Air Emissions Inventory

Background:
The Clean Air Act (CAA) dictates CO, NOx, O₃, PM2.5 and PM10, SO₂, and Pb as “criteria pollutants.” These pollutants all have detrimental effects on environmental and human health. Fermilab is required to calculate the Potential to Emit (PTE) and track the actual emissions (AE) of these CAPs, volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) of all relevant sources on the Batavia site grounds each year to the Illinois EPA.

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<table>
<thead>
<tr>
<th></th>
<th>PM10</th>
<th>NOx</th>
<th>SO₂</th>
<th>VOC</th>
<th>GHG (in CO₂eq)</th>
<th>Total HAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Emissions</td>
<td>4.6</td>
<td>18.9</td>
<td>3.3</td>
<td>2.6</td>
<td>213</td>
<td>496</td>
</tr>
</tbody>
</table>

Criteria pollutant emissions factors calculated by AP-42: Compilation of Air Emissions Factors from Stationary Sources. These values serve to estimate the quantity of pollutant released into the atmosphere per unit (weight, volume, distance, or duration) of activity. Typically, these factors are derived by averaging acceptable quality data.

Of the designated CAPs, Pb is not directly tracked because no emissions sources release a measurable amount. O₃ is not tracked because ground-level ozone is created by reactions involving VOCs and NOx.

Purpose:
Currently, the lab is classified as a small enough source (below 100 TPY for any CAP in a moderate nonattainment zone) such that it falls within coverage by the Registration of Smaller Sources (ROSS) program. ROSS does not require all emissions sources to be factored into calculations, but PTE for every source must be calculated to ensure emissions stay below the small source threshold value. An inventory is used to ensure continued compliance with the CAA.

Tracking & Inventorying Air Emissions Sources:
We collected data for the actual emissions of internal combustion engines, debonding ovens, cavity processing units, storage tanks, and boilers at the Batavia site. We reviewed various locations to ensure all relevant emissions sources of were appropriately logged. Generators and internal combustion engines were found to be the most common sources at the lab. We also visited IB4 to improve the PTE accuracy associated with electropolishing. We completed calculations for each emission sources’ PTE using EPA and Fermilab derived emissions factors. We are still in the process of locating the remaining emissions sources on-site.

Chemical Inventory

Introduction & Purpose:
DOE requirements include management of chemicals, including a chemical tracking system. Currently, no site-wide chemical inventory exists, and the SDS database does not provide locations or tracking of chemicals used. Therefore, development of a lab-wide chemical inventory was identified as a significant long-term goal for the Environmental Program Department. Along with HCTT, the eventual goal is to establish a lab-wide chemical inventory using real-time awareness of the presence of chemicals on site, potentially using a QR code system like Argonne National Laboratory.

Using existing infrastructure, a database will be created tracking chemicals from acquisition and delivery through storage, and then through usage and disposal. This tracking is a priority as the EPA is working to phase out certain chemicals under the Toxic Substances Control Act (TSCA) and the DOE PFAS Roadmap requires tracking of all PFAS purchases, uses, storage, and planned disposal.

Work conducted/information collected:
We collected information on chemical components and their respective CAS number(s), volume, weight, container type, location, and links to the respective SDS database entry for each chemical (excluding common household chemicals like paint) in every building we visited. Some buildings and labs have existing inventories or tracking systems, so we also worked to align existing information with the additional collection parameters required, as well as updating the inventories.

In our visits, the chemicals most frequently logged were common solvents: acetone, isopropyl alcohol, and ethyl alcohol. Many chemicals are also extremely old, emphasizing the need for a review.

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