

THE CHLORINE INSTITUTE, INC.

1300 Wilson Boulevard, Arlington, VA 22209

Phone: 703-741-5760 Fax: 703-741-6068

NINTH ANNUAL REPORT TO EPA

For the Year 2005

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The Chlorine Institute continues to be a proactive leader in the effort to reduce mercury emissions and use in the United States. This Ninth Annual Report to the U. S. Environmental Protection Agency (EPA) illustrates the chlor-alkali industry's progress in voluntarily reducing mercury use and emissions.

Since 1996, the Chlorine Institute and its members have worked cooperatively with federal and state authorities to voluntarily reduce mercury use by 50 percent by 2005 over the base years of 1990-1995. That goal has been met and exceeded. In addition, the Institute has reported to EPA on projects and initiatives underway to reduce mercury use and emissions. These efforts continue to this day.

In this report we will discuss the following items:

- The decline in the use of mercury in the chlor-alkali industry over the nine years since the commitment was originally made.
- A discussion of mercury use and purchases within the chlor-alkali industry.
- A summary of the current status of the projects being undertaken to improve cell performance by several facilities. Some of these projects involve increasing cell mercury inventory.
- A summary of the status of the new commitments made in 2004.
- A summary of other activities undertaken in the past year.

MERCURY USE AND PURCHASES

The overall mercury usage reduction to date over a nine-year period is 94%. Mercury use in 2005 was 10 tons, a decrease of 4 tons from 2004. Mercury use is detailed in Table 1. After adjusting for shutdown facilities, the reduction in mercury use by the chlor-alkali industry from the base period is 91%.

In 2005, one mercury cell facility closed. Additionally, another facility announced its intention to convert to the membrane cell process in 2007. Last month, a third facility announced that it would close in 2008. Currently there are eight mercury cell plants operating. When the currently announced changes are implemented, there will be six plants operating. In 1996, when the original commitment was made, there were 14 plants operating. Of the eight facilities that

have closed or announced that they will close, two will have converted their process and six would have simply closed resulting in a loss of employment.

Reductions in mercury use in the future will be slow in coming and will not be as significant as in the past. Mercury releases to the environment from the chlor-alkali industry are a very small portion of the global pool of mercury releases and have declined at a greater rate than the overall decline in this pool.

Mercury purchases in 2005 were 32 tons. As explained in past reports, **mercury purchases do not necessarily equal mercury use.** Process changes or different equipment may require more mercury be added to the process. Such mercury additions are required as part of programs to advance the cell room technology that are currently being undertaken at several facilities. Such programs are allowing the facilities to operate longer between cell maintenance and/or allow the facilities to utilize equipment designed to minimize fugitive emissions. These new technology advancements already underway at several facilities were detailed in the last two annual reports. These advancements include the following:

- (1) **Enlarging the size of decomposers to reduce the need to open the equipment.**
- (2) **Using better electrical current distribution equipment.**
- (3) **Upgrading equipment.**
- (4) **Improving the reliability of cell room equipment.**

KEY PROJECTS CURRENTLY UNDERWAY

Below is a summary of key projects currently underway at several facilities that are resulting in reduced mercury emissions but that have a short term increase in mercury purchases because they require an increase in mercury process inventories:

Process mercury inventory increased by 57 tons in 2005 at the eight facilities operating at the end of 2005. Nearly all this inventory increased at one facility which replaced 24 decomposers and associated piping accounting for an increase of 52 tons of process inventory.

A second plant replaced three decomposers with larger ones accounting for an additional four tons of process inventory.

A third plant made modifications to its end boxes and associated mercury piping accounting for an increase in process inventory of 10 tons.

Two of the remaining plants allowed their mercury process inventories to decline resulting in the net inventory increase of 57 tons as reported above.

One plant continued its conversion of mercury pumps to a sealless type resulting in less emissions.

In 2005 several plants embarked on programs to enhance the monitoring of cell room emissions. In June of 2005, one of these facilities hosted all the mercury cell producers at a technology session to view the installation and to discuss the system's capabilities.

These process changes allow for reductions of mercury emissions in two ways. First, because much of the newer equipment being installed is larger than the previously installed equipment, operating cycles between maintenance activities are being lengthened. These maintenance activities nearly always require equipment openings. Even though many improvements in techniques to reduce mercury emissions during equipment openings have been made, such emissions can not be totally eliminated. As a result, a lower number of openings results in reduced mercury emissions. Secondly, the newer equipment is better designed to reduce fugitive emissions. Sealless mercury pumps, sealed end boxes, and improved hydrogen cooler design are examples of equipment changes that are resulting in reduced fugitive emissions.

In addition to the above items, facilities have taken other steps to reduce mercury emission. These changes were described in prior reports and include the following:

- Improved collection devices to more effectively capture mercury during cell maintenance activities.
- New decomposer compression system design to improve efficiency of amalgam decomposition.
- New gasket materials to provide better seals on mercury containing equipment.
- The installation of additional collection devices such as weirs to cell room trenches to more efficiently recapture and reuse accumulated mercury.
- Process changes to reduce mercury carry-over with the water exiting the end boxes resulting in less mercury handling.

UPDATE ON 2004 COMMITMENTS

In the 2004 report, we made two new commitments to the Binational Toxics Strategy. Specifically, the Chlorine Institute members committed to:

- (1) Enhance Cell Room Air Monitoring
- (2) Fully Account for Mercury Inventory

The following summarizes the status of these commitments:

Enhance Cell Room Air Monitoring

Two facilities completed installation of cell room mercury monitoring systems in 2005. A third facility is nearly complete with its installation. The remaining facilities are in various stages of evaluating such systems. EPA has evaluated the data from the two completed installations. It is our understanding that the agency has confirmed that emissions from each of these facilities are below the current NESHAP requirements.

Fully Account for Mercury Inventory

Data presented in our past voluntary annual reports to EPA continue to be misinterpreted or mischaracterized by some groups. In order to further clarify the facts; in 2004 we added a new table, Table 2, to this report. Table 2 is a compilation of data for calendar years 2002 thru 2005 showing the differences between mercury purchases, mercury use, reported toxics release inventory (TRI) emissions, and mercury contained in chlor-alkali products.

We stated then that we were not satisfied with the 30 tons of “unaccounted for inventory” reported in 2002 and 2003 even though this unaccounted inventory represents only one percent of the total mercury inventory for the industry. We committed then to fully account for the mercury we use. In 2005, the “unaccounted for” mercury amounted to three tons, a reduction of nearly 90% from the prior two years. Mercury process inventory is typically measured using the radioactive isotope technique discussed in Chlorine Institute publication, *Guidelines for Conducting a Mercury Balance*, May 1999. The methodology has a variability of between 0.1 and 0.3%. Applying this variability to the 2005 year ending mercury inventory of 2,560 tons, means the measurement is accurate within 2 - 8 tons. We believe we have made significant progress in fully accounting for the mercury we use.

OTHER 2005 ACTIVITIES

While aggressively leading the U.S. industry’s voluntary efforts, the Chlorine Institute’s mercury cell producers have actively participated in numerous activities to further reduce mercury use and emissions worldwide. A summary of the Institute’s mercury task groups and their global activities for 2005 are discussed in Appendices A and B.

Since issuing its Eighth Annual Report to EPA last year, the Chlorine Institute continued to coordinate the chlor-alkali industry’s continued efforts to reduce mercury use and emissions. Specifically, CI and its member companies:

- Worked with EPA to assist it in its plan to conduct mercury emissions monitoring studies at two additional chlor-alkali facilities.

- Participated in follow up activities related to technology sharing workshops in Brazil and India addressing global mercury chlor-alkali issues. Participated in the planning for workshops held in Russia in the Fall of 2005 and in Mexico in the spring of 2006. Our sister organization, Euro Chlor led the efforts for the Russian workshop. The United States based chlor-alkali industry was a principal driver for the Mexican workshop held in late March.
- Conducted the 13th Annual Mercury Issues Workshop at the April Chlorine Institute Annual Meeting.

SUMMARY OF COMMITMENTS

CI's member companies that use mercury cell technology are safe and perform above and beyond all applicable laws and regulations pertaining to mercury use and emissions.

As an industry, we reaffirm our support for the regulation of mercury by committing to four action steps:

- **Fully account for the mercury we use,**
- **Further reduce the mercury we use,**
- **Continue to improve methods to more accurately measure emissions from the cell rooms at each mercury cell chlor-alkali facility, and**
- **Further reduce air emissions from point sources by as much as 93% by implementing the extensive new work practices standards and fully complying with EPA's new MACT requirements.**

PATH FORWARD

Our commitment to the Binational Toxics Strategy is completed. We believe this voluntary effort has been a success for the chlor-alkali industry and for the Binational Toxics Strategy. We believe we have proactively addressed many of the concerns regarding the use of mercury and the release of mercury into the environment by the mercury cell chlor-alkali industry. We will continue to do so.

Through the World Chlorine Council (WCC), the Chlorine Institute is participating in the United Nations Environmental Program to reduce mercury use and environmental releases in the chlor-alkali partnership sector. Since the UNEP program was established, the WCC has held workshops in Russia and Mexico to discuss ways the industry can reduce both the use of mercury and the release into the environment from the chlor-alkali sector. Prior to the UNEP

program being established similar such workshops were held in Brazil and India.

The WCC has committed to providing reports to UNEP discussing activities associated with mercury reduction programs. While the structure of the reports is still under discussion within the WCC, it is expected that the reports will be similar in content to those the Institute has submitted to the BTS. The reports will provide data by region. Initially reports are expected to include the United States, Western Europe, and parts of South American. Over time we would expect to increase the regions being covered with a goal of eventually covering the entire globe. As with the CI current annual reports, individual facilities will not be identified. WCC has also set a criterion that the smallest region must include at least three such facilities.

It is the desire of the Chlorine Institute to substitute the current annual report being provided to the BTS with the planned one for UNEP. We will discuss this matter more fully with BTS officials after we have issued the first report to UNEP. The target date for the first UNEP report is November 2006 covering calendar year 2005 and providing some historical perspective. We would expect to issue subsequent reports to UNEP in the summer following the reporting year.

ABOUT CI

The Chlorine Institute Inc., founded in 1924, is a trade association of companies and other entities that are involved or interested in the safe production, distribution and use of chlorine, sodium and potassium hydroxides, and sodium hypochlorite, and the distribution and use of hydrogen chloride.

Because of chlorine's nature and its widespread and varied use, the promotion of its safe handling has long been an accepted responsibility of its producers, packagers, distributors and users. The Institute is the focal point for their joint efforts.

For more information on CI's mission, go to www.chlorineinstitute.org.

Table I**Chlor-Alkali Mercury Cell Process – USA Only**

| | <u>Average 1990 - 95</u> | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> |
|-------------------------------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Mercury purchases, lb. | 296,408 | 242,015 | 320,460 | 340,658 | 214,749 | 172,885 | 69,932 | 259,069 | 437,434 | 75,982 | 63,829 |
| Total Mercury Purchases, tons | 148 | 121 | 160 | 170 | 107 | 86 | 35 | 130 | 219 | 38 | 32 |
| Total Mercury Used, lb. | 319,715 | 273,659 | 232,056 | 210,213 | 177,968 | 156,403 | 61,506 | 71,052 | 75,309 | 28,637 | 20,660 |
| Total Mercury Used, tons | 160 | 137 | 116 | 105 | 89 | 79 | 30 | 36 | 38 | 14 | 10 |
| Annual Chlorine Capacity, 1,000 tons | 1,758 | 1,784 | 1,801 | 1,785 | 1,676 | 1,589 | 1436 | 1355 | 1,353 | 1,363 | 1,221 |
| Total Number of Mercury Cells | 762 | 762 | 762 | 762 | 706 | 682 | 646 | 594 | 594 | 594 | 506 |
| Mercury Used, lb/ton of Chlorine Capacity | 0.182 | 0.153 | 0.129 | 0.118 | 0.106 | 0.102 | 0.044 | 0.052 | 0.056 | 0.021 | 0.017 |

Notes: 1 ton = 2,000 lb

Data are for those plants operating at the end of the calendar year. In 2005, the Occidental Chemical Company plant in Delaware closed. 2005 data exclude this site.

Table 2

**Mercury Purchases and Use Data (In Tons) For the Facilities Operating At Year End In That Calendar Year; Nine Facilities for 2002 -2004
2005 Data for the Eight Facilities Operating At Year End 2005**

| | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> |
|-------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|
| Mercury Virgin Inventory as of Jan 1 [1] | 67 | 46 | 166 | 90 |
| Mercury Process Inventory as of Jan 1 [2] | 2,478 | 2,593 | 2,654 | 2,493 |
| Total Mercury Inventory as of Jan 1 [3] {[3] = [1] + [2]} | 2,545 | 2,639 | 2,820 | 2,583 |
| Mercury purchases in the calendar year [4] | 130 | 219 | 38 | 32 |
| Total Mercury Available [5] {[5] = [3] + [4]} | 2,675 | 2,858 | 2,858 | 2,615 |
| Mercury Virgin Inventory at on site storage (warehouse/room) as of Dec 31 [6] | 46 | 166 | 96 | 45 |
| Mercury Process Inventory as of Dec 31 [7] | 2,593 | 2,654 | 2,748 | 2,560 |
| Total Mercury Inventory as of Dec 31 [8] {[8] = [6] + [7]} | 2,639 | 2,820 | 2,844 | 2,605 |
| Total Mercury Used (Consumed) [9] {[9] = [5] – [8]} | 36 | 38 | 14 | 10 |
| Mercury Released to the Environment (TRI) [10] | 8.2 | 8.1 | 6.8 | 6.7 |
| Mercury Contained in Products [11] | 0.2 | 0.1 | 0.1 | 0.1 |
| Total Mercury Losses to Environment and Products [12] | 8 | 8 | 7 | 7 |
| Unaccounted for Mercury [13] {[13] = [9] – [12]} | 28 | 30 | 7 | 3 |

Numbers may not add due to rounding

2005 beginning inventory data adjusted to reflect shutdown of Delaware facility.

APPENDICES

Appendix A - Mission Statements of Various Groups

Mercury Issues Management Steering Committee (MIMSC)

The Mercury Issues Management Steering Committee is dedicated to continuous improvements in the protection of human health and the environment connected with the production of chlorine by mercury cell technology. The committee believes that the industry is in compliance with existing regulations governing releases of mercury to the environment, and that no significant harm to human health or the environment exists as a result of mercury releases from the chlor-alkali industry. However, driven by the industry's commitment to continuous improvement, the committee will strive for further improvements, always guided by sound science, risk management principles, and cost/benefit analysis.

The committee proactively addresses safety, environmental and health issues that will impact the manufacture and use of chlor-alkali products produced by the mercury cell process. The committee will develop and promote practices that will assist the users of this technology in the continued protection of human health and the environment.

Mercury Emissions Measurement (MEM) Task Group

The mission of the task group is to identify methodologies to allow for more accurate measurements of mercury emissions from cell room operations and point sources and to provide guidance to members to help them implement the commitment to more accurately measure mercury emissions from cell room.

Mercury Emissions Measurement and EPA Interaction Task Group

Mission Statement

The mission of the task group is to interact with EPA as the agency develops its plans for cell room and other testing at two additional facilities.

Mercury Data Management Task Group

Mission Statement

The mission of the task group is to develop a management system to assist members in complying with the housekeeping provisions of EPA's Mercury MACT for mercury cell chlor-alkali plants. The team should determine whether a paper system should first be developed prior to consideration of a computerized system.

APPENDIX B - Task Group Progress and Activities Reports for 2005

Mercury Emissions Measurement Task Group

This group continues to focus on the review of the EPA's final MACT rule. It continues to provide guidance concerning how members can best implement the final rule. The team met at a member's plant site in June to discuss that member's installation of a cell room mercury emissions monitoring system.

Mercury Issues Workshop

Fifty people attended the 13th Annual Mercury Issues Workshop held during the Chlorine Institute's 2006 Annual Meeting held in April in Chicago. Topics discussed included the following:

- Legal, Legislative, and Regulatory Update
- Mercury Cell Technology: A Historical Prospective
- European Mercury Issues Update
- South American Mercury Issues Update
- AIM for Compliance: Mercury MACT Case Study
- MACT Issues Panel Discussion

Coalition Activities

The mercury teams continue to participate in two industry coalitions addressing mercury issues: the Federal Water Quality Coalition and the Coalition for Mercury Management.