TESTIMONY OF ARTHUR E. DUNGAN

IN BEHALF OF

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BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT AND HAZARDOUS MATERIALS

COMMITTEE ON ENERGY AND COMMERCE

UNITED STATES

HOUSE OF REPRESENTATIVES

PERTAINING TO THE MERCURY EXPORT BAN ACT OF 2007 (H. R. 1534)

JUNE 22, 2007

Introduction

Mr. Chairman and Members of the Subcommittee:

I am Art Dungan, President of the Chlorine Institute and am here representing the Institute, as well as the Chlorine Chemistry Division of the American Chemistry Council. I appreciate the opportunity to testify before you concerning the Mercury Export Ban Act of 2007 (H. R. 1534) and the advisability of establishing a federal stockpile for mercury.

The Chlorine Institute, Inc., founded in 1924, is a 220-member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers. The Institute's mission is the promotion of safety and the protection of human health and the environment in the manufacture, distribution and use of chlorine, sodium hydroxide, potassium hydroxide and sodium hypochlorite, plus the distribution and use of hydrogen chloride. The Institute's North American Producer members account for more than 98 percent of the total chlorine production capacity of the U.S., Canada, and Mexico.

Everyday life would be very different without the benefits of chlorine chemistry. Combined with the power of human innovation, chlorine chemistry plays an essential role in providing the indispensable products of modern life. From providing one of the most basic human needs—clean drinking water—to contributing to the production of high-tech first-responder equipment, sustainable building materials, food protection chemicals, computer microprocessor chips and more than 90 percent of prescription pharmaceuticals, chlorine chemistry is essential to everyday life in America.

In the United States, there are currently seven facilities that produce chlorine using the mercury cell process accounting for approximately 7% of the annual chlorine production. All are members of the Chlorine Institute. Of these seven facilities, two have announced their intention to close or to convert to another technology by the end of 2008. The remaining five plants would be affected by this bill. We believe these plants can continue to operate until the end of their economic life in a manner that is fully protective of human health and the environment and in compliance with all regulatory requirements.

The Chlorine Institute and the Mercury Cell Producers' Commitment to Mercury Reduction

The Chlorine Institute and the chlor-alkali producers using the mercury cell technology have worked diligently to address mercury use and release issues since they first surfaced nearly 40 years ago. In the 1950s and 1960s, the mercury cell technology was the technology of choice because the sodium hydroxide co-product was felt by many customers to be superior in quality. Exhibit 1 provides a brief description of this technology. As a result, mercury cell technology increased from less than 10% of chlorine capacity in the early 1950s to nearly 30% in the 1970s. In the early 1970s there were approximately 30 mercury cell plants in operation. It was at this time that environmental concerns about the effects of mercury releases became an issue. Since that time, no new mercury cell plants have been built in the United States. As these chlor-alkali plants reached the end of their economic life, they have either closed or converted to a different

technology. In the last twenty years, most new chlor-alkali plants constructed throughout the world have utilized the membrane cell technology.

The mercury cell chlor-alkali producers individually and through the Chlorine Institute have worked aggressively and voluntarily to reduce mercury use and releases to the environment and have worked cooperatively with all agencies as they set regulatory standards limiting such releases. The Chlorine Institute established technical teams beginning more than forty years ago to address mercury issues. The first such teams focused on worker protection with the goal to minimize human exposure to mercury.

In the early 1970s, technical teams were established to reduce releases to the environment. Technologies were voluntarily shared between the mercury cell producers. These technologies first addressed emissions to water, then to air, and then to solid wastes. When EPA proposed the land disposal restrictions pertaining to solid wastes in the late 1980s, through the Chlorine Institute, the industry embarked on a nearly $4 million research program that would allow the mercury from these wastes to be recovered, prior to disposal, in a more environmentally friendly manner. The information that was developed enabled many mercury cell producers to utilize new methods to recover mercury from the wastes utilizing equipment that allowed for reduced air emissions when compared with the traditional mercury retorting technology.

In 1996, the Chlorine Institute and the mercury cell producers voluntarily agreed to reduce mercury use by 50 percent by 2005 compared to the base years of 1990-1995. This commitment was made to help the United States achieve its mercury reduction goals as part of the United States - Canadian Binational Toxics Strategy Agreement (BTS). As part of its voluntary

commitment, the Chlorine Institute agreed to issue annual reports highlighting the progress being made. The Ninth Annual Report was issued last year (Exhibit 2), and the tenth report will be issued in the coming weeks. **As indicated in this report, the overall reduction in annual mercury usage in the ninth year was 94%.**

In order to meet this commitment, the Institute established several new technical teams to address a variety of issues. In addition to meeting numerous times, the teams held several workshops and developed additional guidance documents to address mercury issues (Exhibit 3).

When the commitment to the BTS was made, 14 mercury cell plants were operating. Today seven plants continue in operation. Two of these plants are scheduled to close or convert by the end of 2008. The remaining five plants intend to operate until the end of their economic life. Exhibit 4 provides a list of these fourteen plants and their current status.

In addition, the Chlorine Institute and the Chlorine Chemistry Division of the American Chemistry Council are active participants in the World Chlorine Council (WCC). WCC has been an active supporter of the United Nations Environment Programme (UNEP) Global Mercury Program and has made a sustained effort to help mercury-based chlorine producers around the world reduce mercury uses and emissions. As part of this effort, WCC is supporting and contributing to the UNEP Global Mercury Partnership. The Global Mercury Partnership builds upon WCC's long-standing commitment to share best practices globally for reducing the use and release of mercury from mercury cell chlor-alkali facilities. WCC has contributed significant time, expertise and financial resources and has worked with governments, chlor-alkali

producers, and UNEP to help make this partnership a success. (See http://www.chem.unep.ch/mercury/partnerships/progress-reports/WCC%20Submission.pdf).

The Chlorine Institute's Position on H. R. 1534

H. R. 1534 has two main provisions. These are (1) Prohibition on Export of Mercury and (2) Establishment of an Excess Mercury Storage Advisory Committee.

(1) Prohibition on Export of Mercury

The Institute is opposed to the prohibition of export of mercury because it is premature to establish a ban on mercury exports until the United States has a program established and in place for the permanent storage of mercury. Such an export ban must also be coordinated with international groups (e.g., UNIDO and UNEP) to ensure that the reduced supply of mercury from countries such as the United States does not result in the expansion of existing or the opening of new primary mercury mines elsewhere in the world to meet the demand. While most uses of mercury continue to decline, two significant non-domestic uses, artisanal mining for gold and catalysts for chemical plants in China, are growing rapidly. It was reported at a June 14, 2007 meeting of EPA's newly established Advisory Committee on Commodity Mercury that primary mining of mercury results in emissions of at least 10% of the mercury produced. If the goal of the export ban is to reduce mercury use and, indirectly, mercury releases to the environment, a ban established before international action is taken to reduce mercury use will have the opposite effect.

Implementation of the export ban will not only affect the five remaining mercury cell plants, but also other sources of mercury. These five plants are estimated to have approximately 1,400

(short) tons of mercury that will need to be sold or otherwise disposed of when these plants reach the end of their economic life. This figure is large when compared with other domestic mercury supplies when examined in a short time frame. However, over the 40 year horizon described in the bill, it is likely that other domestic sources of mercury (by-product mining and recycling programs) would have a far greater contribution to the US mercury supply. At the same June 14 meeting referred to above, it was stated that the current quantity of net mercury exports is about 300 tons per year. With an export ban in place, this surplus mercury will have to be stored somewhere. The generators might store the mercury, which is a commodity, at various sites in the hope that it could eventually be sold. While most of this mercury would be stored safely and without any adverse effects to the environment, few of the sites would have the safeguards in place that a permanent federally managed storage site would have.

(2) Establishment of an Excess Mercury Storage Advisory Committee

The Institute supports this provision of the bill. This advisory committee would supplement the work of the existing EPA stakeholder panel looking at different approaches for management of non-federal supplies of commodity grade mercury. This stakeholder panel, established by EPA, has a much more limited scope. The panel is limited to individual input on alternative approaches. No consensus is desired or being sought by EPA. The panel will not issue a final report.

The Institute believes the make-up of the excess mercury storage advisory committee membership should be expanded. One significant source of elemental mercury is by-product mercury from mining operations. We believe this industry group should be included on the advisory committee. While the Institute has no additional specific recommendations, there may

be other groups that should be considered for representation. While the Institute agrees with the 40 year time frame described in the bill for considering various aspects of mercury storage, the Institute believes the charge of the advisory committee should be expanded to specifically state that the underlying assumption is that permanent storage (i.e., beyond 40 years) of mercury will be necessary.

Advisability of Establishing a Federal Stockpile for Mercury

In addition to commenting on H. R. 1534, The Chlorine Institute was asked to address the advisability of establishing a federal stockpile for mercury. For more than five years the Institute has publicly supported the establishment of a federal stockpile for mercury. In the spring of 2002, the mercury cell producers through the Chlorine Institute endorsed six key principles pertaining to the retirement of mercury (Exhibit 5). These principles were first presented at a mercury conference co-sponsored by the USEPA and the Northeast Waste Management Officials' Association (NEWMOA). In July 2002, we reiterated our support of such a stockpile in a letter to the Senate's Environment and Public Works Committee (Exhibit 6).

The Institute believes that the principles it endorsed in 2002 are still sound today. We see no viable alternative other than a stockpile under the control of the federal government. We believe the mercury stockpile should be located at as few sites as possible. Because of the relatively small size involved (mercury is more than 13 times denser than water), it is very likely all the surplus mercury could be stored at a single site.

The Department of Defense Logistics (DLA) has stored mercury safely for more than 50 years. This mercury had been acquired as part of the U. S. government's policy to have a strategic

reserve of essential materials, but it is no longer needed. Earlier this decade, the DLA undertook a very public process to examine how the long term storage of its surplus mercury should be addressed. The conclusion was that the mercury could continue to be safely stored for a long term period by the DLA, but that the multiple storage sites should be consolidated to store at a single site. The Institute does not believe that any viable alternative exists to the permanent storage of surplus mercury as being implemented by the DLA. The DLA is currently beginning a process to consolidate all of its nearly 5,000 tons of mercury to a single site. In addition, the Department of Energy has about 500 tons of surplus mercury that is being stored at a single site. Currently, there are no plans to consolidate this mercury to the DLA site.

While the Institute does not have verified data on mercury generated annually from recycling and by-product mining operations, it would appear that the US government would account for about 50% of the mercury which would need to be stored over the next 40 years. [Basis: 5,500 tons of mercury currently owned by the government; 1,400 tons of surplus mercury from the five chlor-alkali plants; and 100 tons per year of surplus mercury generated by the recycling and mining industries.] The contribution of the chlor-alkali industry is less than 15% of the total.

The Chlorine Institute recognizes that it is beyond the current mission of the DLA to manage the long term storage of all the surplus mercury generated in the United States. However, the Institute believes it would be sound public policy for the United States government to manage all the surplus mercury in a safe and environmentally friendly way as is being done by the DLA.

Conclusions

1. The Institute is opposed to the prohibition on the export of mercury because it is premature to establish a ban on mercury exports until the United States has a program established and in place for the permanent storage of mercury. Such an export ban must also be coordinated with international groups to ensure that the reduced supply of mercury from countries such as the United States does not result in the expansion of existing or the opening of new primary mercury mines elsewhere in the world to meet the demand. We believe that consideration of an export ban should not be undertaken until these two necessary steps are in place.

2. The Institute supports the establishment of a federal stockpile for mercury.

3. The Institute supports the establishment of an Excess Mercury Storage Advisory Committee. While the Institute has already reached many conclusions about the permanent storage of mercury, the committee will provide answers to many questions that will enable the establishment of a federal stockpile for mercury.

I thank you again for the opportunity to appear before the Committee and share the Chlorine Institute's views.

Exhibit 1

Chlorine Manufacture

Most chlorine is manufactured electrolytically by the mercury, the diaphragm or the membrane cell process. In each process, a salt (sodium chloride) solution is decomposed by the action of direct electric current in an electrolytic cell which converts the solution to elemental chlorine, and co-products sodium hydroxide and hydrogen. United States chlorine production is approximately 13 million short tons per year or about 30% of the global production.

In the mercury cell process recirculating mercury serves as the cathode. Chlorine is removed from the gas space above the anodes and elemental sodium is formed at the cathode. The sodium amalgamates with the mercury. The sodium-mercury amalgam then flows to a decomposer where it is reacted with purified water to produce sodium hydroxide and hydrogen with the mercury being recirculated. The mercury cell requires a relatively large amount of mercury inventory, but make-up to replenish losses is quite small. The typical mercury cell plant, depending on the size, may have 200 to 400 tons of mercury in inventory. A mercury cell plant may have between 25 and 100 of these electrolytic cells. Typically these cells are located in a cell room whose dimensions approximate a football field.

In the diaphragm cell process, sodium chloride brine is electrolyzed to produce chlorine at the positive electrode (anode) while sodium hydroxide and hydrogen are produced at the negative electrode (cathode). In order to prevent the reaction of sodium hydroxide and hydrogen with the chlorine, the anode and cathode chambers are separated by a porous diaphragm.

The membrane cell process electrolyzes sodium chloride brine to produce chlorine at the positive electrode (anode) while sodium hydroxide and hydrogen are produced at the negative electrode (cathode). An ion selective membrane prevents the reaction of sodium hydroxide and hydrogen with chlorine.

Chlorine is also produced in a number of other ways, for example, by electrolysis of potassium chloride brine in membrane and mercury cells with co-production of potassium hydroxide; by electrolysis of molten sodium or magnesium chloride to make elemental sodium or magnesium metal; by electrolysis of hydrochloric acid; and by non-electrolytic processes. A good reference for additional information is the Kirk-Othmer Encyclopedia of Chemical Technology which contains a section on chlorine and sodium hydroxide.

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Exhibit 2

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NINTH ANNUAL REPORT TO EPA
For the Year 2005

May 15, 2006

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 facilites 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 Sates 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

	Average 1990 - 95	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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

	2002	2003	2004	2005
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 m 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.

Exhibit 3

Documents Developed by the Institute's Technical Teams

- **Guidelines: Medical Surveillance and Hygiene Monitoring Practices for Control of Worker Exposure to Mercury in the Chlor-Alkali Industry**
- **Guidelines for the Handling of Rubber-Lined Cell Parts Potentially Contaminated with Mercury**
- **Guidelines for Conducting a Mercury Balance**
- **Guidelines for Technologies to Reduce Mercury in Sodium Hydroxide**
- **Guidelines for Mercury Cell Chlor-Alkali Plants Emission Control: Practices and Techniques**
- **Guidelines For The Optimization Of Mercury Wastewater Treatment (Sulfide Precipitation Process) Systems**

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Exhibit 4

Mercury Cell Plants Operating in 1996 and Current Status

	Company	Location	Current Status
1	ASHTA Chemicals	Ashtabula, Ohio	In operation
2	ERCO Worldwide	Port Edwards, Wisconsin	In operation
3	Olin Corporation	Augusta, Georgia	In operation
4	Olin Corporation	Charleston, Tennessee	In operation
5	PPG Industries	New Martinsville, West Virginia	In operation
6	Occidental Chemical Corp.	Muscle Shoals, Alabama	In operation; scheduled to close in second half of 2008
7	Pioneer	St. Gabriel, Louisiana	In operation; scheduled to close at the end of 2008
8	PPG Industries	Lake Charles, Louisiana	Conversion in process (mercury cell plant closed earlier this month)
9	Westlake	Calvert City, Kentucky	Converted
10	Georgia Pacific	Bellingham, Washington	Closed
11	Holtra Chem	Orrington, Maine	Closed
12	Holtra Chem	Riegelwood, North Carolina	Closed
13	Occidental Chemical Corp.	Deer Park, Texas	Closed
14	Occidental Chemical Corp.	Delaware City, Delaware	Closed

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Exhibit 5

THE CHLORINE INSTITUTE, INC.
1300 Wilson Boulevard, Arlington, VA 22209
Phone: 703-741-5760 Fax: 703-741-6068
http://www.chlorineinstitute.org

Chlor-alkali Industry Principles Concerning the Retirement of Mercury

1. Mercury is a marketable commodity. It is not a hazardous waste. There are numerous beneficial uses for mercury that provide value to our society and which are likely to continue for the foreseeable future.

2. In the United States, the supply of mercury available from facilities (e.g., strategic reserve, converted/shutdown mercury cell plants) that no longer need it or that becomes available through reclamation processes exceeds the demand for such mercury. However, on a world wide basis, a net demand for additional mercury does exist. Currently, there is still at least one mine in operation for the express purpose of supplying virgin elemental mercury to meet this world demand.

3. Improper handling/use of mercury can lead to adverse environmental consequences (especially in countries where sufficient environmental restrictions are not in place). Therefore, it may be prudent for the United States to consider a national policy to identify which worldwide outlets are acceptable vs. the present free market approach. This restriction of outlets recognizes that the mining of fresh mercury will be encouraged to meet the demand for the identified unacceptable outlets outside of the US.

4. Any government policy related to the retirement of mercury must be predicated on the government's taking title to the mercury and assuming full responsibility for the permanent management of such mercury in a manner consistent with safety and environmental regulations and engineering standards.

5. In the event that recovery processes do not provide sufficient mercury to supply future needs, mercury from the permanent storage stockpile should be made available for the legitimate needs of users of mercury rather than the mining of virgin mercury.

6. Assuming that such a government policy regarding the retirement and storage of such mercury is developed, the chlor-alkali industry is willing to discuss options concerning how the chlor-alkali industry can best insure that any surplus mercury from idled or converted sites is placed into that permanent storage and is not allowed to enter poorly managed commercial markets.

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Exhibit 6

(Electronic version; letterhead copy of letter unavailable)

June 26, 2002

The Honorable James M. Jeffords, Chairman
Environment and Public Works Committee
410 Dirksen Senate Office Building
Washington, DC 20510-6175

The Honorable Bob Smith, Ranking Member
Environment and Public Works Committee
456 Dirksen Senate Office Building
Washington, DC 20510-6175

Dear Senators Jeffords and Smith:

Reference: S. 351

The Chlorine Institute, Inc. supports Senate Bill 351 as presented in the version dated June 25, 2002 and identified by the file name DEC02.471. While we support the portion of the bill pertaining to fever thermometers, we believe the key part of the bill is that which addresses the retirement of surplus mercury.

The United States government has approximately 6,000 tons of surplus mercury within the Department of Defense and the Department of Energy. In addition, approximately 3,000 tons of surplus mercury may become available over the next several decades from mercury cell chlorine production plants as they reach the end of their economic life. Mercury recycling and recovery programs already make the supply of mercury greater in the USA than the demand. The excess supply will increase in the future, as legitimate mercury needs decline. All of these reasons combine to make it highly desirable for the United States to develop a policy to address the retirement of surplus mercury.

The Institute worked with EPA and the Northeast Waste Management Officials' Association (NEWMOA) in helping to plan the Mercury Workshop held in Boston on May 1 - 3, 2002. At this workshop, the Institute presented its views on issues associated with the retirement of surplus mercury in a formal presentation made by one of our members. Attached is a framework presenting the principles that we support and have provided to the Mercury Policy Project. We believe that the current draft of Senate bill 351 embodies the essence of these principles.

The Chlorine Institute, Inc., founded in 1924, is a 220-member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers. The Institute's mission is the promotion of safety and the protection of human health and the environment in the manufacture, distribution and use of chlorine, sodium hydroxide, potassium hydroxide and sodium hypochlorite, plus the distribution and use of hydrogen chloride. The Institute's North American Producer members account for more than 98 percent of the total chlorine production capacity of the U.S., Canada, and Mexico. In the United States, there are ten facilities that produce chlorine using the mercury cell process accounting for 10% of the annual chlorine production. All are members of the Chlorine Institute.

The Chlorine Institute has long worked on a cooperative basis with various federal, state, and local agencies and other groups to address issues associated with mercury use in chlorine production. We believe that production of chlorine with mercury cell technology continues to be a safe, environmentally sound way to manufacture chlorine and chlorine-based products. Mercury cell facilities can be operated in a manner that meets or exceeds environmental standards. However, we remain committed to voluntary mercury reduction strategies. For example, in April of this year, the Institute submitted its fifth annual report to the USEPA concerning the commitment the Institute and the mercury cell chlorine producers made to the Binational Toxics Strategy in 1996 to reduce mercury use by 50% or more by 2005 and to provide the agency with an annual report of progress. In the fifth year of the program, the goal has been achieved. The overall reduction to date is 81%. We will continue to provide these reports to the agency as we strive to make further reductions.

The Institute has worked with EPA and other entities on a variety of other issues. These include issues such as the currently pending MACT standard for further reductions in mercury emissions from mercury cell chlorine production plants and RCRA issues associated with mercury containing materials. The Institute has also worked on international issues such as the United Nations Economic Commission for Europe (UN/ECE) Convention on the Long Range Transboundary Air Pollution Protocol on Heavy Metals (includes mercury). The Institute formally supported this protocol and urged our government to sign it -- which it has.

We have been most privileged to work with your committee staff on this bill.

Very truly yours,

Robert G. Smerko

TESTIMONY OF ARTHUR E. DUNGAN

IN BEHALF OF

THE CHLORINE INSTITUTE, INC.
1300 WILSON BOULEVARD
ARLINGTON, VA 22209
703-741-5760

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT AND HAZARDOUS MATERIALS

COMMITTEE ON ENERGY AND COMMERCE

UNITED STATES

HOUSE OF REPRESENTATIVES

PERTAINING TO THE MERCURY EXPORT BAN ACT OF 2007 (H. R. 1534)

JUNE 22, 2007

Introduction

Mr. Chairman and Members of the Subcommittee:

I am Art Dungan, President of the Chlorine Institute and am here representing the Institute, as well as the Chlorine Chemistry Division of the American Chemistry Council. I appreciate the opportunity to testify before you concerning the Mercury Export Ban Act of 2007 (H. R. 1534) and the advisability of establishing a federal stockpile for mercury.

The Chlorine Institute, Inc., founded in 1924, is a 220-member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers. The Institute's mission is the promotion of safety and the protection of human health and the environment in the manufacture, distribution and use of chlorine, sodium hydroxide, potassium hydroxide and sodium hypochlorite, plus the distribution and use of hydrogen chloride. The Institute's North American Producer members account for more than 98 percent of the total chlorine production capacity of the U.S., Canada, and Mexico.

Everyday life would be very different without the benefits of chlorine chemistry. Combined with the power of human innovation, chlorine chemistry plays an essential role in providing the indispensable products of modern life. From providing one of the most basic human needs—clean drinking water—to contributing to the production of high-tech first-responder equipment, sustainable building materials, food protection chemicals, computer microprocessor chips and more than 90 percent of prescription pharmaceuticals, chlorine chemistry is essential to everyday life in America.

In the United States, there are currently seven facilities that produce chlorine using the mercury cell process accounting for approximately 7% of the annual chlorine production. All are members of the Chlorine Institute. Of these seven facilities, two have announced their intention to close or to convert to another technology by the end of 2008. The remaining five plants would be affected by this bill. We believe these plants can continue to operate until the end of their economic life in a manner that is fully protective of human health and the environment and in compliance with all regulatory requirements.

The Chlorine Institute and the Mercury Cell Producers' Commitment to Mercury Reduction

The Chlorine Institute and the chlor-alkali producers using the mercury cell technology have worked diligently to address mercury use and release issues since they first surfaced nearly 40 years ago. In the 1950s and 1960s, the mercury cell technology was the technology of choice because the sodium hydroxide co-product was felt by many customers to be superior in quality. Exhibit 1 provides a brief description of this technology. As a result, mercury cell technology increased from less than 10% of chlorine capacity in the early 1950s to nearly 30% in the 1970s. In the early 1970s there were approximately 30 mercury cell plants in operation. It was at this time that environmental concerns about the effects of mercury releases became an issue. Since that time, no new mercury cell plants have been built in the United States. As these chlor-alkali plants reached the end of their economic life, they have either closed or converted to a different

technology. In the last twenty years, most new chlor-alkali plants constructed throughout the world have utilized the membrane cell technology.

The mercury cell chlor-alkali producers individually and through the Chlorine Institute have worked aggressively and voluntarily to reduce mercury use and releases to the environment and have worked cooperatively with all agencies as they set regulatory standards limiting such releases. The Chlorine Institute established technical teams beginning more than forty years ago to address mercury issues. The first such teams focused on worker protection with the goal to minimize human exposure to mercury.

In the early 1970s, technical teams were established to reduce releases to the environment. Technologies were voluntarily shared between the mercury cell producers. These technologies first addressed emissions to water, then to air, and then to solid wastes. When EPA proposed the land disposal restrictions pertaining to solid wastes in the late 1980s, through the Chlorine Institute, the industry embarked on a nearly $4 million research program that would allow the mercury from these wastes to be recovered, prior to disposal, in a more environmentally friendly manner. The information that was developed enabled many mercury cell producers to utilize new methods to recover mercury from the wastes utilizing equipment that allowed for reduced air emissions when compared with the traditional mercury retorting technology.

In 1996, the Chlorine Institute and the mercury cell producers voluntarily agreed to reduce mercury use by 50 percent by 2005 compared to the base years of 1990-1995. This commitment was made to help the United States achieve its mercury reduction goals as part of the United States - Canadian Binational Toxics Strategy Agreement (BTS). As part of its voluntary

commitment, the Chlorine Institute agreed to issue annual reports highlighting the progress being made. The Ninth Annual Report was issued last year (Exhibit 2), and the tenth report will be issued in the coming weeks. **As indicated in this report, the overall reduction in annual mercury usage in the ninth year was 94%.**

In order to meet this commitment, the Institute established several new technical teams to address a variety of issues. In addition to meeting numerous times, the teams held several workshops and developed additional guidance documents to address mercury issues (Exhibit 3).

When the commitment to the BTS was made, 14 mercury cell plants were operating. Today seven plants continue in operation. Two of these plants are scheduled to close or convert by the end of 2008. The remaining five plants intend to operate until the end of their economic life. Exhibit 4 provides a list of these fourteen plants and their current status.

In addition, the Chlorine Institute and the Chlorine Chemistry Division of the American Chemistry Council are active participants in the World Chlorine Council (WCC). WCC has been an active supporter of the United Nations Environment Programme (UNEP) Global Mercury Program and has made a sustained effort to help mercury-based chlorine producers around the world reduce mercury uses and emissions. As part of this effort, WCC is supporting and contributing to the UNEP Global Mercury Partnership. The Global Mercury Partnership builds upon WCC's long-standing commitment to share best practices globally for reducing the use and release of mercury from mercury cell chlor-alkali facilities. WCC has contributed significant time, expertise and financial resources and has worked with governments, chlor-alkali

producers, and UNEP to help make this partnership a success. (See http://www.chem.unep.ch/mercury/partnerships/progress-reports/WCC%20Submission.pdf).

The Chlorine Institute's Position on H. R. 1534

H. R. 1534 has two main provisions. These are (1) Prohibition on Export of Mercury and (2) Establishment of an Excess Mercury Storage Advisory Committee.

(1) Prohibition on Export of Mercury

The Institute is opposed to the prohibition of export of mercury because it is premature to establish a ban on mercury exports until the United States has a program established and in place for the permanent storage of mercury. Such an export ban must also be coordinated with international groups (e.g., UNIDO and UNEP) to ensure that the reduced supply of mercury from countries such as the United States does not result in the expansion of existing or the opening of new primary mercury mines elsewhere in the world to meet the demand. While most uses of mercury continue to decline, two significant non-domestic uses, artisanal mining for gold and catalysts for chemical plants in China, are growing rapidly. It was reported at a June 14, 2007 meeting of EPA's newly established Advisory Committee on Commodity Mercury that primary mining of mercury results in emissions of at least 10% of the mercury produced. If the goal of the export ban is to reduce mercury use and, indirectly, mercury releases to the environment, a ban established before international action is taken to reduce mercury use will have the opposite effect.

Implementation of the export ban will not only affect the five remaining mercury cell plants, but also other sources of mercury. These five plants are estimated to have approximately 1,400

(short) tons of mercury that will need to be sold or otherwise disposed of when these plants reach the end of their economic life. This figure is large when compared with other domestic mercury supplies when examined in a short time frame. However, over the 40 year horizon described in the bill, it is likely that other domestic sources of mercury (by-product mining and recycling programs) would have a far greater contribution to the US mercury supply. At the same June 14 meeting referred to above, it was stated that the current quantity of net mercury exports is about 300 tons per year. With an export ban in place, this surplus mercury will have to be stored somewhere. The generators might store the mercury, which is a commodity, at various sites in the hope that it could eventually be sold. While most of this mercury would be stored safely and without any adverse effects to the environment, few of the sites would have the safeguards in place that a permanent federally managed storage site would have.

(2) Establishment of an Excess Mercury Storage Advisory Committee

The Institute supports this provision of the bill. This advisory committee would supplement the work of the existing EPA stakeholder panel looking at different approaches for management of non-federal supplies of commodity grade mercury. This stakeholder panel, established by EPA, has a much more limited scope. The panel is limited to individual input on alternative approaches. No consensus is desired or being sought by EPA. The panel will not issue a final report.

The Institute believes the make-up of the excess mercury storage advisory committee membership should be expanded. One significant source of elemental mercury is by-product mercury from mining operations. We believe this industry group should be included on the advisory committee. While the Institute has no additional specific recommendations, there may

be other groups that should be considered for representation. While the Institute agrees with the 40 year time frame described in the bill for considering various aspects of mercury storage, the Institute believes the charge of the advisory committee should be expanded to specifically state that the underlying assumption is that permanent storage (i.e., beyond 40 years) of mercury will be necessary.

Advisability of Establishing a Federal Stockpile for Mercury

In addition to commenting on H. R. 1534, The Chlorine Institute was asked to address the advisability of establishing a federal stockpile for mercury. For more than five years the Institute has publicly supported the establishment of a federal stockpile for mercury. In the spring of 2002, the mercury cell producers through the Chlorine Institute endorsed six key principles pertaining to the retirement of mercury (Exhibit 5). These principles were first presented at a mercury conference co-sponsored by the USEPA and the Northeast Waste Management Officials' Association (NEWMOA). In July 2002, we reiterated our support of such a stockpile in a letter to the Senate's Environment and Public Works Committee (Exhibit 6).

The Institute believes that the principles it endorsed in 2002 are still sound today. We see no viable alternative other than a stockpile under the control of the federal government. We believe the mercury stockpile should be located at as few sites as possible. Because of the relatively small size involved (mercury is more than 13 times denser than water), it is very likely all the surplus mercury could be stored at a single site.

The Department of Defense Logistics (DLA) has stored mercury safely for more than 50 years. This mercury had been acquired as part of the U. S. government's policy to have a strategic

reserve of essential materials, but it is no longer needed. Earlier this decade, the DLA undertook a very public process to examine how the long term storage of its surplus mercury should be addressed. The conclusion was that the mercury could continue to be safely stored for a long term period by the DLA, but that the multiple storage sites should be consolidated to store at a single site. The Institute does not believe that any viable alternative exists to the permanent storage of surplus mercury as being implemented by the DLA. The DLA is currently beginning a process to consolidate all of its nearly 5,000 tons of mercury to a single site. In addition, the Department of Energy has about 500 tons of surplus mercury that is being stored at a single site. Currently, there are no plans to consolidate this mercury to the DLA site.

While the Institute does not have verified data on mercury generated annually from recycling and by-product mining operations, it would appear that the US government would account for about 50% of the mercury which would need to be stored over the next 40 years. [Basis: 5,500 tons of mercury currently owned by the government; 1,400 tons of surplus mercury from the five chlor-alkali plants; and 100 tons per year of surplus mercury generated by the recycling and mining industries.] The contribution of the chlor-alkali industry is less than 15% of the total.

The Chlorine Institute recognizes that it is beyond the current mission of the DLA to manage the long term storage of all the surplus mercury generated in the United States. However, the Institute believes it would be sound public policy for the United States government to manage all the surplus mercury in a safe and environmentally friendly way as is being done by the DLA.

Conclusions

1. The Institute is opposed to the prohibition on the export of mercury because it is premature to establish a ban on mercury exports until the United States has a program established and in place for the permanent storage of mercury. Such an export ban must also be coordinated with international groups to ensure that the reduced supply of mercury from countries such as the United States does not result in the expansion of existing or the opening of new primary mercury mines elsewhere in the world to meet the demand. We believe that consideration of an export ban should not be undertaken until these two necessary steps are in place.

2. The Institute supports the establishment of a federal stockpile for mercury.

3. The Institute supports the establishment of an Excess Mercury Storage Advisory Committee. While the Institute has already reached many conclusions about the permanent storage of mercury, the committee will provide answers to many questions that will enable the establishment of a federal stockpile for mercury.

I thank you again for the opportunity to appear before the Committee and share the Chlorine Institute's views.

Exhibit 1

Chlorine Manufacture

Most chlorine is manufactured electrolytically by the mercury, the diaphragm or the membrane cell process. In each process, a salt (sodium chloride) solution is decomposed by the action of direct electric current in an electrolytic cell which converts the solution to elemental chlorine, and co-products sodium hydroxide and hydrogen. United States chlorine production is approximately 13 million short tons per year or about 30% of the global production.

In the mercury cell process recirculating mercury serves as the cathode. Chlorine is removed from the gas space above the anodes and elemental sodium is formed at the cathode. The sodium amalgamates with the mercury. The sodium-mercury amalgam then flows to a decomposer where it is reacted with purified water to produce sodium hydroxide and hydrogen with the mercury being recirculated. The mercury cell requires a relatively large amount of mercury inventory, but make-up to replenish losses is quite small. The typical mercury cell plant, depending on the size, may have 200 to 400 tons of mercury in inventory. A mercury cell plant may have between 25 and 100 of these electrolytic cells. Typically these cells are located in a cell room whose dimensions approximate a football field.

In the diaphragm cell process, sodium chloride brine is electrolyzed to produce chlorine at the positive electrode (anode) while sodium hydroxide and hydrogen are produced at the negative electrode (cathode). In order to prevent the reaction of sodium hydroxide and hydrogen with the chlorine, the anode and cathode chambers are separated by a porous diaphragm.

The membrane cell process electrolyzes sodium chloride brine to produce chlorine at the positive electrode (anode) while sodium hydroxide and hydrogen are produced at the negative electrode (cathode). An ion selective membrane prevents the reaction of sodium hydroxide and hydrogen with chlorine.

Chlorine is also produced in a number of other ways, for example, by electrolysis of potassium chloride brine in membrane and mercury cells with co-production of potassium hydroxide; by electrolysis of molten sodium or magnesium chloride to make elemental sodium or magnesium metal; by electrolysis of hydrochloric acid; and by non-electrolytic processes. A good reference for additional information is the Kirk-Othmer Encyclopedia of Chemical Technology which contains a section on chlorine and sodium hydroxide.

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Exhibit 2

THE CHLORINE INSTITUTE, INC.

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NINTH ANNUAL REPORT TO EPA
For the Year 2005

May 15, 2006

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 facilites 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 Sates 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

	Average 1990 - 95	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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

	2002	2003	2004	2005
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 m 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.

Exhibit 3

Documents Developed by the Institute's Technical Teams

- **Guidelines: Medical Surveillance and Hygiene Monitoring Practices for Control of Worker Exposure to Mercury in the Chlor-Alkali Industry**
- **Guidelines for the Handling of Rubber-Lined Cell Parts Potentially Contaminated with Mercury**
- **Guidelines for Conducting a Mercury Balance**
- **Guidelines for Technologies to Reduce Mercury in Sodium Hydroxide**
- **Guidelines for Mercury Cell Chlor-Alkali Plants Emission Control: Practices and Techniques**
- **Guidelines For The Optimization Of Mercury Wastewater Treatment (Sulfide Precipitation Process) Systems**

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Exhibit 4

Mercury Cell Plants Operating in 1996 and Current Status

	Company	Location	Current Status
1	ASHTA Chemicals	Ashtabula, Ohio	In operation
2	ERCO Worldwide	Port Edwards, Wisconsin	In operation
3	Olin Corporation	Augusta, Georgia	In operation
4	Olin Corporation	Charleston, Tennessee	In operation
5	PPG Industries	New Martinsville, West Virginia	In operation
6	Occidental Chemical Corp.	Muscle Shoals, Alabama	In operation; scheduled to close in second half of 2008
7	Pioneer	St. Gabriel, Louisiana	In operation; scheduled to close at the end of 2008
8	PPG Industries	Lake Charles, Louisiana	Conversion in process (mercury cell plant closed earlier this month)
9	Westlake	Calvert City, Kentucky	Converted
10	Georgia Pacific	Bellingham, Washington	Closed
11	Holtra Chem	Orrington, Maine	Closed
12	Holtra Chem	Riegelwood, North Carolina	Closed
13	Occidental Chemical Corp.	Deer Park, Texas	Closed
14	Occidental Chemical Corp.	Delaware City, Delaware	Closed

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Exhibit 5

THE CHLORINE INSTITUTE, INC.
1300 Wilson Boulevard, Arlington, VA 22209
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http://www.chlorineinstitute.org

Chlor-alkali Industry Principles Concerning the Retirement of Mercury

1. Mercury is a marketable commodity. It is not a hazardous waste. There are numerous beneficial uses for mercury that provide value to our society and which are likely to continue for the foreseeable future.

2. In the United States, the supply of mercury available from facilities (e.g., strategic reserve, converted/shutdown mercury cell plants) that no longer need it or that becomes available through reclamation processes exceeds the demand for such mercury. However, on a world wide basis, a net demand for additional mercury does exist. Currently, there is still at least one mine in operation for the express purpose of supplying virgin elemental mercury to meet this world demand.

3. Improper handling/use of mercury can lead to adverse environmental consequences (especially in countries where sufficient environmental restrictions are not in place). Therefore, it may be prudent for the United States to consider a national policy to identify which worldwide outlets are acceptable vs. the present free market approach. This restriction of outlets recognizes that the mining of fresh mercury will be encouraged to meet the demand for the identified unacceptable outlets outside of the US.

4. Any government policy related to the retirement of mercury must be predicated on the government's taking title to the mercury and assuming full responsibility for the permanent management of such mercury in a manner consistent with safety and environmental regulations and engineering standards.

5. In the event that recovery processes do not provide sufficient mercury to supply future needs, mercury from the permanent storage stockpile should be made available for the legitimate needs of users of mercury rather than the mining of virgin mercury.

6. Assuming that such a government policy regarding the retirement and storage of such mercury is developed, the chlor-alkali industry is willing to discuss options concerning how the chlor-alkali industry can best insure that any surplus mercury from idled or converted sites is placed into that permanent storage and is not allowed to enter poorly managed commercial markets.

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Exhibit 6

(Electronic version; letterhead copy of letter unavailable)

June 26, 2002

The Honorable James M. Jeffords, Chairman
Environment and Public Works Committee
410 Dirksen Senate Office Building
Washington, DC 20510-6175

The Honorable Bob Smith, Ranking Member
Environment and Public Works Committee
456 Dirksen Senate Office Building
Washington, DC 20510-6175

Dear Senators Jeffords and Smith:

Reference: S. 351

The Chlorine Institute, Inc. supports Senate Bill 351 as presented in the version dated June 25, 2002 and identified by the file name DEC02.471. While we support the portion of the bill pertaining to fever thermometers, we believe the key part of the bill is that which addresses the retirement of surplus mercury.

The United States government has approximately 6,000 tons of surplus mercury within the Department of Defense and the Department of Energy. In addition, approximately 3,000 tons of surplus mercury may become available over the next several decades from mercury cell chlorine production plants as they reach the end of their economic life. Mercury recycling and recovery programs already make the supply of mercury greater in the USA than the demand. The excess supply will increase in the future, as legitimate mercury needs decline. All of these reasons combine to make it highly desirable for the United States to develop a policy to address the retirement of surplus mercury.

The Institute worked with EPA and the Northeast Waste Management Officials' Association (NEWMOA) in helping to plan the Mercury Workshop held in Boston on May 1 - 3, 2002. At this workshop, the Institute presented its views on issues associated with the retirement of surplus mercury in a formal presentation made by one of our members. Attached is a framework presenting the principles that we support and have provided to the Mercury Policy Project. We believe that the current draft of Senate bill 351 embodies the essence of these principles.

The Chlorine Institute, Inc., founded in 1924, is a 220-member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers. The Institute's mission is the promotion of safety and the protection of human health and the environment in the manufacture, distribution and use of chlorine, sodium hydroxide, potassium hydroxide and sodium hypochlorite, plus the distribution and use of hydrogen chloride. The Institute's North American Producer members account for more than 98 percent of the total chlorine production capacity of the U.S., Canada, and Mexico. In the United States, there are ten facilities that produce chlorine using the mercury cell process accounting for 10% of the annual chlorine production. All are members of the Chlorine Institute.

The Chlorine Institute has long worked on a cooperative basis with various federal, state, and local agencies and other groups to address issues associated with mercury use in chlorine production. We believe that production of chlorine with mercury cell technology continues to be a safe, environmentally sound way to manufacture chlorine and chlorine-based products. Mercury cell facilities can be operated in a manner that meets or exceeds environmental standards. However, we remain committed to voluntary mercury reduction strategies. For example, in April of this year, the Institute submitted its fifth annual report to the USEPA concerning the commitment the Institute and the mercury cell chlorine producers made to the Binational Toxics Strategy in 1996 to reduce mercury use by 50% or more by 2005 and to provide the agency with an annual report of progress. In the fifth year of the program, the goal has been achieved. The overall reduction to date is 81%. We will continue to provide these reports to the agency as we strive to make further reductions.

The Institute has worked with EPA and other entities on a variety of other issues. These include issues such as the currently pending MACT standard for further reductions in mercury emissions from mercury cell chlorine production plants and RCRA issues associated with mercury containing materials. The Institute has also worked on international issues such as the United Nations Economic Commission for Europe (UN/ECE) Convention on the Long Range Transboundary Air Pollution Protocol on Heavy Metals (includes mercury). The Institute formally supported this protocol and urged our government to sign it -- which it has.

We have been most privileged to work with your committee staff on this bill.

Very truly yours,

Robert G. Smerko