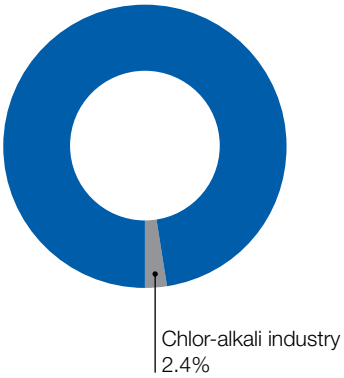
INC 2 BRIEFING PAPER SERIES

Mercury in Chlor-Alkali Plants

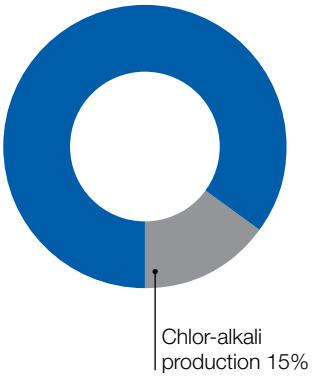
Mercury Purge

Source: Hogue, C. 2009. "Mercury Purge," Chemical & Engineering News 87, 24 (June 15, 2009): 24-25 (accessed online Oct 29, 2010 http://pubs.acs.org/cen/government/87/8724gov2.html).

Sources of Mercury Emissions



How Mercury Is Used

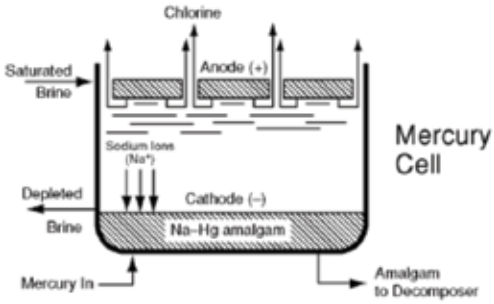


The Issue

Mercury-cell chlor alkali plants (MCCAP) produce chlorine and caustic soda from salt using mercury to conduct an electric current for an electro-chemical reaction. Although this process is based on 19th century technology, MCCAPs around the world still account for roughly 15% of global mercury demand, and are a significant source of local and global mercury pollution.

The Process

In this outdated mercury cell chlor-alkali process, an electric current is run through a vat of salt water with a layer of mercury on the bottom. The electro-chemical reaction separates the salt into chlorine and sodium; in the reaction, mercury combines with the sodium separating it from the chlorine.



Source: Bommaraju, T. V., P. J. Orosz, and E. A. Sokol. 2001. "Brine Electrolysis," Electrochemistry Encyclopedia. Earnest B. Yeager Center for Electrochemical Sciences Case Western Reserve University. Nov. 2001(accessed online Oct. 29, 2010 http://electrochem.cwru.edu/ed/encycl/art-b01-brine.htm).

Since the early 1970s the chlor-alkali industry has moved away from MCCAP to a safer, more economical "membrane" process, in which a semi-permeable membrane separates the sodium and chlorine during production, eliminating the need for mercury. Switching to mercury-free technology is often economically beneficial, since the newer membrane process uses less energy and has fewer potential occupational exposure problems. In fact, some facilities that have switched to mercury-free technology have reported that the new technology paid for itself in five years or less.[1]

The Quantity of Mercury Involved

Chlor-alkali production facilities using mercury typically lose some of their mercury during production and maintenance, which must be replaced. Globally, the chlor-alkali industry uses between 450-550 metric tons of mercury per year to replace this lost mercury, according to the most recent UNEP report.

When a MCCAP closes, mercury remaining in cells is often packaged and sold as commodity metal onto the global open market, where it supplies artisanal gold mining and other polluting practices around the world. An estimated 20,000-30,000 metric tons of mercury is currently located at these facilities globally. Preventing this mercury from entering the marketplace when the mercury plants are decommissioned is an important element of a global mercury supply reduction strategy.

	Facilities Not Yet Committed to Mercury Phase-Out by 2020[2]
Africa	4
Asia	16
Eastern Europe/Russia	7
Latin America	8
Middle East	12
North America	1
Total	48

Treaty Control Measures

Because MCCAPs are a large source of mercury use and pollution with readily available alternative technology and should be phased out ("decommissioned"), many plant owners have already announced plans or indicated an ability to decommission by 2020. Only about 50 plants have not announced plans or are not required to decommission by 2020, and their combined production is quite small, so converting these remaining plants is very feasible. The treaty should require the approximately 50 non-committed facilities to close or convert as soon as possible. Once the MCCAPs are closed, the mercury remaining after closure must be fully accounted for and safely sequestered from the marketplace.

Appendix A. Uncommitted Facilities

Country	Facilities Uncommitted to Mercury Phase-Out by 2020	2010 Mercury Cell Chlorine Capacity (thousands of metric tons)
Algeria	1	14
Angola	1	10
Brazil	4	217
China	6	81
Columbia	1	22
Cuba	1	7
Indonesia	5	25
Iran	4	332
Iraq	3	68
Israel	1	33
North Korea	2	25
Libya	1	45
Mexico	1	120
Morocco	1	8
Myanmar	1	7
Pakistan	1	33
Peru	2	76
Philippines	2	14
Russia	3	401
Serbia & Montenegro	4	10
Syria	1	14
United Arab Emirates	2	9
Total	48	1571

Appendix B. Committed Facilities

Country	Facilities Committed to Mercury Phase-Out by 2020	2010 Mercury Cell Chlorine Capacity (thousands of metric tons)
Argentina	2	122
Azerbaijan	1	145
Belgium	2	420
Czech Republic	2	197
Finland	1	42
France	6	690
Germany	6	870
Greece	1	40
India	8	188
Hungry	1	137
Italy	1	42
Mexico	1	120
Poland	1	125
Romania	1	186
Slovakia	1	76
Spain	7	732
Sweden	1	120
Switzerland	2	27
Turkmenistan	1	
United Kingdom	1	277
United States	4	437
Total	51	4,993

[1] Mahan S. and K. Warner. 2009. "Hidden Costs: Reduced IQ from Chlor-Alkali Plant Mercury Emissions Harms The Economy." Oceana. p.7 (accessed online Oct. 29, 2010 http://na.oceana.org/en/news-media/publications/reports/hidden-costs-reduced-iq-from-chlor-alkali-plant-mercury-emissions-harms-the-economy).

[2] UNEP. "Global Estimate of Global Mercury Cell Chlorine Capacity" UNEP Global Mercury Partnership, 2009 (accessed online Nov 1, 2010 www.unep.org/hazardoussubstances/Mercury/PrioritiesforAction/ChloralkaliSector/Reports/tabid/4495/language/en-US/Default.aspx); www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/INC2/INC2_17_chloralkali.pdf.