The Toxics Release Inventory and Emissions Reduction Measures

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Toxics Release Inventory Program
Office of Environmental Information

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Review: What is TRI?

- TRI tracks the management of certain toxic chemicals
- U.S. facilities in certain sectors report how much of each chemical is released and/or managed as waste
- TRI includes data about approximately 20,000 facilities across the country and covers more than 675 toxic chemicals.
What Emissions Data Does TRI Collect?

- Total chemical fugitive (non-point) air emissions and total chemical stack (point) air emissions
- Basis of estimate for air emissions (e.g., published emission factors, monitoring)
- On-site treatment methods and associated destruction or removal efficiency
  - Treatment methods are reported using 25 codes that correspond to treatment activities
  - Treatment efficiencies are reported using six codes that correspond to six efficiency ranges
TRI Emissions Trend, 2003-2013

On-site Air Releases, 2003-2013

- HAPs
- Other Chemicals

Millions of Pounds

- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
On-site Air Releases of HAPs, 2003-2013

- Fugitive Air Emissions
- Stack Air Emissions
- Count of Facilities
Largest Decreases by Sector

Air Emissions for Industries with Largest Decreases, 2003-2013

- Electric Utilities (-84%)
- Chemicals (-44%)
- Paper (-23%)
- Transportation Equipment (-64%)
- Plastics and Rubber (-47%)

Note: Limited to HAPs
Largest Decreases by Chemical

Air Emissions for Chemicals with Largest Decreases, 2003-2013

- Hydrochloric Acid (-81%)
- Methanol (-30%)
- Hydrogen Fluoride (64%)
- Toluene (58%)
- Xylene (mixed isomers) (-65%)

Note: Limited to HAPs
Treatment of HAPs

Treatment Methods Reported, 2013

- Hydrochloric Acid
- Methanol
- Hydrogen Flouride
- Toluene
- Xylene (mixed isomers)

Count of Treatment Activities

Legend:
- A01: Flare
- A03: Scrubber
- A05: Electrostatic Precipitator
- A06: Mechanical Separation
- H040: Thermal destruction other than use as a fuel
- Other Waste Treatment Codes

Note: Limited to gaseous wastestreams for HAPs with the largest decrease in air emissions, 2003-2013
Treatment Efficiencies for HAPs

Efficiency Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>&gt;99.9999%</td>
</tr>
<tr>
<td>E2</td>
<td>&gt;99.9% but ≤ 99.9999%</td>
</tr>
<tr>
<td>E3</td>
<td>&gt;99% but ≤ 99.99%</td>
</tr>
<tr>
<td>E4</td>
<td>&gt;95% but ≤ 99%</td>
</tr>
<tr>
<td>E5</td>
<td>&gt;50% but ≤ 95%</td>
</tr>
<tr>
<td>E6</td>
<td>≥0% but ≤ 50%</td>
</tr>
</tbody>
</table>

Reported Efficiency Codes for Top Treatment Methods, 2013

- H040: Thermal Destruction Other Than Use as a Fuel
- A01: Flare
- A03: Scrubber
- A05: Electrostatic Precipitator
- A06: Mechanical Separation
Frequency with which scrubber use was reported increased 64% from 2005-13.
The Pollution Prevention Prevention Act

- Sets out hierarchy of preferred waste management techniques
- Tracks each TRI facility’s progress up the hierarchy
- Provides an opportunity to publicly highlight steps a facility takes to reduce toxic chemical releases to the environment
• **Waste Management Quantities**
  – Prior Year, Current Year, and Future Years (projections)

• **Production Ratio**
  – Ratio of current year production or activity to previous year
  – Puts changes in releases into context of production

• **Source Reduction Activities**
  – Codes corresponding to specific types of activities (required if any P2 activities were newly implemented during the reporting year)

• **Optional Pollution Prevention Information**
  – Additional detail about P2, recycling, or pollution control (free-text)
Optional P2 Descriptions from 2013

Process Modifications
• A rubber product manufacturer installed three natural gas boilers and decommissioned two #6 fuel oil boilers to reduce emissions. The change was made in September 2013 and resulted in a 36% reduction in benzo(g,h,i)perylene emissions from the previous year.

Surface Preparation and Finishing
• By changing to an immersion acid process instead of using spray acid equipment, a semiconductor manufacturer reduced emissions of aerosolized hydrochloric acid.

Waste Treatment and Leak Detection
• A chemicals manufacturer installed a new emissions scrubber system for capturing methanol emissions for re-use in their process. Testing shows emission control efficiency of >95%. The facility also implemented an LDAR program to identify VOC leaks.
Accessing TRI P2 Data

TRI National Analysis

- Presents national trends in P2 reporting
- Highlights industries and chemicals with significant decreases in releases
- Presents air release trends

TRI P2 Tool

- Identify P2 activities
- Visually compare P2 performance at the facility and corporate level
Questions That TRI’s P2 Tool Can Address

Industry or Chemical-Specific

• How have toxic chemical releases for a specific industry or chemical changed over time?
• How do different facilities or companies compare in terms of waste generation and waste management practices?
• What P2 activities have contributed to the biggest reductions?

Facility-Specific

• Have toxic chemical releases at a particular facility gone up or down over time?
• Were changes in releases driven by changes in production? Did P2 practices play a role?
• How do the facility’s TRI and GHGRP trends compare?
TRI P2 Search Tool

www.epa.gov/enviro/facts/tri/p2.html
Hydrochloric Acid Managed by NAICS 2211 - Electric Utilities Facilities (2013, Top 20)

Click on facility name to view P3 Details for the selected chemical and year. Green links indicate the facility reported P3 activities for the selected chemical and year, orange links indicate the facility reported barriers to P3. Use Chart Options to add data to the chart (e.g., waste trends, GHG emissions).

Use the slider bar to adjust the Y-axis (zoom in):

Management of Hydrochloric Acid, NAICS 2211 - Electric Utilities
P2 Activities Example: Chemical Manufacturing and Ethanol

Search Criteria

Show P2 info for facilities
Show P2 info for parent companies

Select one or more Industry Sector(s):
Chemicals (325)

Select one or more Chemical(s) or Chemical Group(s):
Methanol

Select one or more Year(s):
2013

Select one or more State(s):
All States

Show P2 Activities
Display Facility Comparison
Clear
### List of Facilities in TRI submitting Pollution Prevention Information for Selected Criteria:

**Industry:** NAICS 325 - Chemicals  
**Chemical:** Methanol  
**Year:** 2013

<table>
<thead>
<tr>
<th>FACILITY NAME</th>
<th>ADDRESS</th>
<th>PRIOR YEAR AIR RELEASE</th>
<th>CURRENT YEAR AIR RELEASE</th>
<th>PERCENTAGE CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VANDERMARK CHEMICAL INC</td>
<td>1 N TRANSIT RD, LOCKPORT, NY 14094</td>
<td>32.89</td>
<td>0</td>
<td>-100%</td>
</tr>
<tr>
<td>MONTGOMERY CHEMICALS</td>
<td>901 CONSHOHOCHEK RD, CONSHOHOCHEK, PA 19428</td>
<td>97,077.00</td>
<td>10,496.00</td>
<td>-89.19%</td>
</tr>
<tr>
<td>PENRAY COS INC</td>
<td>1801 ESTES AVE, ELK GROVE VILLAGE,</td>
<td>500.00</td>
<td>67.70</td>
<td>-86.46%</td>
</tr>
</tbody>
</table>

**W58:** Other process modifications – Methanol is not used in the manufacture of any products. It is only used to clean/dry vessels during transitions. Methanol can be used multiple times for this purpose.

Method(s) to Identify P2 Activities: T11 [Other] - We have become much more efficient in re-using the methanol during transitions which has generated much less waste.

We have become much more efficient in re-using the methanol during transitions which has generated much less waste. Methanol is not used in the manufacture of any products. It is only used to clean/dry vessels during transitions. Methanol can be used multiple times for this purpose.

The facility completed the installation of a new emissions scrubber system for capturing methanol emissions for re-use in the process. Emissions control system includes venturi eductors and a packed column in series. A certified compliance test was performed in late spring of 2013 showing the scrubber with an emission control efficiency of greater than 95%. The facility also continues to monitor all regulated equipment for VOC leaks on a regular schedule according to the facility LDAR program schedule.

**W73:** Improved maintenance scheduling, recordkeeping, or procedures – N/A
P2 Activities Example: Chemical Manufacturing and Ethanol

- **Goal**: to understand how source reduction affects facilities’ releases of toxic chemicals
  - How do the average facility’s TRI releases change when it implements a source reduction project?
  - How has source reduction affected U.S. aggregate TRI releases over the last 20 years?

- **Methodology**: “Differences-in-differences” approach
  - Estimates how toxic releases at each facility-chemical changed in the year before and after implementing a source reduction project
  - Controls for other facility- and industry-level factors
Main result: In the year a facility implements a source reduction project, its TRI releases of targeted chemicals decrease by an average of 9% to 16%
Projects vary in effectiveness. Raw material modification has the largest effect.
Cumulative Impact on U.S. Total Releases

Simulated U.S. Total Releases without Source Reduction

The gray lines show simulated releases, if no source reduction projects had occurred, under different sets of assumptions.

The solid black line shows actual total annual TRI releases of all chemicals.

- Without source reduction, actual cumulative U.S. toxic releases (49.9 billion lb) would have been 8 to 23% higher between 1990 and 2012.
- It is estimated that source reduction prevented between 4.3 and 14.4 billion pounds of releases.
Cumulative Impact on U.S. Air Releases

Simulated U.S. Air Releases without Source Reduction

- Without source reduction, actual cumulative U.S. air releases (24.9 billion lb) would have been 9 to 23% higher between 1990 and 2012.
- It is estimated that source reduction prevented between 2.5 and 7.4 billion pounds of air releases.
Additional TRI Resources

• Daniel Teitelbaum, **TRI P2 Staff Lead:**
  Teitelbaum.Daniel@epa.gov

• Check out the **TRI Pollution Prevention (P2) Search Tool:**
  www.epa.gov/enviro/facts/tri/p2.html

• Visit the **TRI Program’s website:** www.epa.gov/tri
  – TRI P2 webpage: www.epa.gov/tri/p2
  – 2013 TRI National Analysis: www.epa.gov/tri/nationalanalysis