Controlling Mercury Air Emissions: Successes and Challenges

Ellen Kurlansky
Office of Air and Radiation
US EPA

June 22, 2010
Total Estimated Anthropogenic Emissions of Mercury in U.S.A. 1990 & 2005

Source: EPA 1990 NTI and EPA 2005 NEI

- Coal-fired utility boilers: 50.9%
- Municipal waste combustion: 2%
- Electric arc furnaces: 7.1%
- Portland cement: 7.3%
- Boilers & process heaters: 15.3%
- Gold mining: 2.4%
- Chlor-alkali plants: 1.1%
- Mobile sources: 1.1%
- Hazardous waste incineration: 4%
- Hospital/medical/infectious waste incineration: 0.3%
- Other: 8.2%

Total mercury emissions: 103 short tons
Maximum Achievable Control Technology

Clean Air Act section 112

The maximum degree of emissions reduction achievable taking into consideration cost, any non-air quality health and environmental impacts and energy requirements.

- **For existing facilities:**
  - No less stringent than the average emissions limitation achieved by the best performing 12% of the sources.

- **For new facilities:**
  - No less stringent than the emissions control achieved by the best controlled similar source as determined by the Administrator.

Note: section 129 contains similar language for solid waste combustion facilities.
## Upcoming MACT Standards for Sources of Mercury

### Projected Schedule

<table>
<thead>
<tr>
<th>Source Category</th>
<th>Proposal Date</th>
<th>Final Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Boilers</td>
<td>4/2010</td>
<td>12/2010</td>
</tr>
<tr>
<td>Electric Arc Furnaces</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Integrated Iron and Steel</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Industrial Gold Production</td>
<td>4/2010</td>
<td>12/2010</td>
</tr>
<tr>
<td>Municipal Solid Waste Incinerators*</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Chlor-Alkali Manufacturing</td>
<td>7/2010 (supplemental)</td>
<td>TBD</td>
</tr>
<tr>
<td>Sewage Sludge Incinerators*</td>
<td>Summer 2010</td>
<td>12/2010</td>
</tr>
<tr>
<td>Commercial and Industrial Solid Waste Incinerators*</td>
<td>4/2010</td>
<td>12/2010</td>
</tr>
</tbody>
</table>

*Section 129 rule*
General Approach

• Consistent with the Act
  – As interpreted by the Court

• Sector wide strategies – where multiple regulatory actions apply to one industry.
  – Portland Cement MACT gives an example of this.
  – MACT and NSPS
  – So that companies know the full suite of requirements when developing compliance strategies.
MACT for Coal and Oil-fired Electric Power Plants

• One of several regulations – an integrated strategy

• Not just mercury – must also address:
  – Other metals
  – Acid gases
  – Organics

• First step, collect information
  – Changes in industry since 1999.
Collecting Information: MACT for Power Plants

- 1,334 units proposed to provide required information on boiler, fuels, controls, etc. and all available data from past 5 years

- Testing requirements
  - Over 200 coal-fired units are testing for acid gases (e.g. HCl/HF/HCN)
  - Over 200 coal-fired units for non-dioxin/furan or other organics
  - 50 coal-fired units for dioxin/furans
  - Over 200 coal-fired units for metallic HAP (e.g., Hg, As, Se, Pb, Cd)
  - 2 coal-fired IGCC units for all HAP (i.e., acid gas, organic, metallic)
  - 65-70 oil-fired units for all HAP
  - 10 petroleum coke-fired units for all HAP
Mercury Control

- Fueled by State regulation, permits, legal action

- Currently 84 units of coal-fired generation are operating mercury control technology (e.g. activated carbon injection)
  - About 31 GW

- Over 100 additional units have contracted for the installation of controls
  - 63 GW of total coal-fired generation
  - About 25% of the coal-fired fleet

Data from ICAC 6/4/2010
MercNet – Monitoring mercury in air, water, land, fish and wildlife

**Mercury Monitoring Goal** (Established by scientists from federal, state, academic, and private organizations at a 2008 National Mercury Monitoring Workshop)
- Systematically monitor, assess, and report on indicators of nationwide changes in atmospheric mercury deposition and concentrations of mercury in land, water, and biota in coastal and freshwater ecosystems in response to changing mercury emissions over time

**Proposed Monitoring Network Design Elements**
- Combination of “intensive sites” and “cluster sites”
- 10-20 intensive sites, accompanied by about 20 cluster sites for each intensive site
- Build on existing monitoring efforts, where possible, to maximize information, benefits and coordination with existing resources

Based on Mason et al. 2005 & Harris et al. 2007
Why is NADP/MDN not enough?

- Dry deposition not measured or estimated
- Lack of mercury dry deposition measurements is one of the biggest scientific gaps in understanding the transport, deposition, and fate of atmospheric mercury
  - No adequate field methodology available for direct dry deposition monitoring in a network
  - Dry deposition estimated to be more than 50% of total mercury deposited to most locations
- Limited monitoring coverage over different geographic scales provide an insufficient picture of mercury atmospheric transport and total (wet + dry) mercury deposition
- MDN does not track mercury once it deposits to the landscape
Atmospheric Mercury Network (AMNet) of the National Atmospheric Deposition Program

Mission and Goals

• To **coordinate**, quality-assure, store, and share existing and new atmospheric mercury data
• To measure a baseline of **total deposition** (dry and wet)
• To analyze **trends** in total (dry and wet) deposition over time and geographically
• To evaluate and improve **predictive models**
• To provide data to scientists and policy makers to **assess mercury** emission **reductions**
• To stimulate, test, and incorporate **R & D**
NADP/AMNet – Current Site Locations & Participants

- Federal Agencies
  - EPA, NOAA, USGS
- State Agencies
  - New York DEC, Utah DEQ, New Jersey DEP, Vermont DEC, Wisconsin DNR
- Tribes
  - Cherokee Nation
- International
  - Environment Canada
- Academic Institutions
  - Clarkson University, Ohio University, U. of New Hampshire, U. of Maryland, U. of Utah, U of California
- Private
  - Eastern Research Group, Tekran, Inc.
International Negotiations

- US provided new leadership at the 2009 UNEP Governing Council in Nairobi to call for negotiations toward a Global Mercury Treaty

- US is active participant in negotiations and preparation
  - First International Negotiating Committee session was in Stockholm from June 7 to June 11.

- Leadership role in applying technology and reducing emissions