ATC/MG&E Transformer Spill

Jason B. Lowery, Wisconsin DNR
Initial Incident Overview

- July 19, 2019
- Transformer explosion at MGE Substation – Main St. (a few blocks E of capitol)
- Majority of 18,000 gallons of mineral oil in transformer spilled
- Secondary fire a mile away
MFD used 59g of Class A/B Foam (AFFF) mixed w/ 120,000 g of water. Entered storm sewer.
Failed Transformer & Oil Skimming
Absorbents on Main St.
• 120,000 g of water entered storm sewers
• High water in surrounding lakes “contained” PFAS, no rain
• Contractors/consultants: North Shore (ATC), AECOM (ATC) and SCS (MG&E)
Water Cleanup

- Oil “non-PCB” – 14,000g removed from oil/water separation
- 60,000g of water from cable vaults and nearby catch basins
- 80,000g of water from storm sewers
- 40,000g of water from later skimming, utility vault dewatering, & oil/water separation (installing replacement transformer)
- Boom placed/replaced at outfalls & storm sewer (reduced to sheen)
- Samples tested for DRO & PFAS to guide cleanup. Some PCB sampling.
Oil/Water/Foam Removal
Oil/Water/Foam Removal
Frac Tanks on Main St. (water storage)
Oil skimming next to transformer pad
Yahara River Outfall Monitoring/Boom Placement
Lake Monona Outfall Boom Placement
Soil

- Initial 60 to 80 cu yd of soil scraped from substation yard and perimeter
- Additional 300 cu yd of soil later excavated from foundation for new transformer
  - Can’t find disposal location in WI
  - Being transported to US Ecology (PCB Cell) in Belleville, MI
- More soil possible pending additional sampling
Soil Excavation (Main St.)
PFAS-Contaminated Water

- AFFF Foam (FireAde) was initially believed to not contain PFAS, but SDS said:
  - Later obtained Certificate of Analysis for foam
    - Reported 17 PFAS compounds
    - Reporting Detection Limit 20 ppt → cannot report below 20 ppt
    - PFHxA (C6) only detected analyte in Certification of Analysis (may be others below the reporting limit.....)

<table>
<thead>
<tr>
<th>Perfluoroheptane sulfonate</th>
<th>ug/L</th>
<th>&lt;0.020</th>
<th>&lt;0.020</th>
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<tbody>
<tr>
<td>Perfluoroheptanoic Acid (PFHpA)</td>
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PFAS-Contaminated Water

- PFHxA (C6) was 88 ppt before dilution with storm sewer (based upon analysis). Storm water analysis was diluted.
- What about proprietary chemicals? Other PFAS compounds?
- Takes a week to get results
- Meanwhile, North Shore recovered foam from storm sewers pending results
6:2 FTS standards are 200 ppt (Canada) and 100 ppt (Denmark)
Most concentrations < 20 ppt (LOD in Certificate of Analysis)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Analyte</th>
<th>CAS Number</th>
<th>Catch Basin 7/19/2019</th>
<th>Surface Water 7/19/2019</th>
<th>Blount 7/19/2019</th>
<th>LW 7/19/2019</th>
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<tr>
<td>4:2 FTS</td>
<td>4:2 Fluorotelomer Sulfonic Acid or 4:2 FTSA</td>
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<td>10:2 FTS</td>
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</table>
Texas dw standard for PFHxA is 93 ppt
WI proposed ES is 20 ppt for PFOA/PFOS
PFHxA ($\text{C}_6\text{H}_{11}\text{O}_2$) – 5 F-saturated Cs.

PFOS to 6:2 FTS: 8, 7, and 6 F-saturated Cs.
PFAS-Contaminated Water

- 170,000 gallons of water (collected from storm sewers & utility vault) has been containerized.
- Stored in Frac tanks at MGE Coal Yard
- Being treated with GAC (zeolite+3 x 1,000 lb.).
- Then re-analyzed
- If ND, dispose at MMSD or Storm Sewer (WPDS Permit)
Work Plan for Future PFAS Sampling

- Soil Sampling (grid across substation)
- Storm Water (catch basins & outlets)
  - look for trends
- Groundwater (2 sumps & 1 temp well)
  - 3 quarterly rounds
- All samples analyzed for 36 PFAS compounds
PFAS Disposal in Wisconsin

- Disposal difficult in WI, especially solids (WWTPs don’t want leachate)
- Water treated
- “Effective Disposal Work Group” looking at various options
  - Solidification of liquids
  - Incineration
  - Other technologies (plasma, diamond-boron, etc.)
PFAS in AFFF in WI

- Working on a survey for airports and fire departments ➔ where is foam used and stored in the state (late 2019/early 2020)
- Looking into options for AFFF disposal statewide
- Develop BMP’s associated with foam usage to prevent or significantly reduce these types of events (e.g. find fluorine-free foam alternatives)