Use of the TRI in developing the 2008 NEI v2-- Challenges and Successes

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What is the National Emissions Inventory (NEI)?

A national compilation of air emissions sources collected from state, local, and tribal air agencies (SLT) as well as from EPA emissions programs. Developed by EPA's Office of Air Quality Planning and Standards.

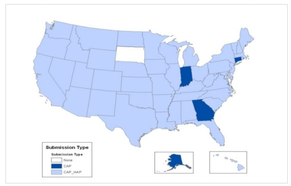
- Sources: stationary (large and small industries, commercial, institutional and consumer), mobile sources, fires, and biogenic (natural) emissions
- Pollutant coverage: criteria air pollutants (CAPs) and precursors (NO_X, SO_2, CO, PM, NH_3, Pb, VOC) related to the NAAQS, and toxic or hazardous air pollutants (HAPs)
- Spatial Resolution: process level, including stack and fugitive parameters for release points associated with those processes for stationary and mobile sources reported at facilities, county-level for smaller stationary and mobile sources
- Temporal: annual emissions
- Frequency: complete integrated inventory of CAPs and HAPs released every 3 years. The most recent inventory of this triennial cycle is the 2008 NEI[1], and will be followed by the 2011 NEI, 2014 NEI, etc.

The Air Emissions Reporting Rule[2] requires that State and Local Agencies report CAPs each year to EPA for large point sources and report a comprehensive inventory every three years for stationary and mobile sources. HAP emissions is voluntary rather than required. The Emission Inventory System (EIS) is the repository for the data.

The NEI supports national air pollution reduction rules, development and implementation of National Ambient Air Quality Standards (NAAQS), the National Air Toxics Assessment (NATA), analysis of geographic trends and source sectors, international programs and air pollution research.

Why and how did we use TRI to build the 2008 NEI v2?

HAP reporting by SLTs is voluntary. The amount of reporting by SLTs can vary by pollutant and data category. As indicated in the map figure below, for the 2008 NEI, most SLTs reported both HAPs and CAPs. Four states: GA, IN, CT, and AK reported only CAPs – no HAPs. South Dakota reported neither CAPs nor HAPs.



5 states did not report HAPs in 2008

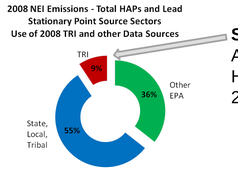
To use the TRI[3] we do the following:

1. Match TRI facilities to facilities in the Emission Inventory System (EIS). The EIS contains the facility inventory (i.e., facility configuration and metadata) and the emissions associated with processes at facilities.
2. MAP TRI pollutants to NEI pollutants. Drop pollutants where there are matching issues.
3. For facilities that are missing HAP emissions, allocate facility-level TRI emissions to processes within facilities based on the SLT reported process-level CAP emissions. Use PM10-FIL for metal HAPs, VOC for VOC HAPs, and SO_2 for acid gas HAPs. Some facilities are considered priority based on high risk as identified by the 2005 NATA or if key for Hg. For priority facilities we manually assign facility emissions to processes, e.g., metal HAPs are assigned to kilns at cement facilities.
4. For TRI chromium, use process-related speciation profiles to speciate the chromium into the hexavalent (Cr VI) and trivalent (Cr III) species – hexavalent chromium is important for risk modeling.
5. Check for and remove TRI emissions that appear to be outliers.
6. Submit process-level emissions to EIS via the Central Data Exchange (CDX).

We do not use TRI emissions to replace any SLT-reported data unless requested by SLT. For 2008, we did not use TRI for EGUs (electric generating units), but rather use other EPA data from the EGU reporting program and Mercury and Air Toxics (MATs)[4] rule. Where EPA rule data are available for other sources, they are used ahead of TRI.

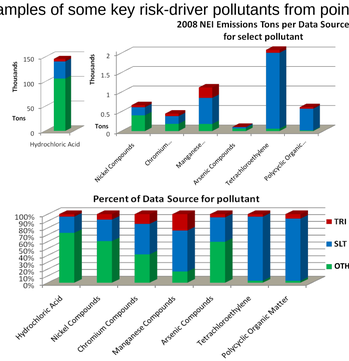
Challenges and successes

- Inconsistencies across data systems made it difficult to match facilities –we matched 10,000 out of approximately16,000 TRI facilities. (EIS has over 100,000 facilities, excluding airports)
- Facilities are defined differently resulting in many-to-one and one-to-many relationships.
- Automated approach using lat/lon differences to disqualify matches between TRI and EIS facilities caused potential matches to be thrown out due to unexpected lat/lon differences between the two datasets.



SUCCESS: Added ~80 million pounds of HAPs and lead (Pb) to the 2008 NEI

Examples of some key risk-driver pollutants from point sources



Hydrochloric acid much higher emissions than other HAPs - comes primarily from EGUs . EGU emissions used primarily information from the Mercury and Air Toxics Rule for the 2008 NEI.

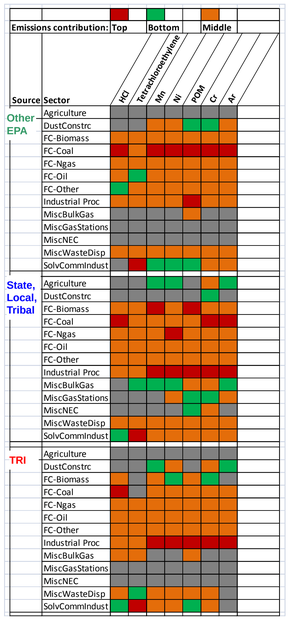
Manganese uses more TRI mass than other metal HAPs, most of TRI used is from industrial processes– Ferrous Metals

Tetrachloroethylene predominently from SLT - drycleaning and degreasing facility emissions

Polycyclic Organic Matter predominantly from SLT – dominated by a few plants – values also in TRI for these facilities but are much less

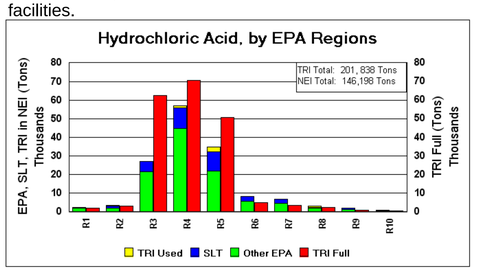
This graphic shows the 3 datasets and their relative point source contribution to sectors for key pollutants

TRI contributes highly for industrial processes as does state, local tribal data. This shows that the TRI data have been allocated reasonably well to processes.

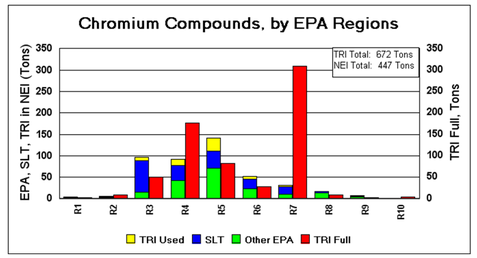


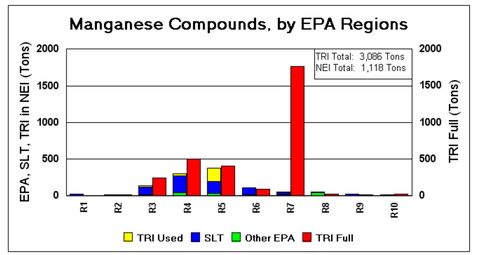
Regional Scale Use of TRI

EGUs are the main sources of HCl, as shown by regional pattern. TRI has several high HCl emitters in Region 3 (Top 3 in TRI) –NEI HCl emissions not consistent for these facilities.

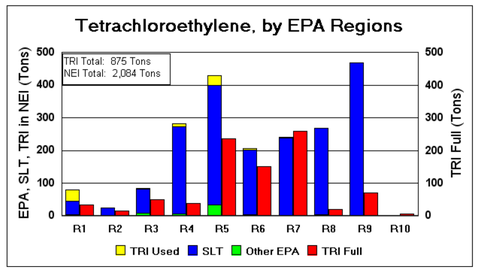


High spikes in TRI data for some pollutants result from a few sources with high TRI emissions – potential outliers?



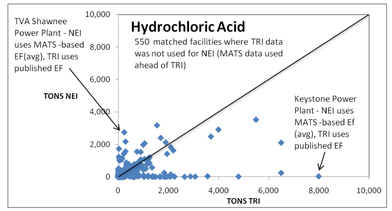


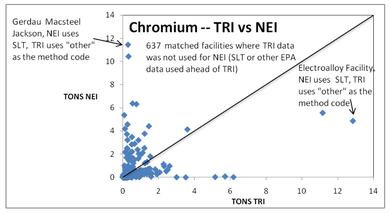
Dry Cleaners reported in Point Inventory in some California counties explains high Region 9 peak; high dry cleaner emissions at a few Illinois facilities explains Region 5 peak.

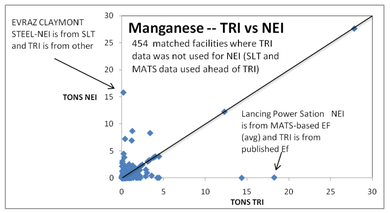


Where TRI was not used…

Comparing TRI and NEI Emissions – Where TRI was not used can determine potential outliers in both datasets







References

1. 2008 National Emissions Inventory: http://www.epa.gov/ttn/chief/net/2008inventory.html
2. Air Emissions Reporting Rule (AERR): http://www.epa.gov/ttn/chief/aerr/
3. TRI data from: Previous Years' TRI Basic Plus Data Files. http://www.epa.gov/tri/tridata/data/basicplus/index.html, Downloaded March, 2011.
4. Mercury and Air Toxics Standards (MATS-based) data: Acid gas (HCl , HF, HCN) and metal HAP emission estimates developed for 2008 and other years in support of rule development can be downloaded from the MATS Website, http://www.epa.gov/ttn/atw/utility/utilitypg.html The direct address of the file containing the emissions is: http://www.epa.gov/ttn/atw/utility/mats_final_current_base_hap_inven.xlsx

Conclusions

- TRI is a good source of data for the NEI
- Could make better use of it for both SLT HAP reporters and for gap filling if we can better integrate the data systems
  - Need direct link between EIS and TRI facilities
  - Need to identify one-to-many and many-to-one facility relationships
  - Need to crosswalk pollutant codes, method codes
- Data systems have inconsistent data, not only emissions but also geographic information --- should try to reconcile
- TRI is a good way to identify potential outliers in the NEI and vice versa

For further information

http://www.epa.gov/ttn/chief/eiinformation.html

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