

# US Metal Emissions Trends, 2001-2005

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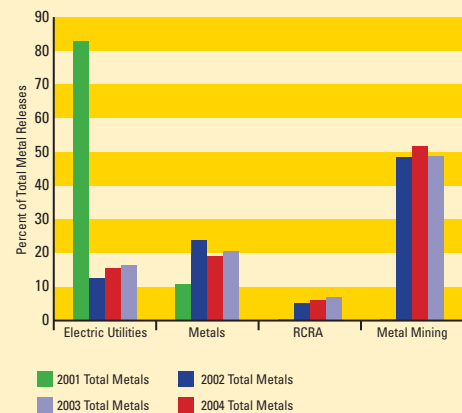
## Findings:

- Airborne metal releases increasing; major source is metals industry
- TCLP hazardous metal rankings: mercury > cadmium, selenium > arsenic, lead
- Metals industries – selenium air releases increasing and larger than mercury releases
- Substantial air emissions reductions projected in secondary aluminum industry (EPA Area Source regulations) but how verified?
- Little publicly available data for metals industry on emissions monitoring, environmental audits or air pollution controls

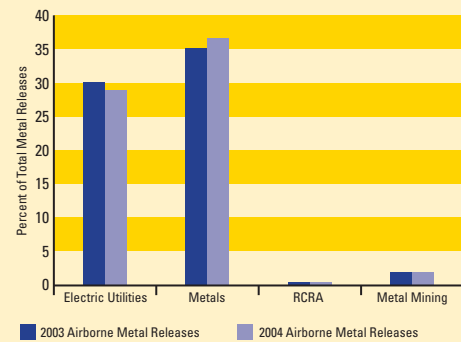
## Data Sources

- US EPA Toxic Release Inventory (TRI)
- Organization for Economic Cooperation and Development (OECD) reports
- US EPA Toxicity Characteristic Leaching Procedure (TCLP) regulations
- US EPA Area Source air regulations
- www.SeleniumWatch.org

## 2001-2005 Total Metals Releases Decreased Due to Electric Utilities



## For Airborne Releases, Metals Industry is Largest Source and Releases Increasing



## Limited International Data Available

- Available reports confirm that metals industry is major source of air emissions
  - OECD: Non-ferrous metals industry is most intensive source of air emissions
- But major data source is EPA TRI

## Metals Toxicity Ranking

EPA Hazardous Waste Toxicity Characteristic Leaching Procedure (TCLP) Standards

Mercury = 0.2 mg/L

Cadmium, Selenium = 1.0 mg/L

Arsenic, Lead = 5.0 mg/L

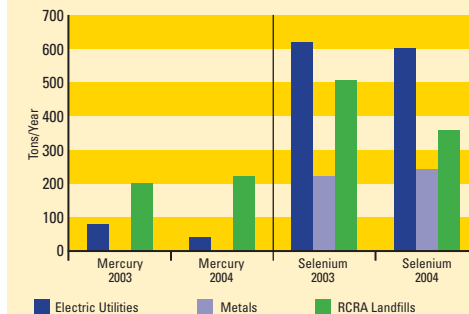


## Metal Emissions Primarily Point Sources – Controllable

2004 EPA TRI SIC 33xx Releases (Pounds)

METALS & METAL COMPOUNDS	TOTAL ON/OFF SITE	TOTAL AIR FUGITIVE + POINT SOURCES	AIR PERCENT POINT SOURCES
TCLP = 0.2 mg/L			
<b>Mercury</b>	26,824	9,917	96 %
TCLP = 1 mg/L			
<b>Cadmium</b>	1,170,000	3,813	77 %
<b>Selenium</b>	501,087	35,679	97 %
TCLP = 5 mg/L			
<b>Arsenic</b>	167,620	329	85 %
<b>Lead</b>	31,600,000	440,000	72 %

## Metals Industry – Selenium Releases Increasing and Larger than Mercury



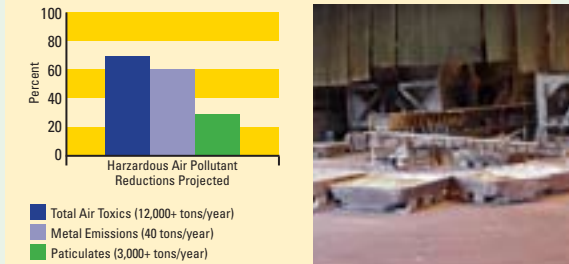
## Increase Likely Due to Increased Use of Selenium-Contaminated Metals

- Manganese metal widely used as hardening alloy in aluminum and steel industries
- Selenium use as catalyst in manganese metal production increasing — now 75% of the global manganese market
- Manganese metal made using selenium contains 400 to 1500 ppm selenium

## Metals Emissions Data Limited

- No air emissions factors (EPA AP-42) for arsenic, cadmium and selenium
  - Site specific stack emission monitoring or environmental audits
  - Air pollution control efficiencies
- Most metals data from coal-powered utilities industry
  - Likely different from metals industry

## Large Reductions Projected in Air Emissions from Secondary Aluminum Plants – Verification? (EPA Area Source Regulations, 40 CFR Part 63, 2000)



## Conclusions

- Metals industry is major source of airborne metal emissions and these emissions increasing
- Metal air emissions primarily from point sources – controllable
- TCLP hazardous metals ranking: mercury > cadmium, selenium > arsenic and lead
- Metals industry – selenium emissions increasing and larger than mercury emissions
- Metal industry data lacking:
  - Site specific stack emission monitoring/ environmental audits
  - Air pollution control efficiencies for metals

## Recommendations

- Collect metal industry specific stack emissions monitoring data and/or conduct environmental audits
- Evaluate air pollution control efficiencies for metals industry
- Establish EPA Air Emission Factors for arsenic, cadmium and selenium
- Confirm EPA secondary aluminum industry air emissions reductions