CN Tunnel Derailment

EPA Response Highlights

6/28/19 - 7/6/19
46 car derailment
In tunnel
1 sulfuric acid car involved
LPG, fuel
Flooded
Report from USCG
Initial Actions

- OSC Betsy Nightingale - Lead OSC
- Checked in with CN, State, County EMA
- Mobilized START, SPM flex units with mineral acid tapes, AreaRAEs, ER response vehicles
- Requested that EOC:
  - Analyze consist
  - Map downstream drinking water intakes
  - Issue precautionary notification to drinking water facilities
- Requested IMMAC Model
- Departed for Port Huron
Arrived on Scene

✧ Update
  ❘ Sulfuric car breached – assumed 13,700 gal of 94% sulfuric acid released
  ❘ No evidence of release to river
  ❘ Aluminum ingots and rolls of paper acid impacted
  ❘ Tunnel not flooded
  ❘ No LPG involved
  ❘ Auto cars involved
  ❘ Ballast was granite, ties concrete
  ❘ Sump
  ❘ Unsure where border lies relative to sulfuric car
  ❘ Ventilation to Canada
  ❘ Drainage piped to Canada into sanitary, but piping destroyed
Arrived on Scene

- Discussed lead with USCG
- Formed Unified Command
  - CN, EPA, State (MSP and EGLE), St Clair County EMA, City of Port Huron Fire Department US Customs and Border Protection
- Established Stakeholder/Collab Agency Group
- Established Incident Objectives, Org Structure, Meeting Schedule
- Developed Health and Safety Plan and Air Monitoring Plan
- Developed IAP for first operational period
Initial Incident Objectives

- Ensure health and safety of public and response personnel
- Develop health and safety plan
- Develop and implement air monitoring plan
- Develop IMAAC Model
- Research reactivity of material spilled
- Ensure effective containment, cleanup, recovery, and disposal of spilled product
- Protect drinking water sources
- Maximize protection of environmentally sensitive areas
- Investigate the potential for and, if feasible, utilize alternative technologies to support response efforts
ICS Structure

- Unified Command (CN, EPA, State, County, City)
- SO – CN
- LIO – Not Filled
- PIO – CN, County and EPA
- PSC – CN and EPA
  - SITL, DOC, RESL CN; ENVL EPA Remote
- OPS – CN, EPA
  - Air Monitoring Branch – CN, EPA and START
- LOGS- CN
- FSC – CN
Planning - Meeting Schedule

<table>
<thead>
<tr>
<th>Incident Name</th>
<th>Incident Location</th>
<th>Operational Period / Date / Time</th>
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<tbody>
<tr>
<td>Shrewsbury Tunnel Derailment</td>
<td>Port Huron, MI</td>
<td>From 7/1 to 7/3 10:00</td>
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</tbody>
</table>

**Daily Meeting Schedule (ICS 230 - CN)**

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>Meeting Name</th>
<th>Meeting Purpose</th>
<th>Attendees</th>
<th>Location</th>
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<tbody>
<tr>
<td>7/1 10:00</td>
<td>Stakeholder Briefing</td>
<td>Stakeholders</td>
<td>Tent</td>
<td></td>
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<tr>
<td>7/2 09:00</td>
<td>Stakeholder Briefing</td>
<td>Stakeholders</td>
<td>Tent</td>
<td></td>
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<tr>
<td>7/2 10:30</td>
<td>Tactics</td>
<td>Tentative Status</td>
<td>Tent</td>
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<td>7/2 12:30</td>
<td>CIGS</td>
<td>Tentative Status</td>
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<tr>
<td>7/2 18:00</td>
<td>Tactics</td>
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<tr>
<td>7/3 09:00</td>
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Prepared by Sarah Kirkwood, D/PSC, 7/1/19
Planning -SITUATION Boards
Press releases issued frequently by County and CN

Coordinated with Unified Command

Most media attention was local

40 train cars derail in international St. Clair River Tunnel spilling 13.7K gallons sulfuric acid

Posted: 9:36 AM, Jun 28, 2019   Updated: 4:09 PM, Jun 28, 2019
Health and Safety Plan

- Long non-site specific plan was presented to UC
- UC approved, but required all tasks to also have EPA ICS Form 208 HM completed and approved
Modeling Summary

- (U//FOUO) Known Information: Single railcar ruptured and releasing 194,000 lbs. of sulfuric acid within the St. Clair River Tunnel.

- (U//FOUO) Modeling Assumptions:
  - Sulfuric acid does not readily evaporate. We estimated a sulfuric acid spill in the tunnel. Rapid analysis was conducted by simulating a very small pool at each entrance and scaling the size relative to internal ventilation estimates. The Canadian source is twice as large due to reported forced ventilation.

- (U//FOUO) Summary:
  - Models indicate minimal toxic vapors just outside of the tunnel entrances.
  - Calculations of potential sulfuric acid vapors inside the tunnel indicate potentially fatal levels inside the tunnel (at least AEGL-3; death possible) at 10 minute exposure.
  - There is likely a toxic environment within the tunnel and PPE should be used in the tunnel until environmental measurements indicate safe levels.
EPA conducted perimeter air monitoring and monitored staging areas

CN conducted air monitoring within the tunnel

Targets:
- Sulfuric acid / H2S / Sulfuric Acid / Hydrogen / VOCs / O2 / CO / LEL / Temp / Particulates

Equipment:
- SPM Flexes
- AreaRAEs / MultiRAes
- Single gas meters
- Draeger tubes
- Temp guns
- Dust Traks
- VIPER

CN also conducted periodic air sampling
High particulate levels detected frequently in tunnel

Particulates may have interfered with SPM flex sulfuric acid detection in tunnel

Working with ERT to further analyze

Low levels of sulfuric detected at perimeter – below MDHHS AL

Most parameters not sustained above action levels within tunnel

Highest sulfuric detected in sample at tunnel mouth was 0.013 ppm (AL Level D less than 0.49 ppm (ACGIH TLV))
Operations

- Primary Overarching Goals
  - Protect health and safety of responders and public
  - Remove derailed cars and debris
  - Remove sulfuric acid, sulfuric acid contaminated debris, ballast
    - Neutralize where removal not possible
  - Empty and replace sump
  - Restore tunnel
  - Reopen rail, ASAP
  - Ensure waste is safely and securely staged and properly disposed of
Due to severity of wreckage, exact car locations and border initially unknown.
Initial Situation

Acid pooled throughout large segments of tunnel, and filling sump
Acid pooled throughout large segments of tunnel, and filling sump
Initial Situation – Sump Location

PORT HURON

ST. CLAIR RIVER

SUMP PIT
STA 11+077.36 (M)
STA 365+43 (FT)
WEST PORTAL = 2449.00 FT
Initial Situation – Sump Design
Paper strewn about wreckage – sitting in acid in areas.
Initial Situation

Auto Rack Car adjacent to paper and acid wreckage
Operations – More Detail

- Generally, rail cars were removed into both US and Canada, one by one, working towards the tunnel center
- EPA Special Operations Focus Areas – Specific Plans required for
  - Pumping/removal of sulfuric acid liquid
  - Neutralization
  - Removal of sulfuric acid car
  - Removal of contaminated ballast
  - Removal of acid contaminated paper
View of exclusion zone entry point from tunnel entrance
Sulfuric Acid Removal System

Track vehicles with mounted totes and pumps were initially used to remove pooled acid from thought out tunnel and sump. Eventually pumped direct to vac truck.
• View of sump while liquid is being pumped out

• Approx 90,000 gal very low pH pumped out to date.
Neutralizing

- pH of liquid in sump was zero initially, and 1 in ballast pools
- 1,329 cubic yards contam ballast estimated in tunnel
- Plans were approved to use both lime and sodium hydroxide
- Due to strength of acid, large quantities of neutralizer required
- Crews tried to use lime and pumping exclusively, but sump kept recharging and pH did not improve enough so eventually did use sodium hydroxide as well
- Dave Mickunas and Larissa Leonova commented on multiple drafts
Removal of Sulfuric Acid Car

- Sulfuric acid car was removed into Canada on 7/4/19
- Car was mostly empty
  - Approx 581 gal of sulfuric acid was pumped from the car prior to removal, and 9,000 L of neutralizer was added to area
- Tunnel was evacuated in removal process due to fuming that CN believed was due to neutralization material reacting with remaining sulfuric
- US and Can fire departments cleared tunnel
- UC called standoff after incident to further address safe removal of remaining rail cars, and debris
- All remaining cars were successfully removed by 7/5/19
Removal of Paper and Auto Car

- A plan to safely remove paper and nearby auto car into the US was drafted with Port Huron Fire, and approved by UC on 7/4/19
- Paper, auto car, and all remaining rail cars were successfully removed without incident on 7/5/19
Wrecking

- Slow process on US side
- Heavier cars, derailed cars deep in tunnel
• Many cars broke apart during removal and spilled all contents into tunnel

• CN eventually removed all rails and ties to speed process
Several staging areas were established to stage debris and acidic liquid. Secondary containment was installed at all areas. CN worked to expedite disposal. Disposal of liquid was challenging due to very low pH.
On 7/3/19, CN informed EPA that they believed that the sump is located in the US, and the sulfuric acid car is in Canada.

On 7/4/19, NTSB and EPA were able to see the flags painted on the tunnel side.

On 7/5/19, NTSB and TSB issued a statement indicating that the derailment location was on the Canadian side of the tunnel.
Coordination

❖ UC composition worked well
❖ Cooperating Agencies
  ❖ Environment Canada
  ❖ Sarnia (Ontario) Fire Department
  ❖ CA TSB and US NTSB/FRA
    ❖ EPA attended NTSB/TSB daily meetings – great information exchange
  ❖ US Customs and Border Protection
  ❖ US Coast Guard
  ❖ Michigan Department of Health and Human Services
❖ Contingency Plans
  ❖ Canada – US Joint Inland Pollution Contingency Plan Applied
  ❖ CANUSCENT Annex (agreement for transfer of resources across border) not invoked
  ❖ Daily/twice daily calls with Environment Canada. No Canadian requests for assistance.
Release / Jurisdiction

- Derailment determined to have occurred in Canada
- CN did not file NRC report – did not believe they had a release
- Sulfuric car accident location determined to be in Canada
- Sulfuric car removed into Canada
- Acid contaminated waste removed into US
- Acid ran into sump in US, and was pumped out into the US, staged in US, disposal in US
- CN data show sulfuric acid in air sampling results outside tunnel mouth
- SPM flexes show detections around site perimeter

Authority Considerations

- CERCLA
  - Broad authorities to evaluate and mitigate release, or threat of release, of hazardous substances, pollutants or contaminants that present imminent and substantial endangerment to human health and the environment
    - Petroleum exclusion evaluate
- CWA/OPA
  - Response actions linked to discharge, or substantial threat of discharge, of oil or hazardous substance to navigable waters
    - Potential issue when there is no threat to navigable waters
- RCRA
  - Broad authorities to require response actions to solid or hazardous wastes (including oil) but no funding mechanism
    - Need a viable liable party for issuance of a 7003 Order

December 2016 OSC Academy
In Closing

- Waste Disposal
  - >90,000 gallons of Sulfuric Acid
  - >1,700 tons of Ballast Waste

- After Action Review
  - August 27, 2019
  - DRAFT Report in Review
QUESTIONS?