hazardous substances.

• The OSCs also received the EPCRA Tier II report of chemicals at the facility. The Tier II information was used to identify the EHS chemicals such as ammonia, Hydrofluoric Acid (HF) and chlorine that were on site.

• The FRP was also sent for oil spill response information.
First things First. Responder safety

- EPA worked with the Refinery and their consultant GHD to establish a three-tiered air monitoring network and was involved with the review/development of the air monitoring plan. Air monitors were immediately deployed throughout the community to assess risks to first responders (Police enforcing evacuations and closures), at the facility fence line to assess on-going emissions from the damaged facility, and inside the refinery to protect workers from new releases and dangerously unstable situations immediately following the fire.

First air monitoring data map, Where are the police deployed?
• EPA worked overnight to collect air data in support of lifting the evacuation order on the 27th.

Local HM team involved in fire, did not develop air monitoring.

Refinery HM teams air monitors deployed after explosion, inaccessible after second fire.
Air monitoring in Hot Zone

Air monitoring at Fenceline

Air monitoring in Community
Water Impacts

- Oil and firefighting foam in Newton Creek
  - Leads to Lake Superior
- MSU Duluth assisted with initial booming oversight in creek, check on Bay
- Sheen noted in Creek
- WDNR taking the lead on all water issues
  - Water sampling
  - Cleanup of oil and firefighting foam
  - Treatment
The control structure near the refinery was closed after explosion, but some portion of 21 million gallons of oily-foamy fire fighting water made its way to the bay.
Mouth of Newton Creek
In addition to 17,000 barrels of asphalt oil from tank 101, No. 6 fuel oil was released from a tank along with every kind of leaking liquid from perforated/broken piping at the refinery.
Incident Command Post, moved four times.
More on Air Monitoring

- EPA worked with Refinery’s Consultant GHD to develop an air monitoring plan.

- EPA developed a Web viewer to manage and share data and information and established the capability for a data push to EPA VIPER servers in case of another incident so stakeholders had immediate access to the data.

- At the end of each day, all air monitoring data was summarized and provided to the Wisconsin State Health Department and the Douglas County Department of Health and made available to the public through their web-site.

- EPA later collected independent air samples for chemicals of concern.
Community Air Monitoring

- START conducted air monitoring overnight until fire had been out for 24+ hours
- ERT on site
- Data uploaded to internal viewer
- Receiving data from refinery contractor
- Will be able to view data live with push of a button in event of another fire or release
EPA/START Data pushed to web viewer
In addition to monitoring conducted by the EPA, the company’s environmental consultant eventually collected more than 20 million air quality readings in the community and at the refinery at approximately 5,600 individual locations. The results of the community monitoring program can be found on the Douglas County Department of Health and Human Services website.
Portable Vapor Combustion Units (VCUs)

- Needed to de-inventory process equipment, main flare damaged
- Permit request run through ICS
- Expedited permitting approvals by WI DNR.
- Add SO2 and H2S as priority air monitoring targets going forward.
Radiation Source Accounting

NRC licensed and exempt sources,
All accounted for.
Soot, Debris and Asbestos

- EPA worked with the refinery to address concerns related to soot deposition and debris from the fire that may contain suspect asbestos.
- EPA worked with ATSDR, Wisconsin Department of Health and the Douglas County Health Department to provide information to the public. WI DHS created a fact sheet on gardening and PAHs which were a prevalent concern at community meetings.
Searching for Soot deposition, following the plume models.
Asbestos Plan developed and Completed with input from OSHA

- Addressing suspect ACM on-site and off-site.
Debris outside of fence line
Searching for debris (tank insulation) and suspect asbestos in community.
- “A search and clean” mission
Initial firefighting water discharged to Newton Creek. By 7pm the facility started to contain the firefighting water on-site in 2 ponds. Eventually hired Clean Harbors (after 1 to 2 weeks) to treat the water. They set up 2 parallel treatment series. Each one had two 10,000 lb. cannisters of activated carbon followed by two cannisters of ion exchange resin. Run water through one while changing out the cannisters in the other one. This is still going on. Water is then discharged to Newton Creek. WWTP was already capable of treating water for asphalt contamination and is still doing that.

Initial PFAS concentrations in Newton Creek (due to initial discharge) was in the 1,000s of PPT (> 1ppb). It has been continuously monitored since that time and now appears to be fluctuating over a stable range and probably averages around 50ppt. This is causing some issues because it is near several different standards that have been published. Not sure why concentrations aren’t going down to what should have been a lower baseline concentration (there was no initial baseline to compare to though).
<table>
<thead>
<tr>
<th></th>
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<td>Benzene</td>
<td>ng/l</td>
<td>55.9</td>
<td>53.7</td>
<td>18.4</td>
<td>&lt; 0.34</td>
<td>&lt; 0.34</td>
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<td>Ethyl benzene</td>
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<td>Toluene</td>
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<td>Xylene, total</td>
<td>ng/l</td>
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<td>16.5</td>
<td>&lt; 0.34</td>
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<tr>
<td>Methyl tertiary butyl ether (MTBE)</td>
<td>ng/l</td>
<td>&lt; 0.40</td>
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<td>&lt; 0.40</td>
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<td>1,2,4-Trimethyl benzene</td>
<td>ng/l</td>
<td>17.2</td>
<td>15.2</td>
<td>9.0</td>
<td>&lt; 0.14</td>
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<td>1,3,5-Trimethyl benzene</td>
<td>ng/l</td>
<td>4.0</td>
<td>3.7</td>
<td>2.3</td>
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<td>Naphthalene</td>
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<td>Total PAHs</td>
<td>ng/l</td>
<td>46.0 &lt; 40</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
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<td>ND</td>
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<tr>
<td>GRO</td>
<td>mg/l</td>
<td>510</td>
<td>13.1</td>
<td>10.3</td>
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<td>0.14</td>
<td>0.081</td>
<td>0.076 b</td>
<td>0.073 c</td>
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<td>mg/l</td>
<td>ND</td>
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<td>2.41</td>
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<td>0.15</td>
<td>0.080</td>
<td>0.073 c</td>
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<tr>
<td>ORO</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
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<td>ND</td>
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<tr>
<td>Oil and Grease</td>
<td>mg/l</td>
<td>6.3</td>
<td>11.1</td>
<td>5.8</td>
<td>5.6</td>
<td>40.0</td>
<td>20.0</td>
<td>40.0</td>
<td>20.0</td>
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<td>Perfluorooctanoic acid (PFOA)</td>
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<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
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<td>&lt; 10</td>
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<tr>
<td>Perfluorooctane sulfonic acid (PFOS)</td>
<td>ng/l</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
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</tbody>
</table>
Fire Water Recovery, AFFF foam
PFOS/PFOA Carbon and Ion Resin Treatment systems
On-Site oil cleanup
Wildlife Management

- This started 1 to 2 days after the fire when a deer wandered into the asphalt area and got contaminated. Husky hired a company called “Focus Wildlife” to conduct the rehab. In a heated building away from the spill. Rehab appears to be done but mostly involved birds; mostly geese. Some animals couldn’t be saved but many could. To prevent hatching of geese eggs, they “oiled” the eggs. To keep animals out of the asphalt contamination they used both lasers and border collies. Mostly chasing the birds. They also set up flags, which apparently scare the birds away.
Wildlife Capture and Recovery
<table>
<thead>
<tr>
<th>Date admitted</th>
<th>Species</th>
<th>Number admitted</th>
<th>Sex/Age</th>
<th>Location obtained</th>
<th>Diagnosis/cause</th>
<th>Disposition</th>
<th>Disposition date</th>
<th>Location released/Transferred</th>
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<tbody>
<tr>
<td>14-May-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
</tr>
<tr>
<td>14-May-2018</td>
<td>Mallard</td>
<td>1</td>
<td>Adult</td>
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<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-May-2018</td>
<td>Mallard</td>
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<td>Adult</td>
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<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
</tr>
<tr>
<td>17-May-2018</td>
<td>Weasel, Short-tailed</td>
<td>1</td>
<td>Young</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>22-May-2018</td>
<td>Goose, Canada</td>
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<td>Adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
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<td>23-May-2018</td>
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<tr>
<td>24-May-2018</td>
<td>Grackle, Common</td>
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<td>Adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>24-May-2018</td>
<td>Grackle, Common</td>
<td>1</td>
<td>Adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled (asphalt)</td>
<td>Released</td>
<td>25-May-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>25-May-2018</td>
<td>Grackle, Common</td>
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<td>Owl, Snowy</td>
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<td>Passerine spp. (unidentified)</td>
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<td>26-May-2018</td>
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<tr>
<td>14-Jun-2018</td>
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<tr>
<td>17-Jun-2018</td>
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<td>Released</td>
<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-Jun-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Sub-adult</td>
<td>Husky Refinery Superior</td>
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<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-Jun-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Sub-adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-Jun-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Sub-adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-Jun-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Sub-adult</td>
<td>Husky Refinery Superior</td>
<td>Oiled</td>
<td>Released</td>
<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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<tr>
<td>17-Jun-2018</td>
<td>Goose, Canada</td>
<td>1</td>
<td>Adult</td>
<td>Husky Refinery Superior</td>
<td>Unoiled (captured with oiled offspring)</td>
<td>Released</td>
<td>17-Jun-2018</td>
<td>Douglas County State Wildlife Area</td>
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</table>
Laser Deterrent
EPA worked with the State of Wisconsin and the Refinery and monitored a multitude of response activities including; site stabilization activities (de-inventorying of damaged equipment and piping, maintaining nitrogen blankets in reactive equipment, oil recovery on-site and off-site, modifying air monitoring parameters as portable Vapor Combustion units (VCUs) were brought on line, PFAS/PFOA fire-fighting water and foam collection and treatment, removal of chlorine and ammonia from the site, WWTP damage and re-start), oiled-wildlife capture-decon and hazing efforts, water quality sampling in Newton Creek and Lake Superior Bay and attending public meetings.
It will be some time before startup!
Questions?