

The Mercury Program Final Report:  
A Plan for the Implementation of S.730  
*The Mercury Emission Act of 2005*

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# Table of Contents

<b>LIST OF ACRONYMS</b> .....	<b>3</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>4</b>
<b>INTRODUCTION</b> .....	<b>5</b>
<b>SCIENTIFIC BASIS FOR INTERVENTION</b> .....	<b>6</b>
<b>LEGISLATIVE SUMMARY</b> .....	<b>7</b>
<b>PURPOSE OF S.730: THE MERCURY EMISSION ACT OF 2005</b> .....	<b>7</b>
<b>SUPPORTERS AND POLITICAL POWER BEHIND S.730</b> .....	<b>7</b>
<b>REGULATING FOSSIL FUEL-FIRED ELECTRICITY GENERATING UNITS</b> .....	<b>8</b>
<b>REGULATORY STRUCTURE AND STATUTES OF S.730</b> .....	<b>8</b>
<b>POLITICAL, IDEOLOGICAL, AND ADMINISTRATIVE OPPOSITION TO S.730</b> .....	<b>9</b>
<b>PROGRAM DESIGN</b> .....	<b>11</b>
<b>RULEMAKING</b> .....	<b>11</b>
<b>TECHNOLOGIES TO REDUCE MERCURY</b> .....	<b>12</b>
<b>MONITORING</b> .....	<b>15</b>
<b>REPORTING AND ENFORCEMENT OF MERCURY EMISSIONS</b> .....	<b>17</b>
<b>POLICY DESIGN SUMMARY</b> .....	<b>19</b>
<b>ORGANIZATIONAL AND STAFFING PLAN</b> .....	<b>21</b>
<b>ADAPTING THE EPA’S EXISTING STRUCTURE</b> .....	<b>21</b>
<b>PROPOSED STAFFING PLAN</b> .....	<b>22</b>
<b>ORGANIZATIONAL STRUCTURE</b> .....	<b>23</b>
<b>PROGRAM IMPLEMENTATION RESPONSIBILITIES</b> .....	<b>25</b>
<b>PERFORMANCE MANAGEMENT</b> .....	<b>28</b>
<b>RULEMAKING</b> .....	<b>28</b>
<b>TECHNOLOGY</b> .....	<b>29</b>
<b>MONITORING AND REPORTING ALONG WITH COMPLIANCE AND ENFORCEMENT</b> .....	<b>29</b>
<b>TASKS FOR YEAR ONE</b> .....	<b>31</b>
<b>RULEMAKING</b> .....	<b>31</b>
<b>TECHNOLOGY</b> .....	<b>32</b>
<b>MONITORING AND REPORTING IN CONJUNCTION WITH COMPLIANCE AND ENFORCEMENT</b> .....	<b>33</b>
<b>BUDGET</b> .....	<b>36</b>
<b>PERSONNEL MANAGEMENT</b> .....	<b>36</b>
<b>COMMUNICATION AND OUTREACH</b> .....	<b>37</b>
<b>OTHER DIRECT COSTS: OFFICE OPERATIONS</b> .....	<b>38</b>
<b>TOTAL EXPENDITURES</b> .....	<b>39</b>
<b>CONCLUSION</b> .....	<b>40</b>
<b>APPENDICES</b> .....	<b>41</b>
<b>APPENDIX A: KEY DISTINCTIONS BETWEEN S.730 AND ALTERNATIVE PROPOSALS</b> .....	<b>41</b>
<b>APPENDIX B: THE ACTION DEVELOPMENT PROCESS</b> .....	<b>43</b>
<b>APPENDIX C: DEVELOPING THE PROGRAM DESIGN</b> .....	<b>45</b>
<b>APPENDIX D: ORGANIZATION AND STAFFING PLAN</b> .....	<b>46</b>
<b>APPENDIX E: FIRST YEAR IMPLEMENTATION</b> .....	<b>52</b>
<b>APPENDIX F: PERFORMANCE MANAGEMENT</b> .....	<b>53</b>
<b>APPENDIX G: MASTER CALENDAR</b> .....	<b>56</b>
<b>APPENDIX H: BUDGET</b> .....	<b>57</b>
<b>REFERENCES</b> .....	<b>59</b>

## *List of Acronyms*

### **List of Acronyms**

ACI	Active Carbon Injection
ADP	Action Development Process
CAA	Clean Air Act
CEM	Continuous Emissions Monitoring
CWA	Clean Water Act
DOE	Department of Energy
ECHO	Enforcement and Compliance History Online
ECOS	Environmental Council of the States
EIA	Energy Information Administration
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ESP	Electrostatic Precipitators
FF	Fabric Filters
FTE	Full-Time Equivalent
GS	General Schedule
HCS	Hg Control Specialist, Inc.
MACT	Maximum Available Control Technology
MOU	Memorandum of Understanding
MRSC	Mercury Regulatory Steering Committee
OAR	Office of Air and Radiation
OAQPS	Office of Air Quality Planning and Standards
PS	Particle Scrubbers
RECAP	Reporting for Enforcement and Compliance Assurance Priorities
SCR	Selective Catalytic Reduction
SD	Spray Dryer
TRI	Toxics Release Inventory
Wet- FGD	Water-based Flue Gas De-sulfurization Scrubbers

## *Executive Summary*

The United States Congress passed the *Mercury Emission Act of 2005* (the Act) on September 21, 2005 to mitigate public health risks and ecological degradation due to mercury contamination in the environment. The law requires a decrease in the national emission levels of mercury from all anthropogenic sources by 90% of 1999 levels. Coal-fired electric generating facilities contribute approximately half of mercury emissions emitted in the United States. Thus, the U.S. Environmental Protection Agency (EPA) has contracted Hg Control Specialists, Inc. (HCS) to design a program for regulating mercury emissions from this source for the Agency. Specifically, Section 3 of the Act establishes a power plant facility air emission standard of 2.48 grams of mercury per 1,000 megawatt-hours and a national emission limit of 5 tons of mercury annually. The contract with the EPA requires HCS to focus on 2006, the first year of the implementation of the Act, such that emissions reduction activities can begin in the second year, 2007.

HCS assessed the mandates of the Act and constructed the Mercury Program for the EPA's implementation and the reduction of mercury air emissions from power plants. In its first year, the Mercury Program has four fundamental phases: rulemaking, technology determination, establishing processes for monitoring and reporting, and establishing processes for compliance and enforcement. Each of the phases is composed of key tasks to establish the program and allow the EPA to reach the overall goal of mercury emission reductions. To staff these tasks, HCS recommends creating a Mercury Regulatory Steering Committee comprised of five employees and one full-time intern. The Mercury Steering Committee will work with 32 existing EPA employees to form the Mercury Workgroup, which will guide the rulemaking process required to implement the Act. The Program Director will oversee the Steering Committee and the Workgroup and manage the entire Mercury Program.

To ensure that the Mercury Program is meeting its implementation goals for the first year, HCS has created a performance management plan for the EPA. This plan establishes guidelines and procedures to ensure that the rulemaking, technology development, and monitoring and enforcement guidelines on track for the year so that mercury emission reductions can begin by the end of 2006. Measurement methods for the goals, an information collection system, a process by which to report collected information, and a feedback mechanism for monitoring and developing any necessary program modifications will assure that the framework for the Mercury Program is operational by the end of the first year. The performance plan will work in conjunction with a master calendar that maintains the completion dates for the key tasks related to each of the four phases of the Mercury Program. HCS has estimated that the first year costs for implementing Section 3 of the Act will be \$360,668.

Together, all the pieces of the Mercury Program will help ensure that mercury air emission reductions from coal fired power plants will begin by 2007 and continue thereafter, thus providing greater protection of human health and the environment.

## ***Introduction***

Mercury is a naturally occurring element in the earth's geologic formations, especially in the fossil fuel coal. A number of industrial processes or anthropogenic activities utilize coal and can release mercury into the atmosphere and soils. When artificially in the environment, mercury can cause harmful ecological and health effects. One way in which mercury reaches the environment occurs when coal is burned through combustion to produce electricity. Once mercury is in the air, it can become incorporated into the water cycle and ingested by aquatic animals including fish. Although humans can be exposed to mercury in several ways, the most prominent path is through the ingestion of mercury contaminated fish.<sup>1</sup>

Ingesting high levels of mercury can pose toxic effects on any of the human systems, including the heart, lungs, and immune system.<sup>2</sup> The system most severely affected by mercury is the neurological system.<sup>3</sup> Therefore, the developing brains of fetuses and small children are particularly vulnerable to the toxic effects of mercury.<sup>4</sup> It is estimated that one in six women of child-bearing age in the United States have unsafe levels of mercury in their blood.<sup>5</sup> Women's mercury contamination is of particular interest since mercury can be passed from mothers to fetuses through the umbilical cord during pregnancy. Using data from the Centers for Disease Control and Prevention, one study found that, annually, between 316,588 and 627,233 newborn babies have high umbilical cord blood mercury levels that are correlated to loss of intelligence quotient points.<sup>6,7</sup>

The *Mercury Emission Act of 2005* was introduced to address the impacts of mercury pollution in the United States (U.S.). The Act seeks to dramatically reduce the emission of mercury; specifically, it proposes a 90% reduction of 1999 levels—66 tons—by the year 2009. While several human-caused sources of mercury emissions exist, by far the largest emitter of mercury in the U.S. is the coal-fired power plant industry.<sup>8</sup> Mercury sources from coal-fired power plants are addressed under Section 3 of the Act, which establishes annual mercury emission standards of 2.48 grams of mercury per 1,000 megawatt-hours for each coal-fired power plant and 5 tons of mercury nationally.

On May 31, 2005, ten Columbia University graduate students launched Hg Control Specialists, Incorporated (HCS), a management consultant company, to assist in the implementation of the Mercury Emission Act of 2005. HCS was contracted by the Environmental Protection Agency (EPA) to provide recommendations on how best to reduce mercury air emissions from coal-fired electric utilities. To ensure the timely accomplishment of the goals established within the Act, HCS has provided a staffing plan, budget, and master calendar to the EPA for implementation during the first year. The Act requires that all rules, processes, and operational support needed to begin mercury reductions are in place by December 31, 2006 for all participating agencies. HCS has designed the following implementation plan, which allows the Mercury Program's immediate integration into the EPA's existing organizational structure.

## ***Scientific Basis for Intervention***

While it has long been recognized that mercury is a toxic pollutant, large quantities of mercury continue to be released into the environment and the negative health impacts of such emissions penetrate nearly every community in the United States. In 2000, a report entitled the “Toxicological Effects of Methylmercury,” was submitted to Congress by the National Academy of Sciences. This report detailed the primary health effects of mercury compounds in the environment. The toxicity of mercury can cause a wide range of symptoms including nausea, vomiting, lack of appetite, weight loss, abdominal pain, kidney failure, skin burns, respiratory disease, swollen gums, mouth sores, drooling, numbness and tingling in lips, mouth, tongue, hands and feet, tremors and incoordination, vision and hearing loss, memory loss, personality changes and headache.<sup>9</sup> Low doses may even effect a child’s development, delaying walking and talking, shortening attention span and causing learning disabilities.<sup>10</sup> Early exposure has considerable effects and can result in mental retardation, cerebral palsy, seizures, deafness and blindness.<sup>11</sup> The most common route of child exposure occurs in the fetus when the mother ingests large amounts of fish and shellfish contaminated with mercury. The developing brains of fetuses and young children are more vulnerable to the negative impacts of mercury than adult systems, therefore pregnant women, women of childbearing age, and children, as well as people who subsist primarily on fish, are particularly at risk for mercury related health impacts.<sup>12</sup>

The prevalence and magnitude of mercury pollution in the U.S. is evident in studies by the U.S. the EPA. This research concludes that at least 32% of lakes and 20% of rivers are contaminated with mercury.<sup>13, 14</sup> Annually, approximately 117 tons of mercury are emitted into the air in the U.S. from a variety of sources:

- fossil fuel-fired electricity generating units,
- commercial and industrial boiler units,
- solid waste incineration units,
- medical waste incinerators,
- hazardous waste combustors,
- chlor-alkali plants, and
- Portland cement plants.<sup>15</sup>

Mercury pollution is a serious problem in the U.S. that must be addressed. As Senator Patrick Leahy (D-Vermont) stated in 2005, “we have known about mercury pollution for decades, and it remains one of, if not the last, major toxic pollutant without a comprehensive plan to control its release. We know where the sources of mercury pollution are, we know where the pollution deposits, and we definitely know what harm it causes to people and to wildlife.”<sup>16</sup> For this reason, he and Senator Olympia Snowe introduced S.730, the *Mercury Emission Act of 2005*, to the U.S. Senate.

## *Legislative Summary*

### **Purpose of S.730: The Mercury Emission Act of 2005**

President Bush and Congress have both proposed plans for reducing mercury levels in the environment, but political leaders have yet to build a consensus about regulatory or policy approaches for how best to control mercury. Following a regulatory proposal by the Bush Administration in March of 2005, Senators Leahy and Snowe offered S.730 as an alternative policy to protect the health of populations at risk to mercury pollution.<sup>17</sup> S.730 proposes to amend the Clean Air Act (CAA) to add mercury to its regulatory structure and include emission requirements for major anthropogenic sources of mercury.<sup>18</sup>

S.730 will reduce the amount of mercury entering the air by 90% of 1999 levels by 2009 by establishing specific mercury emission criteria for the 5 major sources of mercury emissions as stated previously. As per the request of the EPA, the remainder of this report focuses on regulating coal-fired power plants.

### **Supporters and Political Power behind S.730**

Because their bill stands as stark opposition to the cap and trade approach favored by the Bush Administration and its allies in Congress, Senators Leahy and Snowe capitalized on existing political power to enact S.730. Political power can be manifested as constituent support, support from national membership organizations, effectiveness in lobbying other members of congress, or from expertise and experience in specific issues.

In the past, Senators Leahy and Snowe have consistently been on the forefront of regulating mercury emissions. Senator Leahy has been a leading figure in Congress for the reduction of mercury in the Nation's environment. Though Leahy's home state of Vermont has no major sources of mercury, the state has been consistently issued advisories against fish consumption due to high mercury levels in its waterways and lakes from cross-boundary pollutants.<sup>19</sup> Senator Olympia Snowe's (R-ME) home state is also one of the Northeast states consistently plagued by mercury advisories for its many waterways and lakes.<sup>20</sup> Consistent mercury advisories increased constituent support for the reform of existing laws regarding mercury, which enabled Senators Leahy and Snowe to use their positions in the U.S. Senate to tackle the issue.

In addition to being backed by two prominent senators, mercury control policy appears to have broad-based political support nationwide. One reason is that mercury pollution and advisories affect not only the Northeast, but the nation as a whole. As of 2004, 48 states had issued health advisories regarding the consumption of mercury contaminated fish.<sup>21</sup> Though individual states have taken steps to reduce mercury pollution, mercury contamination remains a nationwide problem, with cross-boundary effects.<sup>22</sup> This breadth has led many non-governmental organizations to consider the issue of mercury as a significant organizational priority and to seek out ways by which the federal government could protect citizens from mercury pollution. Although S.730 did not have co-sponsors, the political power derived from constituent backing of national citizen action groups was significant. Major supporters included the Sierra Club, the Natural Resource Defense Council, Friends of the Earth, the Commission for Environmental Cooperation, Earth Justice, and the League of Conservation Voters.

Interest groups and stakeholders leveraged their political power to support mercury control in S.730 in several ways, such as filing lawsuits against the government and lobbying on behalf of legislation like S.730. For example, Earth Justice, along with other environmental groups, sued the EPA over its proposed Clean Air Mercury Rule, seeking to reverse a number of its more controversial decisions such as the inclusion of a cap and trade program.<sup>23</sup> Other groups supporting strong mercury reductions include the American Medical Association who joined with other national health organizations, including the American Public Health Organization, the American Nurses Association and the American Academy of Pediatrics, in July of 2005 to sue the EPA over the Clean Air Mercury Rule, saying it failed to meet the standards of the CAA in the goal of protecting public health.<sup>24</sup> Appendix A describes the mechanisms of the Clean Air Mercury Rule.

Additionally, Leahy and Snowe derived political power from various state agencies whereby State Environmental Protection officials were calling for a repeal of the proposed rules and had requested stricter standards such as those put forth in S.730. For example, in March 2005, Attorneys General from 11 states filed suit against the EPA. The states argued that the cap and trade system of reducing mercury emissions would delay reductions and “perpetuate hot spots of local mercury deposition posing a grave threat to the health of children.”<sup>25</sup>

### **Regulating Fossil Fuel-Fired Electricity generating Units**

The most significant reduction of mercury entering the environment will be accomplished through the regulation of mercury emissions from fossil fuel-fired electricity generating units, which are regulated in Section 3 of the Act. Fossil fuel-fired electricity generating units are the largest source of mercury emissions in the U.S., responsible for the emission of nearly 49 tons of mercury in 1999.<sup>26</sup> S.730 directs the Administrator of the EPA to establish a national emissions limitation for fossil fuel-fired electricity generating facilities. By 2009, the national emissions limitation for each facility must be equal to or less than 2.48 grams of mercury per 1,000 megawatt-hours. This emissions standard is the same for both existing and new facilities, as well as facilities burning different types of coal. The electricity generating facilities will achieve these reductions by employing maximum available control technologies in accordance with the CAA.<sup>27</sup>

The total of the emissions from every facility may not exceed a national emissions level of 5 tons by 2010.<sup>28</sup> On 1 April of every year, the Administrator will review the total mercury emissions from the previous two years and determine whether the sum of mercury emissions from all facilities in the U.S. exceeded the national limitation of 5 tons.<sup>29</sup> If the sum of emissions from all facilities exceeds the national total, the Administrator must revise the published emissions criteria for each facility so that the national emissions level is met.<sup>30</sup>

### **Regulatory Structure and Statutes of S.730**

Mercury pollution is currently addressed by various laws including the CAA, the Clean Water Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act.<sup>31</sup> Whereas these existing laws do not provide a single standardized method to measure and reduce mercury emissions, S.730 endeavors to amend the CAA in order to standardize the regulatory process of reducing emissions, creating a uniform rule to reduce national mercury across the coal-fired utility industry. This standardized approach mandates uniform emission limitations that necessitate the use of maximum available control technologies. This method contrasts with market-based emissions trading programs (such as those used to control sulfur dioxide emissions

from coal-fired utilities), which establish a ‘budget’ of emissions to achieve a national standard whereby facilities can buy and sell permits according to their emission levels.<sup>32</sup> Under this model, facilities can emit different amounts of mercury while simultaneously achieving an overall national emission goal. S.730 contrasts with the emissions trading approach by requiring uniform emission rates across the country, thus avoiding the possibility of regional clustering of mercury levels. Alternative options for mercury regulation and a more in-depth description of maximum control technologies can be found in Appendix A.

The role of promulgating compliance rules for the utility industry to follow as well as enforcement of the standards put forward by S.730 falls under the authority of Administrator to the EPA. Yet, the Act recognizes that the EPA may need to coordinate its implementation efforts with other administrative agencies, particularly for the enforcement and compliance of the new mercury rules.

### **Political, Ideological, and Administrative Opposition to S.730**

While there are many supporters of using an emissions standard to control mercury and the time frame for implementing them as outlined in S.730, others opposed the Act, instead favoring the Bush Administration’s Clear Skies Initiative or the EPA’s Clean Air Mercury Rule. These proposals used a market-based emissions trading program and spread emissions reductions out over a period of 10 or more years. Senators Voinovich and Inhofe were the chief proponents of the Administration’s Clear Skies Initiative and had introduced S.131, the *Clear Skies Act of 2005* into the U.S. Senate in January 2005. As members of the Environment and Public Works Committee, which held both S.131 and S.730, Voinovich and Inhofe had significant power and influence over the guidelines and regulation of mercury emissions. Furthermore, Senator Inhofe currently chairs this Committee while Senator Voinovich chairs the Clean Air, Climate Change and Nuclear Safety subcommittee.

Senator Inhofe was skeptical whether emission reduction technology exists to reach the targets set by S.730. Inhofe cited a study conducted by the Federal Energy Information Administration (EIA) and claimed that “to regulate mercury by 90% by 2008 would lead to a 26% increase in natural gas prices and a 22% increase in electricity prices by 2010.”<sup>33</sup> Indeed, the EIA study concludes that if no control technologies exist to reduce flue gas emissions of mercury by the 2008 deadline, then plants will be forced to either convert to natural gas or use coal with lower mercury content in order to meet stricter standards, thereby raising prices for consumers.<sup>134</sup>

Furthermore, some leading conservative thinkers, such as Joel Schwartz at the American Enterprise Institute, were reluctant to believe the importance of regulating mercury emissions and were hesitant to embrace even the EPA’s Clean Air Mercury Rule.<sup>35,36</sup> Fact sheets circulated by the Heritage Foundation around the time of the 2004 Presidential election asserted

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<sup>1</sup> The same EIA study also looked at three other scenarios not mentioned by Inhofe, for four scenarios total. In the other three scenarios, AEI presumed that mercury-reduction technologies would be able to meet the uniform emissions standards by 2008. Under these three scenarios, AEI did not expect large changes in the fuel-types used in electricity generation or associated increases in electricity prices to consumers.<sup>1</sup> The evidence presented in “S.730, The Mercury Emission Act of 2005” by the Mercury Workshop Group from Columbia University also suggests that Activated Carbon Injection control technologies are the most promising for reducing mercury emissions and could indeed be built onto existing electrical generating structures by 2008.<sup>1</sup>

that the cap and trade approach of the Clear Skies Act and the Clean Air Mercury Rule was the preferred route of emission reduction strategies.<sup>37</sup>

A final complaint voiced by industry and economists alike is that the establishment of a 5 ton national cap on mercury emissions may inhibit the construction of future coal-fired electricity generating facilities. The reasoning is as follows: if power plants nationwide are reaching or exceeding their 2.48 grams of mercury per 1,000 megawatt-hour requirement, which would meet the nation's 5 ton per year cap, then the addition of even one coal-fired facility anywhere in the country, even if it was using the most effective method of mercury reduction technology, would lead to an excess of the national cap on emissions set by S.730. The effective result would encourage policy-makers and energy firms to either a) phase out old power plants that cost more to operate when needing to build new power plants or b) build power stations based on natural gas, nuclear power, or coal-gassification. Either outcome would mean an effective end to the addition of new coal-fired power plants for this nation's energy system.

Although Senators Leahy and Snowe faced opposition, their support of S.730 led to its passage and the increased protection of public and environmental health. The EPA, given the responsibility of implementing S.730, contracted Hg Control Specialists to design the Mercury Program, which we turn to next.

## ***Program Design***

### **Rulemaking**

The *Mercury Emission Act of 2005* mandates that no later than one year following its enactment, the Administrator of the EPA must promulgate regulations to establish mercury air emission limitations for coal-fired electricity generating facilities. The Action Development Process (ADP), which is the process of promulgating these regulations, is required by the EPA as described in “EPA’s Action Development Process: Guidance for EPA Staff on Developing Quality Actions.”<sup>38</sup> The ADP is necessary in order to develop regulations for implementing the emission standards set by the Act and ensures that the EPA uses quality information in the formation of its regulations. The ADP requires that regulations must be supported by high quality information and adequate consideration of scientific, economic, and policy issues and must have several characteristics including:

- Achieving cost-effective environmental objectives;
- Remaining consistent with legal requirements as well as executive orders, directives, Agency guidance, and national policies;
- Involving EPA-wide participation from offices with cross-cutting responsibilities;
- Taking into consideration views outside the EPA, such as the Department of Energy (DOE), states, local governments, and industries;
- Considering multimedia impacts;
- Relying on sound analyses of economic, scientific, legal, policy, and technical issues;
- Establishing efficient implementation and enforcement;
- Using clear and concise language; and
- Following a determined timeline.

### ***Key Players in the ADP***

There are several groups which work together to develop actions and each one is responsible for various aspects of the ADP. Hg Control Specialists, Inc. reports directly to the Mercury Regulatory Steering Committee (MRSC), which is comprised of upper management personnel in the EPA’s Office of Air and Radiation, Office of Policy, Economic, and Innovations, and Office of Research and Development. The MRSC’s major responsibilities include:

- Overseeing the ADP;
- Implementing the tiering process;
- Developing the guidance and information needed to implement the ADP;
- Ensuring that promulgated regulations from the Act comply with existing statutes and executive orders requirements; and
- Ensuring that cross-program process issues are resolved or referred to management.

### ***Stages of the ADP***

To promulgate regulations from the Mercury Emission Act, the ADP employs four major stages (Appendix B, Section 1):

1. Tiering the action, which means ranking the options and choosing a process for forming the action,
2. Developing the proposed or draft action,

3. Requesting the Administrator’s signature and the publication of the action, and
4. Developing the final action and ensuring Congressional review.

This process does not allow the EPA much flexibility in promulgating such regulations; however, the Agency will have flexibility as to how power plants can reach and monitor mercury reduction levels. In addition, the EPA and individual states will be able to determine how these plants must submit mercury emission data and how to properly enforce such levels.

To ensure all guidelines are handled in a timely manner throughout the first year, the key tasks, which are necessary for the rulemaking stage, include:

<b>Key Task</b>	<b>Start Date</b>	<b>Completion Date</b>
Tiering the action	Complete	Complete
Scoping period prior to Rulemaking	January 3	February 1
Drafting of rules	February 2	June 1
Midyear Review	June 2	June 2
Draft of rules released to public for comment	June 29	July 28
Drafting of final version of rules	July 17	November 1
Development of draft action	January 15	August 1
Comment period for draft of final rules	August 2	September 1
Acquire Administrator signature	November 1	December 1
Final rules published	November 1	December 29
Final rules approved by Congress	December 20	December 20
Final rules approved by President	December 21	December 21
Final rules written as official EPA rules	December 29	December 29

## **Technologies to Reduce Mercury**

### *Existing Technologies*

According to the Act, the EPA Administrator will require Maximum Available Control Technology (MACT) standards to achieve the predetermined federal emission criteria for each coal-fired power plant facility. Since the Act does not specify MACT standards, the standards will continue to be developed as mercury control technologies improve and markets responds to the initial mercury air emission regulations.

Currently, many different pollution control technologies exist. In various combinations, multi-emission control technologies and mercury specific control technologies can achieve up to 90% reductions in mercury emissions, depending on the facility’s configuration and the type of coal being burned. The following control technologies can be used to prevent the release of mercury:

Existing multi-emission control technologies:

- *Fabric filters* (FFs) are traditionally used to capture particulate matter (PM) and can therefore capture oxidized mercury bound to PM.<sup>39</sup>
- *Electrostatic precipitators* (ESPs) are traditionally used to capture PM and can therefore capture oxidized mercury bound to PM.<sup>40</sup>
- *Particle scrubbers* (PS) are traditionally used to capture PM and can therefore capture oxidized mercury bound to PM.<sup>41</sup>

- *Spray dryer (SD)* is a technology used in conjunction with ESPs or FFs to capture PM and is typically used in smaller coal-fired electricity generating units.<sup>42, 43</sup>
- *Selective catalytic reduction (SCR)* is a technology traditionally used to reduce nitrous oxide emissions. SCR can also be used to oxidize elemental forms of mercury into the ionic form, which binds more easily with sulfides and PM. These compounds can then be captured by FFs or ESPs.<sup>44</sup>
- *Water-based flue gas de-sulfurization scrubbers (wet – FGDs)* are traditionally used to capture sulfur dioxide, but can also capture oxidized mercury, which bonds with sulfides at certain temperatures.<sup>45</sup> Since wet-FGDs capture mercury bound to sulfides, this technology is not as effective at capturing mercury at facilities that burn coal with a low sulfur content. Wet-FGDs are also not able to recover elemental forms of mercury present in coal, because this form of mercury does not bind to sulfides. Therefore, this technology is most effective at capturing mercury in larger coal-fired electricity generating units, burning high-sulfur coal.<sup>46</sup>

Mercury-specific technology:

- *Activated Carbon Injection (ACI)* is a process wherein carbon is injected into the flue gasses and binds with vaporous mercury, which can then be captured in the FFs or ESPs.<sup>47</sup>

#### *Technology Standards*

Research has determined that different existing configurations of technologies have differing effectiveness for facilities burning different types of coal. Therefore, no one set of technologies can be recommended for all coal-fired electricity generating facilities strictly based on performance. In addition, since the EPA, Electric Power Research Institute (EPRI), and the DOE are all pursuing research and development on these technologies, it is expected that greater reductions will be achievable within the next few years.

In regards to the promulgation of technology standards, HCS recommends that the EPA Administrator allow facilities to pick their own technology configurations, based on what existing pollution controls have already been installed while requiring specific emission targets. Within this option, the Administrator can set industry-wide targets or specify different emission targets for different fuel types. For instance, the Administrator can choose to require facilities burning bituminous coal to meet the emission limitations outlined by the Act, but specify different reduction levels for facilities burning sub-bituminous and lignite coal which need to be met each year until 90% reductions of are achieved, i.e. by the year 2009. An advantage to this option is that this allows facilities more flexibility, which will lead to greater cost effectiveness.<sup>48</sup> However, the flexibility could produce variations in mercury emissions and uncertainties regarding actual emission levels.

#### *Costs of Control Technologies*

From existing data on various control technologies of mercury air emissions, the major observations are as follows:<sup>49</sup>

1. Small facilities will face different costs compared to larger facilities.

2. Facilities burning lower ranking coal will experience greater costs in the short run since existing pollution control technologies are more effective at capturing mercury that is bound to the sulfides present in greater quantities in higher ranking coals.
3. Facilities with different configurations of existing technologies for sulfur dioxide, nitrous oxides, and particulate matter will face different costs.
4. Costs will decrease over time as technology develops in response to the newly promulgated reduction standards.

Cost estimates for installing additional mercury specific controls that can achieve reductions of 80% to 90% for facilities burning bituminous coal have been conducted by the EPA. However, cost estimates for facilities burning lower ranking coal have not been provided since these facilities are not able to achieve reductions of 90% with many of the existing technology configurations. Therefore, more research needs to be conducted on additional controls for these facilities.

Most of the costs associated with additional control technologies can be attributed to the installation of Continuous Emissions Monitors (CEMS), which are devices used to monitor mercury emissions. As CEMS will likely be required for monitoring mercury emissions, no matter what technological configurations are employed to achieve the mandated emissions limitations, the costs of CEMS will likely be unavoidable. However, the costs associated with CEMS, Activated Carbon Injection Systems, and other new mercury specific technologies are likely to decrease as technology continues to develop.

#### *Options for Further Research on Technologies*

While national reductions of 50% to 70% of mercury emissions are currently achievable with existing mercury specific and non-mercury specific technologies, research is still needed to evaluate the long-term effectiveness of these technologies and to increase mercury emissions reduction capability to 90%.<sup>50</sup> Research should also focus on increasing mercury control from burning low ranking coals such as sub-bituminous and lignite coals.

HCS has recommended that ACI technology be selected to ensure a mercury emission reduction. Once the research and development of such technologies have been conducted and are in place at coal-fired power plants, proper monitoring, reporting, and enforcement are needed to ensure that the allowance of mercury air emissions is not exceeded.

The EPA will publish a finalized list of approved technology every six months. Each month, the Quality and Standards Coordinator will submit a draft list of approved technology to be approved and finalized twice a year. The list will be published and distributed to all affected facilities and states. There are four main deadlines, which occur during the technology stage, which are outlined below:

Key Task	Start Date	Completion Date
DOE, EPA, and EPRI establish Memorandum of Understanding to clarify roles and responsibilities of organizations	January 2	February 2
Mid-year release of approved technology	July 3	July 27
End-year release of approved technology	December 4	December 29

In coordination with these key dates, other meetings and tasks will take place. Within the technology phase, such tasks include:

- Monthly meetings with the DOE and EPRI,
- Monthly coordination meetings between the different employees of the MRSC to ensure understanding, integration and compliance with approved technology,
- Monthly production of a draft list of available currently approved technology,
- Written progress report and current list presented to MRSC at bi-weekly meeting,
- Written report and memo submitted to the Program Director bi-weekly.

## Monitoring

### *Existing Mercury Monitoring Technologies*

The *Mercury Emission Act of 2005* necessitates the analysis of mercury emissions with technical control mechanisms that can proficiently measure the volume of mercury being emitted by coal-fired power plants. Currently, the four following technologies exist and are used to measure and evaluate the contents of air emissions:

- The EPA has verified nine Continuous Emissions Monitors through the Environmental Verification Technology program.<sup>51</sup> These monitoring systems differ in their capacity to analyze different types of mercury and in their completeness of data.<sup>52</sup> CEMs directly sample flue gases and measure the mercury composition of the sample.
- Recommended by the U.S. Occupational Safety and Health Administration, dosimeters evaluate ambient mercury levels.<sup>53</sup> Passive dosimeters measure the concentration or volume of gaseous mercury.
- Massachusetts and several other states utilize their own protocols for mercury monitoring.<sup>54</sup> The collection of volatile organic compounds is one such method. These processes employ gold annual denuders, activated carbon, or gold-coated sand adsorbent traps.<sup>55</sup>
- Gold traps collect mercury from the air; however, the samples must be treated prior to analysis. This technology is highly susceptible to error, as it is vulnerable to improper calibration and low collection efficiency.<sup>56</sup>

### *Current Monitoring Process*

Under the Acid Rain Program, which monitors sulfur dioxide, nitrous oxides, and carbon dioxide, the EPA has established guidelines for self-reporting using CEMs.<sup>57</sup> The Acid Rain Program necessitates that CEMs must be certified before use and that a facility's owner or operator must electronically submit the following:

- Monitoring plans,
- Written notifications of monitoring certification tests,
- Report of certification test results in a “certification application,”
- Recording and maintenance of hourly emissions data, flow data, and other information, and
- Quarterly reports of emissions, flow, unit operation, and monitoring performance data.<sup>58</sup>

#### *Economic Impacts from Monitoring*

CEM technology is quite costly due to installation costs and the technological expertise necessary for the maintenance and repair of systems.<sup>59</sup> In many cases, facilities must construct additional structures to protect the quality of emission analyses.<sup>60</sup> Such measures produce installation costs of more than \$200,000.00 per sample.<sup>61</sup>

One method of decreasing the expenditures related to CEMs is to employ fuel cell technologies, which can reduce costs by more than 30%.<sup>62</sup> Fuel cell CEMs have a smaller size and a simpler construction than traditional CEMs.<sup>63</sup> As a result, facilities would incur lower labor and installation costs because fuel cell CEMs require less technological expertise and less space. Another way of decreasing cost is to utilize CEMs with weaker or less accurate calibration gases, as these systems cost less than CEMs with premium calibration gases.<sup>64, 65</sup> These calibration gases can still analyze the mercury content of emissions, however, they are imprecise and less reliable. Notably, many electricity-generating facilities already utilize CEMs. Existing CEMs diminish the economic impact of the Act, as some facilities will not have to install new systems.

#### *Environmental Effects from Monitoring Failures*

The failure of CEMs to assess the emission of mercury could endanger the success of the Act. Emission reductions would be optimistic estimates, considering that the amount of mercury escaping from control technologies could not be quantified. The un-captured mercury would continue to contaminate ecological systems, resulting in neurotoxin damage to wildlife and humans.

#### *Options for Monitoring Emissions*

In regards to the promulgation of monitoring and reporting regulations, HCS recommends that the EPA Administrator select the option of adding mercury to the group of pollutants regulated under the Acid Rain Program. A continuation of the current method of monitoring will conserve staff hours, funding, and other resources related to compliance and enforcement. With the implementation of the Act, the EPA needs electricity output data in addition to emissions data to compute compliance in accordance with Section 3.3.A.<sup>66</sup> Facilities can submit these records with the information and flow data that is part of the Acid Rain Program. A utilization of the self-reporting system established under the Acid Rain Program with addition of mercury as a contaminant will reduce time and effort spent setting up a program. However, a disadvantage to this program is that it relies on the honesty of facilities to accurately report mercury emissions.

Section 3 of the Act frequently refers to the total mercury emissions from electricity generating facilities. In order to ascertain total emissions, the only monitoring technology available is Continuous Emissions Monitors (CEMs). This technology supplants other monitoring methods such as dosimeters and absorbent traps because measurements are sampled continuously. Thus,

the total emissions calculated by the facility will be more representative of actual emissions. Dosimeters and other monitoring technologies are incapable of constantly recording measurements to generate a total amount of emissions. Thus, these systems cannot ascertain compliance with the Act and cannot be utilized for the monitoring of mercury emissions.

Given that facilities can emit mercury in its elemental and ionic forms, bonded onto particles, and within compounds, the inability to measure different forms of mercury remains a concern for the success of the Act.<sup>67</sup> If technology cannot accurately evaluate the mercury output of facilities, then estimates of mercury reductions will not be reliable or indicative of the effectiveness of the Act.

To ensure all guidelines are handled in a timely manner throughout the first year, the key tasks, which are necessary for the monitoring and reporting stage, include:

Key Tasks	Start Date	Completion Date
MRSC will have contacted the TRI and ECHO coordinators for adding mercury into existing databases	January 3	March 15
Draft of Letter of Intent for monitoring and reporting for internal review	March 15	28-Jun
Comment period on draft of Letter of Intent	July 3	August 7
Letter of Intent to states and power plants with guidelines and regulations for monitoring and reporting	June 28	December 29

## Reporting and Enforcement of Mercury Emissions

### *Existing Required Methods*

The EPA's Toxic Release Program facilitates several acts already in place to assist in the reduction of mercury emissions.<sup>68</sup> The federal government has strict guidelines that must be followed by each facility; however, states may require more stringent guidelines. The facilities report to each state and the states submit final documentation to the EPA.<sup>69</sup>

These regulations are enforced on state and federal government levels. The states are required by law to turn findings over to the EPA depending on the enforcing Act's requirements. Most states forward all compliance or noncompliance information in the form of Legislative Reports to the EPA collection division every year or a double report every two years.<sup>70</sup> Every three years, the EPA's Reporting for Enforcement and Compliance Assurance Priorities (RECAP) or the state's governing agency performs inspections on active facilities and reports findings to an EPA coordinator who incorporates the data into the EPA's Enforcement and Compliance History Online (ECHO) database.<sup>71</sup>

If a facility does not meet federal or state permit regulations during the year or during a compliance inspection, permit violations will be filed and fines may be incurred.<sup>72</sup> These permits are generated by each act and are required of all active facilities. If a violation is reported during an inspection, an enforcement case report is generated for documentation. The report entails data about the offense, a total compliance action cost that may be generated and

demanded of the facility, and any fines incurred. All fines are paid to the enforcing federal or state government.

*Current State Roles*

Many U.S. states require their own mercury emissions tracking and reporting and may have stricter facility requirements than stipulated by the EPA. Certain states such as New York, Alabama, and Minnesota monitor the air for quality and various pollutants such as nitrogen oxides, sulfur dioxide, ozone, carbon dioxide, lead, and other particulate matter, as well as mercury.<sup>73</sup> Under the National Air Monitoring Network, New York’s Bureau of Air Quality Surveillance continuously or periodically monitors and keeps an hourly log of air quality readings each day.<sup>74</sup> These readings are recorded for further analysis and are peer-reviewed before approval. Minnesota requires each facility to comply and submit an annual Air Emission Inventory Report for certification.<sup>75</sup> These reports are submitted to the EPA each year.

*Selected Option for Reporting and Enforcement*

The EPA is organized around environmental media; therefore, the Mercury Program will be organized by separation among air and water divisions.<sup>76</sup> The EPA has a well-documented facility report for the entire country. Coal-fired power plants fall under the air section and will be regulated within the requirements mandated by the Act. In regards to the promulgation of compliance and enforcement regulations, HCS recommends that the Administrator select the option of states reporting directly to the EPA, who in turn will closely monitor the program.

The Act requires monthly reports from the facilities to the states and the states will report annually to the EPA. Once the states receive documentation from each facility, they will be required to peer-review the data for accuracy before monthly implementation into a state operated electronic database connected to ECHO. This connection will alleviate both agencies’ input of data and will give the EPA direct access to all information at any given time. The state and federal information technology specialists and regional program coordinators will be in direct contact to ensure compliance with all reporting.

The states will compile all data annually for submission to the EPA Mercury Program Director for review. Each state will be required to compile a semi-annual report to the Mercury Program Coordinator on any violations and fines occurring within any facility. All fines will be divided between the EPA and each state for program funding purposes. EPA regional agents will monitor all facilities with regulation violations for a six-month period to ensure standards compliance. The respective state’s agency inspection officers will closely monitor all other facilities every three months. Fines will increase for each infraction within a one-year period and be divided among the state and the EPA. Many advantages to this selection include greater cooperation and division of labor between the state and the EPA, with the EPA controlling all problem sites. However, the EPA will have to rely on the states to strictly follow all guidelines.

To ensure all guidelines are handled in a timely manner throughout the first year, the key tasks, which are necessary for the compliance and enforcement stage, include:

<b>Key Tasks</b>	<b>Start Date</b>	<b>Completion Date</b>
MRSC will have contacted the TRI and ECHO coordinators for adding mercury into existing	January 3	March 15

databases		
Draft of Letter of Intent for compliance and enforcement for internal review	March 1	November 1
Comment period on draft of Letter of Intent	July 3	August 7
Letter of Intent submitted to states and power plants with guidelines and regulations for compliance and enforcement	March 1	December 29

### Policy Design Summary

In assessing each of the Mercury Program elements outlined above, Hg Control Specialists, Inc., in conjunction with the EPA, has determined the best course of action to ensure compliance with standards set by the *Mercury Emission Act of 2005*. Appendix C reviews the options analysis that HCS utilized. The selected program design seeks to maximize the cost effectiveness, administrative feasibility, and political support of this program. To achieve the reduced mercury emission levels of 2.48 grams of mercury per 1,000 megawatt-hours starting in 2009, HCS recommends the following four-step program:

1. Rulemaking, which includes four key sub-tasks:
  - a. Tiering the action,
  - b. Developing the draft action,
  - c. Requesting the EPA Administrator's signature and publishing the draft action, and
  - d. Developing the final action and ensuring Congressional review;
2. Technology, which includes a list of approved technologies which power plants may use to meet mercury emission reduction levels as determined in the Act;
3. Monitoring and reporting, this involves the development of requirements for how power plants, states, and the EPA will co-ordinate such activities; and
4. Compliance and enforcement, where the EPA will establish guidelines for plants to ensure mercury reductions are achieved.

Below is an integrated list of first year activities designed by HCS for all areas of the Program Design.

<b>Key Tasks</b>	<b>Start Date</b>	<b>Completion Date</b>
Tiering the action	Complete	Complete
Scoping period prior to Rulemaking	January 3	February 1
Work plan for cooperative agreement created by Liaison and Policy Analyst	January 3	February 1
MRSC will have contacted the TRI and ECHO coordinators for adding mercury into existing databases	January 3	March 15
Comment period on draft of Letter of Intent	July 3	August 7
Drafting of rules	February 2	June 1
Cooperative agreement funds sent to the Environmental Council of the States	March 1	March 1
MRSC will have contacted the TRI and ECHO coordinators for adding mercury into existing databases	March 1	March 15
Letter of Intent submitted to states and power plants with guidelines and regulations for compliance and enforcement	March 1	December 29
Draft of Letter of Intent for monitoring and reporting for internal review	March 15	June 28
Midyear Review	June 2	June 2
Letter of Intent to states and power plants with guidelines and regulations for monitoring and reporting	June 28	December 29
Draft of rules released to public for comment	June 29	July 28
Comment period on draft of Letter of Intent	July 3	August 7
Drafting of final version of rules	July 17	November 1
Development of draft action	January 15	August 1
Comment period for draft of final rules	August 2	September 1
Acquire Administrator signature	November 1	December 1
Final rules published	November 1	December 29
Final rules approved by Congress	December 20	December 20
Final rules approved by President	December 21	December 21
Final rules written as official EPA rules	December 29	December 29

To achieve the necessary reductions, the EPA will further promulgate rules during the first year. To complete the rulemaking process, facilitate technology research and prepare for monitoring and enforcement, an organizational and staffing plan, a budget, a performance management scheme, and a master calendar will be needed for the first year.

## ***Organizational and Staffing Plan***

Currently, there is no administrative organization that regulates mercury air emissions; therefore Hg Control Specialists, Inc. recommends the creation of a Mercury Regulatory Steering Committee (MRSC), which will be made up of five new full-time equivalent positions and one full-time temporary intern in the EPA's Office of Air and Radiation (OAR).<sup>77</sup> Figure 3 of Appendix D shows the recommended structure for employees in the MRSC. The MRSC will structure the Mercury Program similar to the EPA's existing Acid Rain Program. Additionally, the MRSC will be in charge of coordinating and overseeing the Mercury Workgroup, which will be made up of employees located throughout the entire EPA who will dedicate a small percent of their time—less than 25%—to develop the Mercury Program. These employees will devote less than one-fourth of their working hours to the Workgroup because the Workgroup will require minimal involvement of EPA employees that currently work on mercury issues. Also, the expansion of an existing cooperative agreement with an inter-state non-governmental organization will be necessary to help disseminate information to states and coal-fired power plants regarding the Mercury Emission Act.

This organizational plan creates a structural network to establish coordination and communication between various offices within the EPA. The MRSC will be housed in the OAR. Within the OAR, existing offices and divisions will help integrate the new Mercury Program with other atmospheric programs. Due to their existing in-house experience, Hg Control Specialists, Inc. recommends that the EPA utilize resources already available instead of contracting any work outside the Agency. Under the proposed organizational plan, the OAR will experience minimal reorganization and will not have any significant structural change.

### **Adapting the EPA's Existing Structure**

The EPA is currently organized into various Assistant Administration offices by environmental media, such as air, water, and land, as well as topical offices, such as enforcement and information exchange.<sup>78</sup> Figure 1 of Appendix D presents the EPA's existing structure of employees who work on mercury issues related to the Act. Since it focuses on mercury air emissions, the Office of Air and Radiation will house the Mercury Program. The OAR is currently divided into six main offices: Policy Analysis and Review, Program Management Operations, Air Quality Planning and Standards, Atmospheric Programs, Transportation and Air Quality, and Radiation and Indoor Air.<sup>79</sup>

### ***Acid Rain Program***

Located in the Office of Atmospheric Programs, the role of the EPA's Acid Rain Program will be expanded to utilize the structure and organization in existence for the regulation of sulfur dioxide and nitrous oxides.<sup>80</sup> The Acid Rain Program is divided among the regulation of three air emissions: carbon dioxide, sulfur dioxide, and nitrous oxides. While carbon dioxide and sulfur dioxide regulations measure total amounts of emissions from a facility and allow for trading between facilities to meet standards, nitrous oxides regulations measure the rate of emission from a facility and do not have a set standard or an established trading program. The mercury emission regulation will be based on nitrous oxides emission regulation. Mercury emission regulations will not utilize an emissions trading market and are focused on the emission rate and compliance by individual facilities, rather than a fixed cap of emissions from facilities. Like the nitrous oxides program, there will be a national emission cap that facilities must achieve

by 2009. This national cap will provide a milestone in regulations. If facilities are meeting rate emissions, but the nation is over the total cap, then the rate of emission will be lowered to comply with the national cap.<sup>81</sup>

There is no current organizational structure established to regulate mercury. For this reason, HCS proposes to utilize the enforcement, regulation, and compliance protocols already established through the Acid Rain program. Implementing the *Mercury Emission Act of 2005* will expand the Acid Rain program to include mercury.

#### *Policy Analysis and Communication*

The Policy Analysis and Communications Staff under the Office of Air Quality Planning and Standards (OAQPS) will assist in the analysis of the Act, as well as providing any communication needs, including press releases concerning mercury regulations and operations.<sup>82</sup> The Planning, Resources and Regional Management Staff will help coordinate between the central office of the EPA and the regional offices. In addition, this staff will aid in implementing rules and regulations while facilitating communication between state, local, and tribal program management systems, and providing support for program resources, budgets, contracts, and human resources.<sup>83</sup> Liaison positions between the facilities, states, and the EPA already exist under the Acid Rain Program through the Certification and Compliance Division. Therefore, the responsibility of the Certification and Compliance Division will expand to include monitoring of mercury emissions.<sup>84</sup>

The OAR currently has a cooperative agreement with the Environmental Council of the States (ECOS), which is a national non-profit, non-partisan association of state and territorial environmental agency leaders. Each state has one member that sits on the ECOS board. The EPA's existing cooperative agreement with ECOS may be utilized to increase states' involvement with and understanding of the Act.

#### *Standards and Regulation*

Next, the Emission Standards Division in the OAR will aid in establishing the national emissions standards and regulations pertaining to individual facilities, while the Air Quality Strategies and Standards Division will fulfill part of the research requirements of the new mercury emission standards.<sup>85, 86</sup> Both Divisions are under the OAQPS. The Information Transfer and Program Integration Division of the OAQPS will aid in education, outreach, and integrated implementation. It will also maintain permits and assist with the design, development, maintenance, and evaluation of information systems, hardware, software, and additional control information.<sup>87</sup> Maximum available control technology standards used to achieve the stipulated federal emissions criteria for each coal-fired power plant facility will be at the discretion of the Combustion Group of the Emissions Standards Division within the OAQPS.

#### **Proposed Staffing Plan**

The ADP is a multi-faceted job. Therefore, the Mercury Regulatory Steering Committee will establish the Mercury Workgroup to develop necessary actions for implementing the Mercury Emission Act of 2005. Figure 2 of Appendix D shows the location of EPA staff members that will make up the Workgroup. The Workgroup will periodically hold meetings and will have members from the following offices: OAR; Office of Policy, Economic, and Innovations; Office of Research and Development; Office of Prevention, Pesticides and Toxic Substances; Office of Environmental Information; and Office of Enforcement and Compliance Assurance.

Additionally, there will be representatives on the Workgroup from the following offices: Office of Prevention, Pesticides and Toxic Substances; Office of Environmental Information; and Office of Enforcement and Compliance Assurance. Table 1 in Appendix D lists all of the EPA offices where these existing employees are housed and which employees will be utilized to serve on the Workgroup.<sup>88</sup>

The major responsibilities of the Workgroup include: overseeing the ADP, implementing the tiering process, developing the guidance and information needed to implement the ADP, ensuring that promulgated regulations from the Act comply with existing statutes and executive orders requirements, and ensuring that cross-program process issues are resolved or referred to management. All of the existing staff throughout the Agency that will serve on the Workgroup will officially be based out of the EPA's headquarters office in Washington, D.C. and the regional laboratory, OAQPS, which is located in Research Triangle Park, North Carolina.

### **Organizational Structure**

The staffing plan will address aspects of promulgating rules, monitoring, reporting and enforcement. Upon the advice of HCS, the EPA has created a new position, the Mercury Program Director, under the OAR's Assistant Administrator to oversee the entire process of the creation of the Mercury Program and the Mercury Workgroup. The Director is responsible for working closely with the OAR's Assistant Administrator, who conducts oversight of agency air activities, including the development of national programs, technical policies, and regulations for air pollution control.<sup>89</sup> Training for members of the Workgroup will be necessary to enhance understanding and knowledge of mercury and mercury-related issues.<sup>90</sup> This training will be led by staff within the OAR and will be provided for full-time and select part-time employees. The training will facilitate a smoother transition for the establishment of new rules and regulations.

The OAR will serve as the primary location for employees that oversee the promulgation of rules. The six employees of the MRSC, all of whom will occupy new positions in the Agency, will be located in the OAR. These new employees will consist of five full-time equivalent (FTE) employees and one temporary intern. In Appendix D, Figure 3's organizational chart shows how the MRSC oversees the Workgroup.<sup>91</sup>

#### *Supervisory Environmental Protection Specialist, Director of the Mercury MRSC and the Mercury Workgroup, General Schedule (GS)-13*

The Director of the Workgroup will serve as one of the key spokespeople for the Agency on the Act. The Director, as a new FTE employee, will spend the majority of the first year on the rulemaking process. The supervisor will have the following duties:

- Define program objectives, priorities, and deadlines;
- Handle problems and deviations in the work assignment in accordance with instructions, policies, previous training, or accepted practices in the occupation;
- Direct the MRSC, which organizes the Workgroup;
- Coordinate, communicate, and transfer information among multiple offices within the OAR, the rest of the EPA, and other governmental organizations;
- Facilitate and conduct any trainings pertaining to mercury regulation for the MRSC and the Workgroup; and
- Travel once per month to conferences and meetings to communicate with involved parties regarding the EPA's recent efforts on reducing mercury through the Act.

*Environmental Protection Specialist, Mercury Liaison Specialist, GS-11*

The second position created within the Assistant Administrator's Office in the OAR is the Mercury Liaison Specialist. The Mercury Liaison Specialist will devote only 50% of his or her time to the Mercury Program, while the other 50% will be spent on work conducted prior to the Mercury Program's implementation. The Mercury Liaison Specialist will be sponsored by the Mercury Program to work in conjunction with the Liaison Office for half-time of salary and function. The liaison specialist will have the following duties:

- Lead communication to states, industry and press regarding the rulemaking process, technology, monitoring, and reporting;
- Correspond with Policy Analysis and Communications Staff and the Planning, Resources and Regional Management Staff to maintain open dialogue between all stakeholders;
- Liaise with governmental agencies; and
- Oversee cooperative agreement with ECOS which will serve as one of the main mechanisms for working with the states and industry in implementing the Act.

*Policy Analyst, Mercury Policy Analyst Coordinator, GS-11*

The third position will be in the Office of Policy Analysis in the OAR. This position will be sponsored by the Mercury Program to work in conjunction with the Office of Policy Analysis for half-time of salary and function. The Policy Analyst Coordinator will work primarily in the rulemaking stage and his/her main duties will be to:

- Provide critical analyses of the MRSC's forthcoming rules;
- Ensure compliance with existing legislation and technical analysis;
- Maintain contact with the Information Transfer and Program Integration Division of OAQPS; and
- Serve the Director of the Workgroup to guide the overall direction being set by the MRSC in the rule-writing process.

*Environmental Protection Scientist, Mercury Quality and Standards Coordinator, GS-11*

The fourth position will be in OAQPS in the OAR and will work full-time for the Mercury Program. The Mercury Quality and Standards Coordinator will spend the entire portion of his or her time working on researching existing and future technologies and creating corresponding standards to which power plants must adhere. He or she will also be responsible for coordinating both the MRSC's priorities and the rule-writing process on issues pertaining to emission standards and technologies. The employee will then serve to manage efforts between five divisions within OAQPS:

1. Policy Analysis and Communications,
2. Planning, Resources and Regional Management,
3. Air Quality Strategies and Standards,
4. Emission Standards, and
5. Information Transfer and Program Integration.

Under the Mercury Quality and Standards Coordinator, the Emission Standards Division will aid in establishing the national emissions standards and regulations pertaining to the individual

facilities. This Coordinator will also utilize the Air Quality Strategies and Standards Division and the Planning, Resources and Regional Management Staff.<sup>92, 93, 94</sup> The Information Transfer and Program Integration Division of OAQPS will also coordinate with this position.<sup>95</sup>

*Environmental Protection Scientist, Mercury Program Coordinator, GS-11*

The fifth position for the Mercury Program resides under the Office of Atmospheric Programs. The Mercury Program Coordinator will work full-time to coordinate divisions within the Office of Atmospheric Programs and will provide support for the Mercury Program. Meanwhile, this person's role in the first year of the Mercury Program will be to aid in the transition of the Mercury Program into the existing Acid Rain Program at the Clean Air Markets Division. The employee will coordinate and synchronize the actions of the Mercury Workgroup with the actions of the Acid Rain Program.

*Environmental Protection Intern through the Environmental Careers Organization*

A temporary intern position will be created that will operate under the Office of the Assistant Administrator. The intern position will aid in any activities of the Director of the MRSC and the Mercury Specialist Liaison and provide support for the Workgroup. The intern will work for approximately ten months through the Environmental Careers Organization program.

These six employees will make up the MRSC. The primary purpose of the MRSC will be to coordinate the activities of the various EPA offices to implement Section 3 of the *Mercury Emission Act of 2005*. Figure 3 in Appendix D shows the organization of the staff with additional information on each staff member's title and duties.

### **Program Implementation Responsibilities**

The Mercury Program Director will be spending the majority of his or her time in the rulemaking stage of the program. The main purpose of the rulemaking procedure is to create the organization and present any new rules or regulations to the EPA Administrator. The director's work on the rulemaking process will be divided accordingly:

- 30% on developing the draft action which will include creating and implementing the Mercury Program's foundation with rules and regulations,
- 20% on stage three of the rule making process to submit the proposed plan to the Administration in order to ensure compliance,
- 15% on stage four developing the final action, ensuring Congressional review and writing a final action plan, and
- 5% on tiering the action.

The Mercury Liaison Specialist will be devoting 50% percent of salary time to the Mercury Program, while the other 50% of the time will be spent on work in the Liaison Office. All of the time spent on the Mercury Program will involve communication with various stakeholders. The liaisons time will be distributed as follows:

- 30% on stage three and four of the rulemaking process which involves active coordination between parties,
- 10% on monitoring, reporting, and enforcement compliance,
- 5% on communicating to the various EPA offices, states, and facilities the approved technologies to reduce mercury emissions,

- 3% on assisting the Program Director in developing the draft action, and
- 2% on stage one of the rulemaking process.

In the first year, the Policy Analyst Coordinator will spend all of the allotted time in the rulemaking phase of the program divided almost evenly amongst the four stages in order to ensure compliance with any legal mandates before any rules are finalized and before the rules are sent to Congress. In the first year, the policy analyst coordinator's time will be split accordingly:

- 15% on stages two and four and
- 10% on stages one and three.

After the first year, the Policy Analyst Coordinator will continue to ensure that the new rules and regulations are in accordance with existing statutes.

The Mercury Program Coordinator will spend the bulk of the time on monitoring and reporting part of the program design and the compliance and enforcement section, and the rest of his/her time on technology, broken up as follows:

- 10% on compiling the list of approved technologies,
- 45% on monitoring, and
- 45% on reporting and compliance to enforce standards.

This is necessary because monitoring and reporting as well as compliance and enforcement will continue throughout the various stages of the program. Therefore, the Program Coordinator will set up how these two parts will function in the first year and will utilize the system to enact these two parts of the program design in the coming years.

### *Implementation Scenario*

To get an understanding of the organizational and staffing structure and how it will implement the recommended program design, this section shows how the structure will implement the 2.48 grams per 1,000 megawatt-hour rate of mercury emissions.

After passage of the *Mercury Emission Act of 2005* by Congress, the Act will progress through the system as follows:

1. The legislation will be given to the Mercury Regulatory Committee. The Mercury Policy Analyst Coordinator will interpret the legislation and explain that the legislation states that the emission rate from an individual facility will be set at a rate of 2.48 grams of mercury per 1,000 megawatt-hours with a national standard of 5 tons by the year 2009.
2. The Quality and Standards Coordinator will distribute this requirement to interior offices like the Air Quality and Standards Division and the Emission Standards Division, which will work to establish the qualifications that facilities will have to achieve and define the parameters of the regulations.
3. The Technologies Division will also produce a list of available technologies that the facilities can utilize to achieve these reductions, utilizing a constant emissions monitoring system.
4. The Quality and Standards Coordinator will ensure that the Office of Research and Development is effectively communicating with the Air Quality and Standard and the Emission Standards Divisions. The Quality and Standards Coordinator will also ensure the communication of this information to the Mercury Program Coordinator.

To summarize, HCS recommends that the EPA create a Mercury Regulatory Steering Committee, which will employ five full-time equivalent positions and one full-time temporary intern in the Office of Air and Radiation to coordinate mercury regulations. The Mercury Regulatory Steering Committee will coordinate the Mercury Workgroup, which will consist of representatives from various offices throughout the EPA and other entities. The Workgroup will establish the rules and regulations of the *Mercury Emission Act of 2005*. In implementing the Act, the MRSC and the Workgroup will adhere to the budget created by HCS (Appendix H).

For further detail on the first year tasks and implementation process, please refer to Appendix E.

## ***Performance Management***

As part of the program design, HCS created a performance management system, which will serve to monitor the implementation of the first year design goals of the Mercury Program. This performance management system includes the identification of program goals and the tasks involved to reach these goals. It also includes measurement methods for the goals, an information collection system, a process by which to report collected information, and a feedback mechanism for monitoring and developing any necessary program modifications. By establishing a performance management plan, the EPA can ensure that the Mercury Program operates effectively so the required national mercury emission reductions can begin after 2006.

### **Rulemaking**

The process of finalizing rules must be written according to the EPA's ADP process and has specific deadlines and indicators for achievement, which are part of the performance management system (Appendix F, Table 1). HCS recommends that the EPA use this evaluation scheme as a guideline to assess the progress of rulemaking. The indicators are the successful completion of the ADP stages (Appendix B, Section 1).

The rulemaking process includes a 30-day scoping period in which comments are received from stakeholders before the draft rulemaking process begins. The scoping comments are meant to inform the staff within the Mercury Workgroup about stakeholder preferences towards compliance with the Act. The draft and final rules will also be released and public comments requested in the Federal Register. The public comment period is the key opportunity for the public to be involved in the rulemaking process and may alleviate concerns once the rule is published. After these periods have closed, comments are to be summarized and responses drafted. The performance management system will ease communication between staff involved in the rulemaking process to ensure that it is completed in an effective and timely manner.

The MRSC, as previously defined, includes the five managers from the OAR. Each manager's staff within the Office of Policy Analysis and Review, OAQPS, and the Office of Atmospheric Programs, will constitute the Mercury Workgroup. Each week, individual staff members or teams of staff members within the Mercury Workgroup will report to their managers in an email with the specific versions of draft rules that have been written that week.

The Workgroup staff for each office will compile the information collected within each email and present it to the Program Director and MRSC in the form of a bi-weekly memo. The memo will include an explanation of the progress made with rulemaking, a detailing of rules, and a paragraph of how the rules were developed with appropriate justifications. The memo will also specify any changes that have occurred from previously developed rules. All memos will be stored by the Liaison in a central database.

During the bi-weekly MRSC meeting, which will be facilitated by the Program Director, all managers will be expected to discuss each memo and its content with the Program Director and Policy Analyst. The Program Director also maintains the right to comment on any part of the memo, based on information he or she may receive at a later date. The Director will also be responsible for alleviating any problems in the development of the rules including overlapping work that may occur, not meeting appropriate deadlines or receiving sub-quality work

The performance management system also proposes that a mid-year review of the system delineated above occur. This mid-year review will allow the Director and the staff involved with the development of the rules to determine whether timelines are being met, as well as review the overall quality and acceptability of the work performed thus far. The Director is empowered at this time to make any mid-course adjustments deemed necessary to keep the MRSC and Mercury Workgroup on schedule.

### **Technology**

In order to assess the technological goals of the Mercury Program, the MRSC will work in conjunction with the DOE and the EPRI to ensure progress on the development of mercury emission reduction technologies for coal-fired electricity generating units. The second design goal of the Mercury Program is the development of new or the improvement of existing mercury-reducing technologies (Appendix F, Table 2). Such technologies must be able to reduce mercury air emissions by five tons nationwide, as well as to meet the individual facility limit of 2.48 grams mercury per 1,000 megawatt-hour of energy produced. In order to address such mandates, a Memorandum of Understanding (MOU) with the DOE, EPA, and EPRI will be established which will clarify the roles and responsibilities of each organization. Within the EPA, the Mercury Liaison will collect an up-to-date, comprehensive list of available technology by the end of the first year of implementing the Mercury Program. Since communication is imperative to the success of the assessment program, the Mercury Liaison Specialist will coordinate with these groups to gather all appropriate information needed by the Mercury Quality and Standards Coordinator to ensure the progress of the Mercury Program's goals.

The respective research bodies will collect information on ongoing research from its consultants and research firms. Second, these groups will establish a working list of technology that indicates the amount of potential mercury emission reductions, as well as the costs and feasibility associated with the technology. On a monthly basis, the DOE, EPA and EPRI will gather all collected information. To best disseminate the gathered information, a written report will be provided that includes the following measures:

- an update of research from various consultants or research teams;
- the current availability and status of proposed technology;
- the estimated amount of mercury emission reduction associated with technology;
- the estimated cost and feasibility associated with the installation, training, and running of the new technology; and
- the cost associated with the research and development of said technology.

The Mercury Liaison Specialist will receive this submitted report from the DOE, EPA and EPRI and forward it to the Quality and Standards Coordinator. The Quality and Standards Coordinator will analyze the report and provide a briefing for the MRSC at scheduled meetings. The MRSC will provide feedback to the Quality and Standards Coordinator who will compile the information and respond directly to the DOE, EPA or EPRI and the Liaison Specialist in the form of a memo when necessary. Situations that warrant feedback would include when there is omitted information from the report and when additional information is requested by the MRSC or the Quality and Standards Coordinator.

### **Monitoring and Reporting along with Compliance and Enforcement**

During the first year, 2006, the program goals specify that the necessity to develop requirements for monitoring and reporting and to establish guidelines for compliance and enforcement although no actual monitoring, reporting, compliance, or enforcement actions will be taken (Appendix F, Tables 3 and 4). Based on these goals, the performance management system consists of communication between the Program Director and the staff to which these tasks are delegated and the Program Director.

By the end of the first year of the Mercury Program, a Letter of Intent for monitoring and reporting requirements will be produced and distributed to power plants to meet the monitoring and reporting task. This document will include information on continuous emission monitors and the process of reporting data using an already established database for the Acid Rain Program. It will delineate how the facility will collect emission information and then forward it to the state environmental agency. The states will have the responsibility of processing the data and entering it into the database.

During the first year, it will also be necessary to establish guidelines for compliance and enforcement, in order to be able to meet the nationwide mercury emission limits. The deliverable of this task will include the publication of guidelines for compliance and enforcement at the end of the first year. The Mercury Program Coordinator will work on these goals, primarily ensuring communication and coordination among the states and facilities, which helps to ensure that the reporting of mercury emissions and the enforcement of emission standards will be ready for implementation after the first year. Bi-weekly, the Mercury Liaison Specialist will collect information on the amount of time spent on communication and the types of communication activities conducted by the Program Coordinator.

The information collected by the Liaison Specialist will be stored electronically and reported to the Program Director in the form of a bi-weekly memo. This memo will detail the specific time spent by the Program Coordinator on the task of establishing guidelines for compliance and enforcement and on establishing methods of enforcement. It will also report on the progress of developing requirements for monitoring and reporting, such as informing states and facilities of the need for continuous emission monitors and of the emission collection database which will be used. The memo will describe any setbacks, as well. In the event that the Program Director finds the Program Coordinator not fulfilling said tasks or not allocating enough time, the Program Director will take action to inform the Program Coordinator of these failings and take appropriate action to correct the situation.

The performance management system that has been established for the implementation of the *Mercury Emission Act of 2005* will monitor the success of the program in reaching its goals. It has identified goals of the program, clarified tasks, and established methods of measurement. An information collection method accompanies the process to report the data and provide feedback. The performance management plan will assist the MRSC and the Mercury Workgroup with assessing the progress of the Mercury Program and whether it corresponds to the dates set by the master calendar.

## ***Tasks for Year One***

In order to implement the Act, HCS has created a master calendar for key tasks, as well as a listing of dates for daily responsibilities and regularly scheduled meetings. The master calendar provides MRSC employees and Mercury Workgroup members a guide to follow and to keep track of progress and will be used as a tool for implementing tasks during the first year of the Mercury Program.

HCS has designed a four step program for the first year of implementation. To review, the four steps are:

1. Rulemaking, which includes four key sub-tasks:
  - a. tiering the action;
  - b. developing the draft action;
  - c. requesting the EPA Administrator's signature and publishing the draft action;
  - d. developing the final action and ensuring Congressional review;
2. Technology, which includes a list of approved technologies which power plants may use to meet mercury emission reduction levels as determined in the Act;
3. Monitoring and reporting, this involves the development of requirements for how power plants, states, and the EPA will co-ordinate such activities; and
4. Compliance and enforcement, where the EPA will establish guidelines for plants to ensure mercury reductions are achieved.

The master calendar will keep employees aware of deadlines for key tasks and allow facilitate in tracking progress. A key goal is to have a functioning framework in place by December 2006 to ensure that mercury emissions reductions can begin after 2006 and that the total national emissions limit of 5 tons will be achieved by 2009.

The calendar for the first year of the Mercury Program begins on Monday, January 3, 2006 and ends on Friday, December 29, 2006. The search for new employees began immediately following the passage of the Act, thus all new employees shall begin work on January 3, 2006. Table 1 of Appendix G shows a calendar overview of key tasks that will be accomplished during the first year of the Mercury Program.

### **Rulemaking**

The main task of the EPA's Mercury Regulatory Steering Committee during the first year of the implementation will be to promulgate final rules that reflect the standards set forth in the Act. These rules, which will be finalized no later than December 29, 2006, will stipulate the necessary requirements for coal-fired electricity generating units to achieve no more than five tons emitted nationwide per year and no more than 2.48 grams of mercury per 1,000 megawatt-hour of power produced. This step is crucial in order for necessary guidelines to be set to pave the way for technology mandates and proper implementation through monitoring and reporting and compliance and enforcement. As reflected in a graphical depiction in Appendix G and in the Program Design section, several key tasks will occur during the rulemaking stage:

1. Tiering the action
2. Scoping period prior to Rulemaking
3. Drafting of rules

4. Midyear Review
5. Draft of rules released to public for comment
6. Drafting of final version of rules
7. Development of draft action
8. Comment period for draft of final rules
9. Acquire Administrator signature
10. Final rules published
11. Final rules approved by Congress
12. Final rules approved by President
13. Final rules written as official EPA rules

In addition to these activities, there are several day-to-day, weekly, bi-weekly, and monthly tasks which take place. These tasks include various memos, meetings, and teleconferences in order for the Mercury Program to keep on track in developing the rules and carrying out the program. These dates are relatively flexible and are solely for the purpose of keeping on track to meet the key task deadlines. Within the rulemaking phase, such tasks include:

- An in-person welcome orientation held in Washington, DC for the MRSC and Mercury Workgroup employees on January 3,
- Two training courses for the MRSC and the Mercury Workgroup held in Washington, DC on January 4 and February 6,
- MRSC meetings via teleconference held every other Wednesday, beginning on January 11,
- Workgroup meetings held on first Monday of each month,
- Emails from MRSC staff to the Program Director every other Tuesday, beginning on January 16, and
- Travel to conferences and meetings by the Director and Liaison on dates which have yet to be determined.

Next, a follow-up memorandum will be sent to the Director and will include an explanation of the progress made of the rulemaking and how such rules have been developed. This memo will also detail any changes that have occurred from previously developed rules. During the bi-weekly Wednesday MRSC meetings, managers will discuss each memo and its content with the Program Director and Policy Analyst. A mid-year review will take place on June 1 to allow the Director and the staff involved with the development of the rules to determine whether timelines are being met, as well as review the overall quality and acceptability of the work performed thus far.

### **Technology**

The second program design task is the development of various technologies so that plants will be able to conform with emissions reduction mandates. The allowance of various technologies will be useful in allowing plants the flexibility of choosing what technology works best for their individual plants. Within the first meeting, the EPA will establish a MOU between the EPA, the DOE, and the EPRI to clarify roles and responsibilities of each organization. These organizations will continue to meet monthly to coordinate activities and ensure effective communication. To fulfill the requirements of this design, the coordination of the different coordination offices is necessary.

In coordination with these meetings, other meetings and tasks will take place. Within the technology phase, such tasks include:

- Monthly coordination meetings between the different employees of the MRSC to ensure understanding, integration and compliance with approved technology,
- Monthly production of a draft list of available currently approved technology,
- Written progress report and current list presented to MRSC at bi-weekly meeting, and
- Written report and memo submitted to the Program Director bi-weekly.

The EPA will publish a finalized list of approved technology every six months. Each month, the Quality and Standards Coordinator will submit a draft list of approved technology to be approved and finalized twice a year. The list will be published and distributed to all affected facilities and states.

A monthly meeting with various non-EPA offices, including the DOE and the EPRI, will be coordinated by the Liaison Specialist. The Quality and Standards Coordinator will attend these meetings. In addition, the Quality and Standards Coordinator will have monthly meetings with the other MRSC members to ensure understanding and compliance with the available technology. These meetings will be held separately from the bi-weekly MRSC meetings. The goal of these meetings is to ensure comprehensive understanding of the available technology and the implications for the various tasks within the Mercury Program.

The Quality and Standards Coordinator and the Program Coordinator will meet bi-weekly to ensure communication between the disparate groups in research and in compliance and enforcement. Such groups may include offices such as the:

- Air Quality Strategies and Standards Division,
- Emissions Standards Division,
- Information Transfer and Program Integration Division,
- Office of Enforcement and Compliance Assurance, and
- Operating Permits Group.

These two groups will be meeting throughout the first year and subsequent years to ensure that approved technology is being utilized properly. At the bi-weekly MRSC meetings, the Quality and Standards Coordinator will submit a progress report and the draft list of available technology. The Quality and Standards Coordinator will also write a written report and memo to the Program Director every other week. This schedule will continue after the first year of implementation.

Data collection will be occurring on a daily basis to provide the most up-to-date information about available technology, which will be summarized in weekly reports given to the Quality and Standards Coordinator for compilation. A summary report will be made for the Program Director. At the end of each month, the Liaison Specialist will distribute a release about all available technology that facilities will be able to utilize.

### **Monitoring and Reporting in conjunction with Compliance and Enforcement**

The first year of the Mercury Program will be used to develop requirements for monitoring and reporting and to establish guidelines for compliance and enforcement. Due to the fact that the

focus is on the first year of implementation, the MRSC will standardize and mandate rules while no actual monitoring, reporting, compliance, or enforcement action will be taken. The appropriate avenues for these actions will not yet be in place before the conclusion of 2006. These activities will utilize components of existing EPA programs, including the Toxics Release Inventory (TRI) and Enforcement and Compliance History Online (ECHO) databases. The key tasks, which are necessary for the monitoring and reporting and compliance and enforcement stages, include:

1. Contact between the MRSC and the TRI and ECHO coordinators and adding mercury into existing databases,
2. Work plan for cooperative agreement created by Liaison and Policy Analyst,
3. Cooperative agreement funds sent to ECOS,
4. Draft of Letter of Intent for monitoring and reporting for internal review,
5. Comment period on draft of Letter of Intent,
6. Letter of Intent to states and power plants with guidelines and regulations for monitoring and reporting,
7. Draft of Letter of Intent for compliance and enforcement for internal review, and
8. Letter of Intent submitted to states and power plants with guidelines and regulations for compliance and enforcement.

Upon submission of the Program Coordinator's time and attendance to the Director, the Program Liaison will develop time and activity progress reports for monitoring and reporting and compliance and enforcement. These reports will be submitted to the Liaison Specialist on the first Monday of each pay period. Since the monitoring and reporting and the compliance and enforcement guidelines will be developed for preparation for internal review throughout the year, the master calendar will enable the Director to monitor the workload appropriately.

A work plan for the cooperative agreement will be created by the Liaison Specialist and the Policy Analyst during the first month of the program. This work plan will clearly set up the first year of agreement and will allocate funding appropriately.

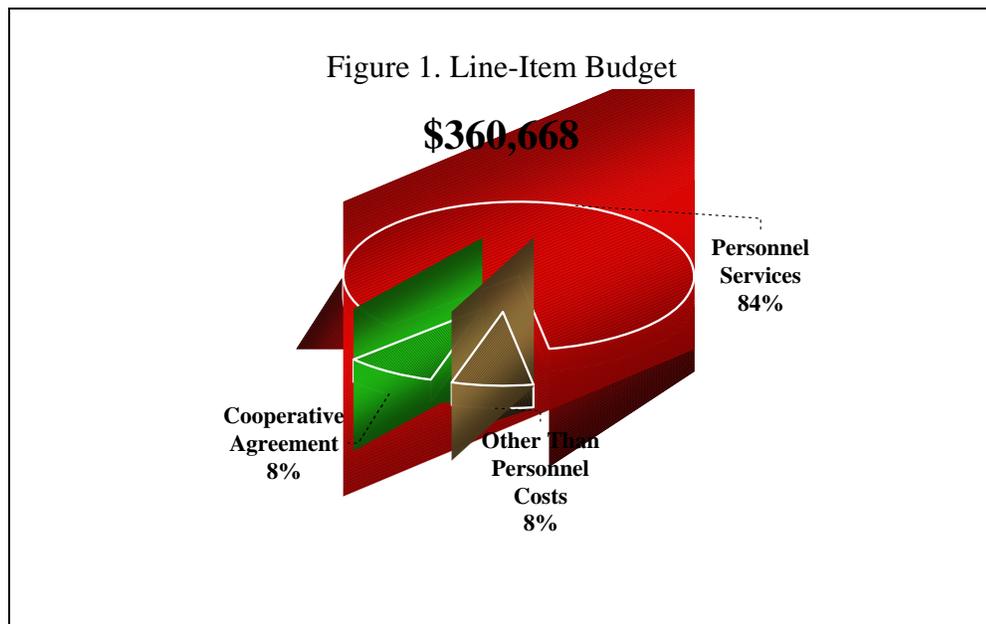
A draft of the letter of intent with monitoring and reporting requirements will be developed and prepared for internal review by June 28, 2006. A 30 day comment period will be open from July 3, 2006 through August 7, 2006 in which a draft of the proposed guidelines will be sent to states and facilities, so that these stakeholders can comment on the proposed requirements. The comment period will also help ensure that when the final Letter of Intent is released, the facilities and States will agree with the requirements set forth. A draft of the final compliance and enforcement guidelines will be developed and prepared for internal review by November 1, 2006. Upon completion of the internal review, the guidelines will be officially developed and publicized by December 29, 2006.

By March 15<sup>th</sup>, the MRSC will contact the ECHO database and the TRI online program coordinators for integration with the Mercury Program. The EPA's ECHO and TRI databases have been developed as online programs between the states and the Agency. All monitoring, reporting, compliance, and enforcement documentation for each facility will be uploaded into the databases for certification purposes. By working with the Agency coordinators and developing a link to this software early, the Mercury Program will be prepared for necessary documentation and certification deadlines by the close of the first year.

As discussed here and demonstrated in Appendix G, the master calendar of key tasks provides recommendations of how and when the EPA can direct staff to take necessary steps for implementing the *Mercury Emission Act of 2005*. Upon completion of all tasks delineated prior to December 29, 2006, a program structure will already be in place for the second year of the Mercury Program, 2007, wherein actual mercury air emission reductions begin.

## ***Budget***

The success of the Mercury Program, the organizational and staffing plan, the performance management system, and the master calendar, will not be possible without the appropriate allocation of resources. Congress has allotted \$2,000,000 for the implementation of the specific mandates of the Mercury Emission Act of 2005 and the first year budget has been set at \$400,000.<sup>96</sup> To implement the Mercury Program for controlling coal-fired power plant emissions, which comprise the bulk of mercury emissions nationwide, HCS estimates that \$360,668 would be needed for 2006. Figure 1 below shows a pie chart of the line-item division of this amount.



### **Personnel Management**

#### *Personnel Services*

The five FTEs will be compensated based on their respective general service (GS) level and location. The MRSC will be comprised of one GS-13 position who will serve as the Director with an annual salary, as determined by the federal government at \$74,796, and four GS-11 positions consisting of the Mercury Policy Analyst Coordinator, the Mercury Quality and Standards Coordinator, the Mercury Program Coordinator, and the Mercury Liaison Program Specialist.<sup>97</sup>

The Policy Analyst Coordinator, Quality and Standards Coordinator, and the Program Coordinator will receive a base pay of \$50,541, relative to their location of Research Triangle Park, North Carolina. The Liaison will generate a base pay of \$52,468.<sup>98</sup> However, as previously mentioned, the Liaison and Policy Analyst will only concentrate 50% of their time on mercury related issues, thus lowering the contribution of the Mercury Program by 50% of their salary.<sup>99</sup> The temporary intern position will be paid \$10.00 an hour for approximately 10 months, which will cost the EPA \$17,120.<sup>100</sup> Tables 1 and 2 of Appendix H provide a detailed account of personnel expenditures.

Each GS level is also divided into ten steps, which produces a salary range for each level. The proposed base salaries for the Director, Liaison, and Intern's GS levels include the 2.50% general schedule increase and a locality payment of 15.98% for the locality pay area of Washington-Baltimore-Northern Virginia.<sup>101</sup> However, North Carolina has a different pay scale due to locality increases that incorporates a 2.50% general schedule increase and locality payment of 11.72% for the locality pay area for "the rest of the U.S."<sup>102</sup>

Based on the low-end salary ranges of Step 1, the total budget appropriated for salary for the FTE employees and the intern will total \$303,178 per year. The EPA transfers money directly to the Environmental Careers Organizations, which pays the intern.

Thirty-two employees from other branches of the EPA will also staff the MRSC, however, work for MRSC will account for less than 25% of their time. Therefore, no part of these employees' salaries is subtracted from the Mercury Program budget. In the rulemaking stage, the Mercury Program will be utilizing 12 additional employees. The technology section of the program will require seven additional employees, monitoring and reporting will require six additional employees, and compliance and enforcement will use seven additional employees.

#### *Fringe Benefits*

Benefits such as health insurance, life insurance, vacation time, retirement plan, and sick leave are required for all federal government employees. Of each base pay, 25% will be added in reference to these requirements. Benefits such as overtime will not be extended to the Mercury Workgroup. All needed time above the 40-hour work week will be comprised of credit hours, which will accumulate as earned and may be used at a later date. In total, fringe benefits represent \$56,852 of the total budget.

#### *On the Spot Awards*

To motivate and encourage each employee throughout the first year's implementation of the *Mercury Emission Act of 2005*, On the Spot Awards, common at the EPA's workplace, will be given to all full-time equivalent employees, including the intern, totaling \$300 per person or an annual total of \$1,800. This amount will automatically be distributed at the end of the first year.

### **Communication and Outreach**

#### *Travel Expenses*

The Director of the MRSC and the Liaison Specialist are responsible for communication and transfer of information between the multiple offices within the OAR, EPA, and other governmental organizations, such as the DOE. These offices are often located in distant locations, which requires travel. Travel will comprise a portion of the total budget tallying \$18,900 due to an estimated rate of \$900 per trip for the Director of the MRSC and Liaison Coordinator. The Director and Liaison Coordinator will travel for approximately two days per trip with an estimated expense of \$250 per day. This estimated expense consists of hotel rates at a cost of \$186 and meals and incidental expenditures at a cost of \$64. An estimated cost of \$400 has been allocated for all airline travel, which is based on a set federal cost for all trips.<sup>103</sup>

In order to effectively manage the MRSC, the Director may be required to make one trip per month totaling \$10,800 for the year. Furthermore, the Liaison Specialist also plays a vital role in attending conferences and meetings with stakeholders such as the power plant industry and

legislators to assess the progress of the Act. Therefore, the Liaison Coordinator will be required to travel every other month, or six trips per year, totaling \$5,400 for the year.

In addition to the necessary program travel, the Mercury Policy Analyst and Quality and Standards and Program Coordinators will participate in a one-day working meeting for training purposes. This training necessitates travel to Washington, DC, which will acquire additional travel expenses of \$2,700.

#### *Employee Learning and Development*

To adequately prepare the personnel working for the MRSC, two training courses will be offered. This instruction is especially necessary for the 32 part-time staff. These staff make up the Mercury Workgroup. The four FTEs, the Mercury Liaison Specialist, Mercury Quality Standards Coordinator, Mercury Program Coordinator, as well as the Policy Analyst Coordinator, will also require ongoing training within the first year to ensure that the standards set by the Act are strictly implemented. Two training sessions per year, which will include training material, and light refreshments, are estimated at \$105 per person. The necessary budget allotment for training purposes for 38 employees totals \$3990 for the first year of the program.

#### *Meeting Costs*

The majority of the program activities will occur in Washington, D.C. and Research Triangle Park, NC. Therefore, the bulk of the meetings will be held through net conferences and teleconferences. There will be no additional meetings held in person, so meetings will not require travel funds. An allocation of \$1,000 for the year has been devised to fund all long distance conferences and the necessary technology.

#### *Print Media*

Printed documents will be a crucial source of relaying information throughout the EPA and to states and coal-fired electricity generating facilities. Thus, an allocation of \$1,000 will be used for the year. These funds will enable all personnel to develop and distribute fact sheets, brochures, and other material pertaining to the rulemaking process, current technologies, monitoring techniques, and compliance regulations.

### **Other Direct Costs: Office Operations**

#### *Technical Supplies*

Due to frequent travel required of the Director and Liaison, technical communication supplies will be needed to enable continuous interaction with Agency staff and stakeholders, especially during travel and other time away from the office. Two Blackberries will be purchased, which have a \$25 monthly fee, totaling \$1,200 per year. Two laptops will be purchased at the cost of \$700 each, totaling \$1,400 for the year. In all, technical supplies will consist of \$2,600 of the total budget.

#### *Facilities*

The MRSC and Mercury Workgroup will implement the rulemaking process within the Offices of the Assistant Administrator, Policy Analysis and Review, Air Quality, Planning and Standards, Atmospheric Programs, and several offices located in Research Triangle Park, NC. Due to the implementation occurring within current offices, no facility fees will be acquired on behalf of the Mercury Program.

### *Contractual Agreements*

The funding budgeted for the OAR and the Environmental Council of the States will add the cooperative agreement of \$30,000 to the currently existing agreement. This funding will serve as one of the main mechanisms for conducting outreach, education, and public comments to the states and industries in implementing the Act. For example, funding will be used on outreach to each state, which will then work with their power plants on technology education.

### *Research and Development*

No funding under the Act will be used for research and development purposes. All mercury research and development will remain under existing EPA mercury programs and offices. This policy will enable all research to continue while the rulemaking process is active without requiring funding.

### **Total Expenditures**

Figure 2 shows the division of the budget for the four areas of the program design.

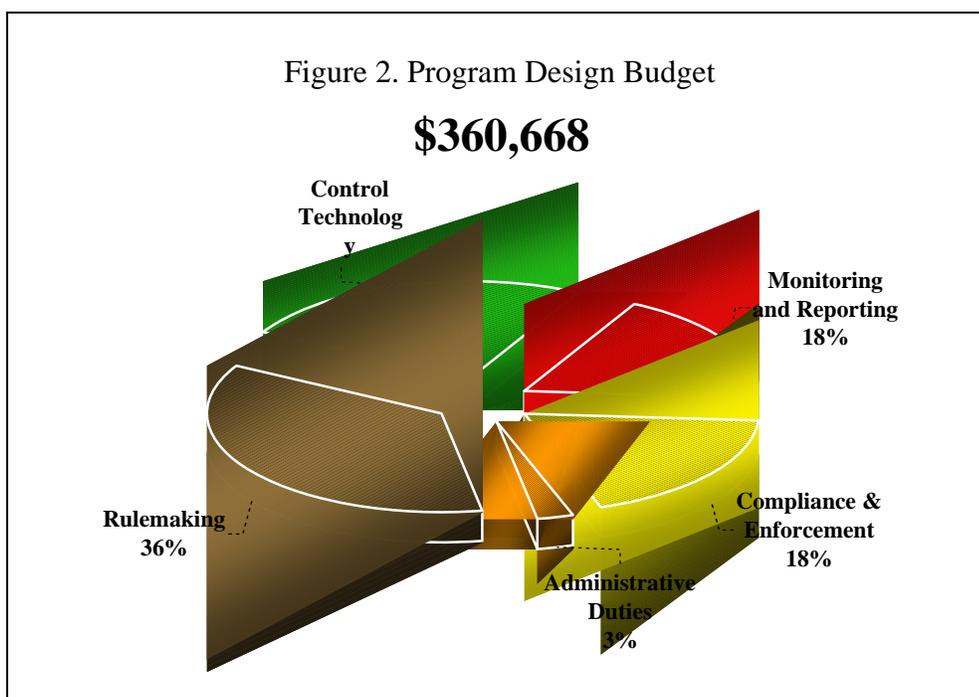


Table 1 in Appendix H includes the expanded annual budget for the first year of the Mercury Program. These costs include salaries, travel, and training for all employees and total \$360,668 for the year. An additional funding request by the EPA to Congress is recommended, since salaries consist of 84% of the \$400,000 allocation from Congress.

## ***Conclusion***

The passing of the *Mercury Emission Act of 2005* calls for the regulation and reduction of the amount of mercury emitted into the environment. The regulations stipulated by this Act are crucial, as mercury is a toxic pollutant that Americans are currently exposed to on a regular basis. Specifically, the Act will reduce the amount of mercury entering the air beginning in 2009 by 90% of the 1999 levels of mercury emissions. The largest reduction of mercury emissions will be achieved by regulating and reducing emissions from coal-fired electricity generating facilities, which are the largest source of mercury emissions in the United States.

Hg Control Specialists, Inc. has devised the Mercury Program for the EPA in order to successfully implement Section 3 of the Act. The Act mandates the promulgation of rules by the EPA to establish limitations of mercury emissions. Therefore, the Mercury Program involves a staffing plan within the EPA and key tasks for these employees to complete during the first year of the Program so that rules are promulgated. The recommended staffing plan employs five employees and one temporary intern, who comprise the Mercury Regulatory Steering Committee, which is within the EPA's Office of Air and Radiation. In addition to these six staff members, 32 pre-existing EPA employees from other offices will compose the Mercury Workgroup, which will contribute to helping establish rules and regulations. The Mercury Program consists of four key sections for the employees to focus on during 2006, the first year of the Act: rulemaking, technology, monitoring and reporting, and compliance and enforcement.

Monitoring the success of the program in reaching its goals during the first year is vital, as the foundation for the following years is established at this time. Therefore, the ultimate success of the Mercury Program depends on proper monitoring. Consequently, a performance management system has been established by Hg Control Specialists, Inc. for implementing the Act by identifying goals of the program, clarifying tasks, and establishing methods of measurement.

To ensure that proper steps toward implementing the *Mercury Emission Act of 2005* are taken during the first year, a master calendar of key tasks has been established for 2006. The estimated total costs for implementing Section 3 of the Act will be \$360,668. Upon completion of all tasks delineated prior to December 29, 2006, an activity framework will already be in place for the second year, 2007, of the Mercury Program, which includes the commencement of mercury air emission reductions from power plants.

## *Appendices*

### **Appendix A: Key Distinctions Between S.730 and Alternative Proposals**

Because mercury pollution has become a highly politicized issue, there have been many bills introduced in the House and Senate dealing with mercury reductions. Here, we compare the three primary proposals to reduce mercury emissions from U.S. coal-fired power plants. These proposals are President Bush's Clear Skies Initiative, the EPA's Clean Air Mercury Rule, and the *Mercury Emission Act of 2005*. While these proposals focus on the reduction of mercury emissions into the air, each individual plan specifies different timelines, emission targets, sites of focus, and reduction methods.

There are two ways to regulate mercury emissions. One way to reduce mercury emissions is to create a market-based emissions trading program. The other way is to mandate specific facility emission standards:

- The market-based emissions trading program employed by the proposals of President Bush and the EPA, establishes a 'budget' of mercury emissions to achieve a national standard whereby facilities can buy and sell permits according to their emission levels.<sup>104</sup> Under this model, facilities can emit different amounts of mercury while simultaneously achieving an overall national emission goal.
- Alternatively, the emissions standard approach that is employed by Senator Leahy's S.730, sets up a uniform emissions standard for all facilities. This standard specifies the amount of mercury emissions that may be emitted per megawatt-hour of electricity generation averaged out over the course of a month, and is based on the monthly average of emissions for a facility. It is further mandated that in order to reach these emission goals, facilities must use maximum available control technologies (MACT).

The differences between approach mechanisms for these three proposals are important to note, as they are the source of political opposition and support for S.730. President Bush's Clear Skies Initiative and the EPA's Clean Air Mercury Rule focus on air emissions within a two-phase process. The first phase aims to reduce current emission levels of 48 tons per year to a 26 ton per year cap in 2010. The second phase further reduces emissions to achieve an ultimate cap of 15 tons/year by 2018 for an overall 69% reduction.<sup>105</sup> In order to achieve this reduction, these proposals propose using the market-based approach whereby mercury emitting plants can purchase or sell permits as noted above. Alternative sources of air emissions and mercury in the waste stream are not addressed in either of these proposals.<sup>106</sup>

The principles guiding the Clear Skies Initiative and the Clean Air Mercury Rule were the motivating factors in creating the alternative approach set forth in S.730, which amends the CAA and aims to reduce mercury emissions into the air and the waste stream by regulating a number of sources. The goal analyzed here, is a reduction of coal-fired power plant emissions of 90% by 2009, thereby reducing current air emissions from 48 tons per year to 5 tons per yr.<sup>107</sup> S.730 proposes to accomplish reduction in air emissions by establishing a command and control approach whereby each plant would be subject to the same emission standard.

Leahy and Snow rejected the Administration's two proposals and offered their alternative on the basis that they do not go far enough in protecting the environment or human health from the effects of mercury pollution.<sup>108</sup> The Congressional Research Institute found that mercury "hot spots" would occur in geographic areas located in proximity to the plants that could purchase multiple pollution permits under the market-based approach.<sup>109</sup> This would mean that some communities next to power plants would receive a disproportionately higher level of mercury contamination than other communities across the country.

Additionally, Leahy and Snowe disagreed with the timeframe set out by the Clear Skies Initiative and the Clean Air Mercury Rule for achieving mercury reduction goals.<sup>110</sup> Technological analysis shows that the emission reduction goals set forth by the Clear Skies Initiative and the Clean Air Mercury Rule could be achieved through the utilization of control technologies currently in place for other pollutants such as SO<sub>2</sub>. Therefore, S.730 proposes the near-immediate employment of MACTs to speed the rate of decreasing emissions.<sup>111</sup> Furthermore, the Congressional Research Service has estimated that the standards used in the Administration's permit trading proposals would lead to long delays in the real reduction of mercury emissions, whereby the 70% reduction goals may not be reached until 2030.<sup>112</sup>

While S.730 addresses numerous sources of mercury emissions in both the air and land, there are other areas that need further attention. While a uniform emissions standard is mandated by S.730 for power plant emissions, the MACTs by which industries may carry out the reduction are not specified. In order to explore options to comply with S.730, MACTs need to be studied, implemented and/or subsidized for cost-effective installation. One control technology that could achieve reduction in mercury emissions is Active Carbon Injection (ACI) and Catalyst Converters. ACI technology and catalyst converters have been implemented for the past decade in municipal waste incinerators and have also been tested for use in coal-fired power plants.<sup>113</sup>

## **Appendix B: The Action Development Process**

### *Stage 1*

The first stage requires each action to be assigned to one of three tiers. The process of tiering is done in order to determine what process should be used to develop an action. Multiple processes are examined and then ranked from most to least efficient. The option that is ranked highest is then examined further. Based on specific criteria, the action is categorized in one of the three tiers. The actions involved in the Act would be classified under Tier 2, since the Act involves extensive cross-Agency involvement or major changes to existing air emission standards. The primary decision authority for Tier 2 actions lies with the Assistant Administrator of the Office of Air and Regional Administrators. Furthermore, Tier 2 actions include a significant amount of scientific, policy, economic, and implementation issues such as those involved in mercury reductions from coal-fired power plants.

### *Stage 2*

Once tiering approval is obtained, stage two begins by developing the proposed action. The process by which an action is developed is dependent on the tier to which it has been assigned. Developing actions for Tier 2 involves eight steps:

1. Chartering the workgroup,
2. Getting the workgroup underway,
3. Preparing the preliminary analytic blueprint and getting early guidance from senior management,
4. Preparing the detailed analytic blueprint,
5. Completing data gathering, consultation, peer review, analysis, and options development,
6. Selecting options,
7. Developing the proposed action, and
8. Conducting final Agency review.

### *Stage 3*

Once the workgroup prepares the action, which is reviewed by the EPA, the Administrator's signature is needed. The actions must also be published in the Federal Register. Before the Administrator signs an action, the lead office must request preliminary review of the regulatory action by the Federal Register Liaison, address any concerns by the Office of Management and Budget, and assure a complete docket.

### *Stage 4*

Developing the final action and ensuring Congressional review, involves three steps:

1. Addressing Public Comments
2. Determining Next Steps
3. Submitting Actions for Congressional Review under the Congressional Review Act and the Courtesy Copy Policy

The general public must have the opportunity to provide comments on the proposed action, which should be considered prior to finalizing the action. Congress then receives the final action,

before publication in the Federal Register. Once the rule is finalized; it is then published in the Federal Register.<sup>114</sup>

## Appendix C: Developing the Program Design

Table 1. Comparison of options in implementing the Mercury Emission Act of 2005

<b>Options</b>	<b>Cost Effectiveness</b>	<b>Administrative Feasibility</b>	<b>Political Support</b>	<b>Overall Rating</b>
<b>Control Tech. Specified</b>	Low	High	Low	Medium
<b>Control Tech. Flexible</b>	High	Medium	High	High
<b>Monitoring Existing: Self-Report</b>	High	High	High	High
<b>Monitoring New: In-house</b>	Low	Low	Medium	Low
<b>Enforcement States</b>	High	High	Low	Medium
<b>Enforcement EPA</b>	Low	Low	Low	Low
<b>Enforcement States &amp; EPA</b>	Medium	High	High	High

Table 2. Summary of options in implementing the Mercury Emission Act of 2005

<b>Options</b>	<b>Control Technologies</b>	<b>Monitoring Programs</b>	<b>Monitoring Technologies</b>	<b>Reporting/Enforcing</b>
<b>Option 1</b>	Require specific technology	Acid Rain Program adds Mercury	CEMs with Fuel Cells	States only
<b>Option 2</b>	Allow facilities to pick	Develop new mercury-specific program	CEMs premium calibration gases	EPA only
<b>Option 3</b>		In-house reviews and data collection	CEMs with low-grade calibration gases	EPA and states

**Appendix D: Organization and Staffing Plan**

Figure 1. Organizational Chart of the Location of Employees Currently Working on Mercury Issues in the U.S. EPA<sup>115</sup>

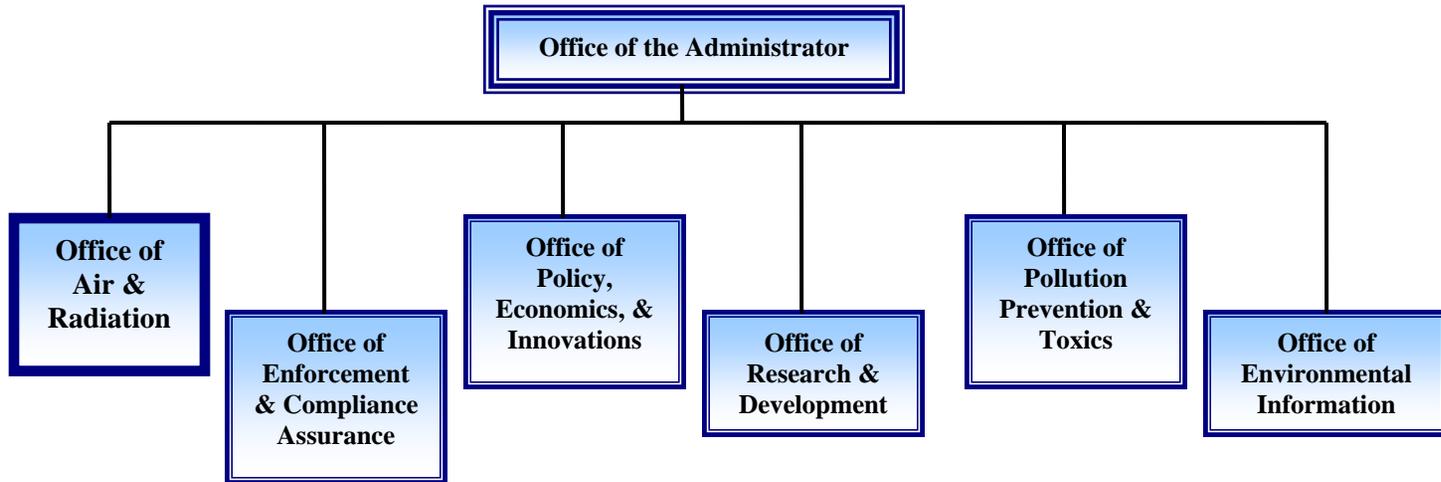


Figure 2. Location of Staff Members of the Mercury Workgroup

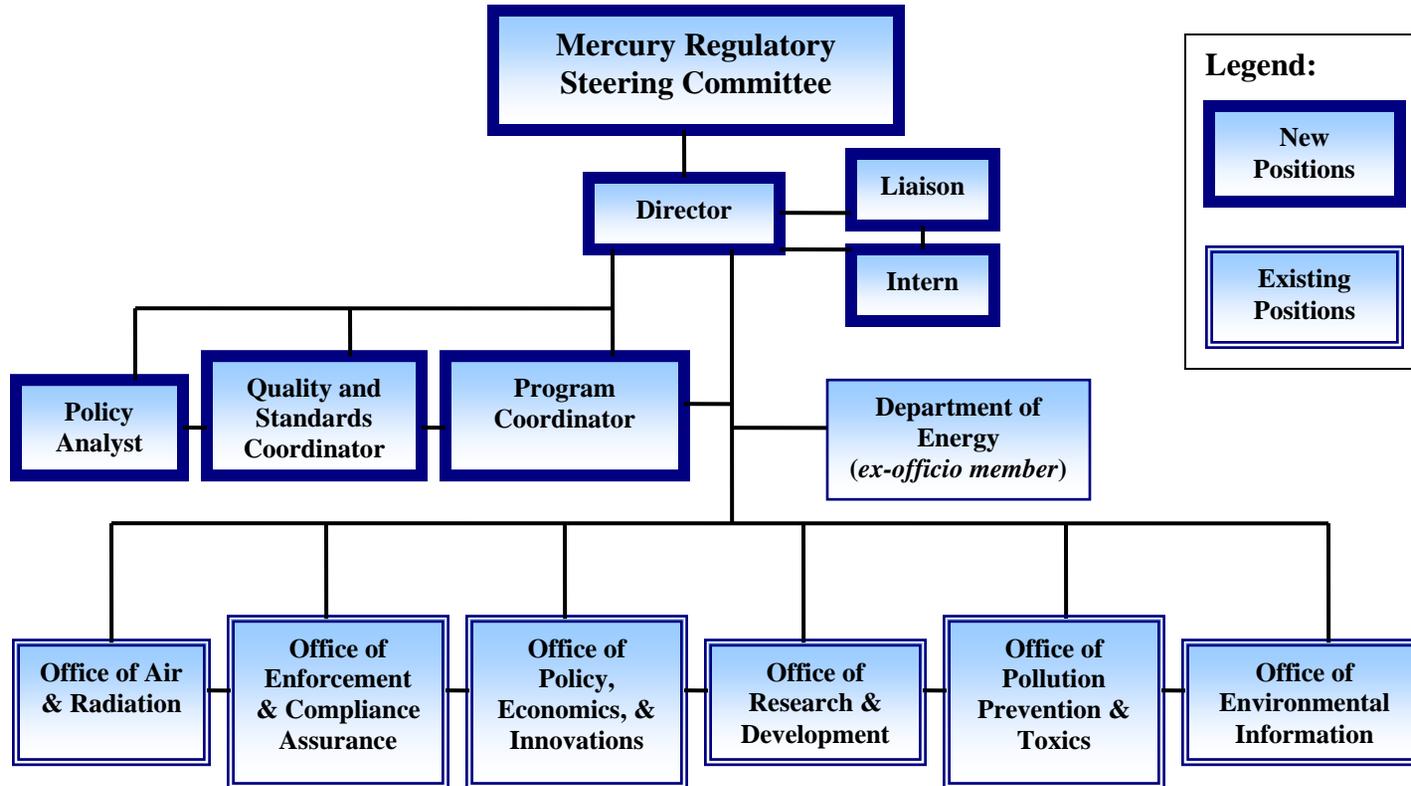
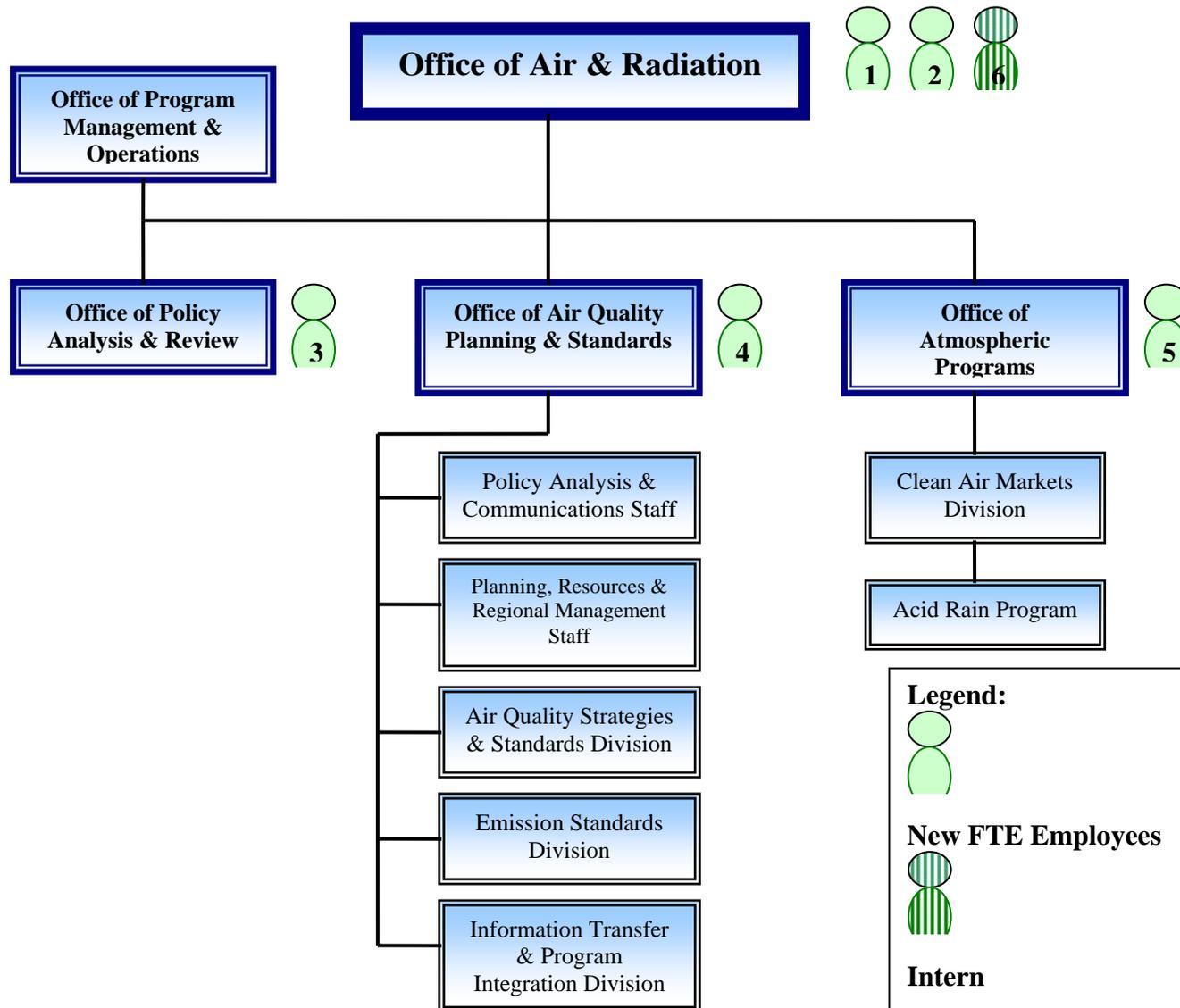


Figure 3. Organizational Chart of the Location of New Staff of the Mercury Regulatory Steering Committee (MRSC) within the Office of Air and Radiation, Which will Oversee the Mercury Workgroup<sup>116</sup>



*Detailed Descriptions Corresponding to Figure 3*

Figurine: #1  
Mercury Title: *Mercury Program Director*  
Federal Title: Supervisory Environmental Protection Specialist (General Schedule: GS-13)  
Location: Assistant Administrator's Office  
Reports to: Assistant Administrator

Figurine: #2  
Mercury Title: *Mercury Liaison Specialist*  
Federal Title: Environmental Protection Specialist (GS-11)  
Location: Assistant Administrator's Office  
Reports to: *Mercury Program Director*

Figurine: #3  
Mercury Title: *Mercury Policy Analyst Coordinator*  
Federal Title: Policy Analyst (GS-11)  
Location: Office of Policy Analysis and Review  
Reports to: *Mercury Program Director*

Figurine: #4  
Mercury Title: *Mercury Quality and Standards Coordinator*  
Federal Title: Environmental Protection Scientist (GS-11)  
Location: Office of Air Quality Planning and Standards  
Reports to: *Mercury Program Director*

Figurine: #5  
Mercury Title: *Mercury Program Coordinator*  
Federal Title: Environmental Protection Scientist (GS-11)  
Location: Office of Atmospheric Programs  
Reports to: *Mercury Program Director*

Figurine: #6  
Mercury Title: Intern  
Federal Title: Environmental Protection Intern  
Location: Office of the Assistant Administrator  
Reports to: *Mercury Program Director*

Table 1. Location by Office of EPA Employees that are Members of the MRSC<sup>117</sup>

<b>Office of Air and Radiation</b>	
Office of the Assistant Administrator (2 FTE* and one temporary intern)	
Policy Analysis and Review (1 FTE)	
Office of Air Quality Planning and Standards (1 FTE)	
- Policy Analysis and Communication	
- Planning, Resources, and Regional Management	
- Air Quality Strategies and Standards	
- Emission Standards	
- Information Transfer and Program Integration	
Office of Atmospheric Programs (1 FTE)	
- Clean Air Markets	
- Acid Rain Program	
Office of Program Management and Operations	
* Full-Time Equivalent (FTE)	
Total FTE Employees: 5	
Total Temporary Intern: 1	
Total Partial Time Employees: 8	
<b>Office of Policy, Economic and Innovations</b>	
National Center for Environmental Economics	
Regulatory and Policy Review	
Outreach and Assistance Coordinator	
Environmental Management Systems	
Environmental Results Program	
Environmental Innovations	
Performance Track	
Regulatory Steering Committee	
Regulatory Management Issues	
Regulatory Agenda and Plan	
Senior Advisory for Communications	
Regulatory and Policy Review	
Total Partial Time Employees: 12	

<b>Office of Research and Development</b>
Steering Committee
Environmental Technology Verification
Total Partial Time Employees: 2
<b>Office of Prevention, Pesticides and Toxic Substances</b>
Regulatory Steering Committee
Pollution Prevention/P2 State Coordinator
Pollution Prevention
Total Partial Time Employees: 3
<b>Office of Environmental Information</b>
Toxic Release Inventory (TRI) Outreach, Web Issues, and TRI Regional and State Coordination
Central Data Exchange
Implementation Guidance
TRI Compliance Assistance
Total Partial Time Employees: 4
<b>Office of Enforcement and Compliance Assurance</b>
Environmental Justice
Regulatory Steering Committee
Compliance Assistance General
Compliance Assistance Plan
Audit Policy
Compliance Assistance – Cross Cutting Issues
Performance Measurement
Inventory of EPA’s Planned Compliance Assistance Activities
Compliance Assistance Centers
Total Partial Time Employees: 9
<b>Total Partial Time Employees for Mercury Regulatory Steering Committee: 38</b>
<b>Total Full Time Equivalent Employees under the Committee: 6</b>

## **Appendix E: First Year Implementation**

The Mercury Quality and Standards Coordinator will be spending the entire portion of time working on researching existing and future technologies and creating corresponding standards to which facilities must adhere. The sole job of this position in the first year will be to establish a structure to approve technologies and create standards for facilities. In the following years, the position will be to select approved technologies and create standards.

The Mercury Program Coordinator will streamline all these efforts and combine the regulations with the current regulations. By combining mercury emissions with the other air emissions, this reduces the redundancy of air emission regulations. While the facilities are measuring for carbon dioxide, sulfur dioxide, and nitrous oxides, they can now measure mercury at the same time and submit the emissions information simultaneously into the same database. The Mercury Program Coordinator will also be responsible for continued monitoring and enforcement of the regulations. The states will report non-compliant facilities to the Mercury Program Coordinator, who will be able to ensure compliance and enforcement.

These regulations now go to the Mercury Workgroup which will ensure that cross-program process issues are resolved or referred to management. After the Mercury Workgroup approves the new regulations, the regulations will be sent to the Administrator of the EPA who signs the regulations into effect. At this point, the Mercury Liaison Specialist will spread the information about the new regulations to the states and facilities.

The task of the MRSC in the first year will be to conglomerate the different offices together and establish an understanding of what the Mercury Program aims to accomplish. Establishing the connections between offices and creating a framework for the following years is essential in the first year.

After the first year, these positions will be essential for the continuation of the Mercury Program. The Mercury Quality and Standards Coordinator will be working to ensure that the new regulations reflect any changes in legislation and encompass new technologies or stricter standards, as well as ensuring that facilities are in regulation. The Mercury Program Coordinator will be integrating the Mercury Program with the other air emission programs primarily in the first year, but will constantly be communicating with the Mercury Quality and Standards Coordinator, and continuing monitoring, compliance, and enforcement of the regulations. The Mercury Policy Analyst Coordinator will ensure that the new regulations, options, and subsequent revisions are within the scope of the legislation and will prepare for the Congressional Review of the program. The Mercury Liaison Specialist will continue to ensure communication between the various stakeholders involved. Finally, to ensure that the MRSC is communicating with each other and with the Mercury Workgroup, the Mercury Program Director will continue to manage the MRSC.

## Appendix F: Performance Management

Table 1: Rulemaking

Tasks (Goals)	Indicators	Collection	Reporting	Feedback
Final Rule Developed by Deadline of December 31, 2006	<p>Stage 1: Tiering the Action</p> <p>Stage 2: Developing the draft action</p> <p>Stage 3: Requesting the Administrator's Signature and publishing an action</p> <p>Stage 4: Developing the final action and ensuring Congressional review</p>	<p>WHO: Managers within the MRSC, collect e-mails from Workgroup</p> <p>HOW: Outputs via email</p> <p>FREQ: Bi-weekly</p> <p>STORED/RECEIVED: computer files maintained by Liaison Specialist</p>	<p>TO WHOM: The Director of the MRSC</p> <p>WHAT FORM: Memo of collected emails: biweekly</p> <p>DETAIL: explanation of progress on rulemaking, how rules developed and justification, notes any changes.</p>	<p>WHAT CIRCUMSTANCES: If work overlaps, if not meeting timeline, if non-compliant with laws, or sub par quality</p> <p>WHO CAN MAKE CHANGES: Director facilitates the changes among the offices</p>

Table 2: Control Technology

Tasks (Goals)	Indicators	Collection	Reporting	Feedback
<p>Research and development of technologies resulting in comprehensive</p> <p>List at end of 1<sup>st</sup> year including cost benefit analysis</p>	<p>List of technologies and on-going research received monthly</p>	<p>MOU with the DOE, EPA, and EPRI will be established which will clarify the roles and responsibilities of each organization.</p> <p>EPA, DOE, EPRI collects information on progress of control technologies along with costs associated with each technology and/ or research/consulting team</p>	<p>TO WHOM: EPA, DOE, EPRI report to Mercury Liaison and then Liaison reports to MRSC (most importantly the Quality &amp; Standards Coordinator and Program Coordinator, who has the most expertise in this area)</p> <p>WHAT FORM: Report</p> <p>HOW OFTEN: monthly</p> <p>DETAIL: potential reduction of Hg emission from specific technology, feasibility, availability, research and development, costs associated with installation, training of staff, and running of technology</p>	<p>MRSC (specifically Q&amp;S coordinator) provides feedback when necessary to EPA, DOE, EPRI in form of memo, with copy to Liaison.</p> <p>Necessary will mean: missing information in the report, additional information requested by the MRSC, additional breakdown of reported costs, further coordination needed with the rules and regulations as set forth by the Act.</p>

Table 3: Monitoring and Reporting and Compliance and Enforcement

Tasks (Goals)	Indicators	Collection	Reporting	Feedback
Letter of Intent for monitoring requirements to power plants by end on first year	Biweekly time and activity on progress of development of requirements for monitoring and reporting	<p>WHO: Liaison collects information on Program Coordinator</p> <p>HOW: From time cards and work activities</p> <p>FREQ: bi-weekly</p> <p>STORED: Electronically</p>	<p>TO WHOM: Director</p> <p>WHAT FORM: Memo</p> <p>HOW OFTEN: Bi-weekly</p> <p>DETAIL: time spent on developing Hg monitoring system and description of progress on meeting tasks</p>	<p>HOW DO WE MAKE MIDCOURSE CORRECTIONS: Director will take action</p> <p>WHAT CIRCUMSTANCES: If Program Coordinator not spending enough time</p>
Establish guidelines of compliance and enforcement, Establish methods of enforcement	Publication of guidelines for compliance and enforcement	<p>WHO: Liaison collects information on Program Coordinator</p> <p>HOW: From time card and work activities</p> <p>FREQ: Bi-Weekly</p> <p>STORED: Electronically</p>	<p>TO WHOM: Director</p> <p>WHAT FORM: Memo</p> <p>HOW OFTEN: Bi-weekly</p> <p>DETAIL: Specific time spent on task and describe work progress</p>	<p>Director takes action</p> <p>WHAT CIRCUMSTANCES: If Program Coordinator not spending allocated time</p>

## Appendix G: Master Calendar

Table 1. Schedule of Deliverables for 2006

Phase	Task	2005	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
<b>1: Rulemaking</b>														
	Tiering the Action	Prior to 2006												
	Scoping/comment Period Prior to Draft Rulemaking		1/1-2/1											
	Beginning of Drafting Rules			2/2 - 6/1										
	Draft Rules Released for Public Comment							6/2						
	Midyear Review							6/29 - 7/28						
	Draft Rules Open for Public Comment							6/2 - 7/15						
	Draft of Final Version of Rules								7/17 - 11/1					
	Completion of Development of Draft Action									8/1				
	Comment Period for Draft Action									8/2 - 9/1				
	Requesting Administrator Signature & Publishing Action												11/1	
	Final Rules Published												11/2	
	Final Rules Signed by Administrator													12/1
	Final Rules Approved by Congress													12/20
	Final Rules Approved by President													12/21
	Final Rules Written as Official EPA Rule													12/29
<b>2: Technology</b>														
	Establish Memorandum of Understanding: DOE, EPA & EPRI		1/5											
	DOE, EPA & EPRI Establish Final Memo of Understanding			2/2										
	Release of Mid-year Draft Technology List								7/3					
	Release of Mid-year Final Technology List								7/27					
	Release of End-year Draft Technology List													12/4
	Release of End-year Final Technology List													12/29
	Final Release Approved Technology to Facilities and States													12/29
<b>3: Monitoring / Reporting</b>														
	MRSC Contact TRI & ECHO for Addition of Mercury to Databases				3/15									
	Development of Draft for Guidelines/Regulations for Monitoring/Reporting							6/28						
	Comment Period by States and Power Plants								7/3 - 8/7					
	Submit Letter of Intent to States and Power Plants													12/29
<b>4: Compliance / Enforcement</b>														
	Draft of Letter of Intent for Guidelines for Compliance/Enforcement												11/1	
	Publication of Guidelines Submitted to States and Power Plants													12/29

## Appendix H: Budget

Table 1. Line Item Budget

<b>EXPANDED ANNUAL BUDGET</b>	<b>Number</b>	<b>Expense</b>	<b>Expense Total</b>
<b>PERSONNEL MANAGEMENT</b>			
<i>Mercury Regulatory Steering Committee</i>	6	\$303,178	\$303,178
GS 13: District of Columbia	1	\$93,495	\$93,495
GS 11: North Carolina	3	\$50,541	\$157,971
GS 11: District of Columbia	1	\$52,468	\$32,793
Intern	1	\$17,120	\$17,120
<i>Mercury Workgroup</i>	32	\$0	\$0
On the Spot Awards	6	\$300	\$1,800
<b>Services Total</b>			<b>\$303,178</b>
<b>COMMUNICATION and OUTREACH</b>			
Meeting Costs	10	\$100	\$1,000
Travel	21	\$900	\$18,900
Employee Learning and Development	38	\$105	\$3,990
Print Media	1	\$1,000	\$1,000
<b>Communications Total</b>			<b>\$24,890</b>
<b>OFFICE TECHNICAL SUPPLIES</b>			
Blackberry	2	\$600	\$1,200
Laptop	2	\$700	\$1,400
Facility	4	\$0	\$0
<b>Other Direct Costs Total</b>			<b>\$2,600</b>
<b>COOPERATIVE AGREEMENT</b>			
Environmental Council of the States	1	\$30,000	\$30,000
<b>Contract Total</b>			<b>\$30,000</b>
<b>TOTAL BUDGET FUNDING</b>			<b>\$360,668</b>

Table 2: Total Budget by Line Item and Program Categories

<b>I. PERSONNEL MANAGEMENT</b>	<b>Quantity</b>	<b>GS Level/ Pay Scale</b>	<b>Base Salary</b>	<b>% Time</b>	<b>Subtotal without Benefits</b>	<b>Fringe Benefits (25%)</b>	<b>Cost</b>	<b>Subtotal With Benefits</b>	<b>Rulemaking</b>	<b>Technology</b>	<b>Monitoring</b>	<b>Compliance</b>	<b>Admin. Duties</b>	<b>Total</b>
<i>MERCURY REGULATORY STEERING COMMITTEE</i>														
Mercury Program Director, Washington DC	1	13	\$74,782	100	\$74,796	\$18,699		\$93,495	\$65,447	\$9,350	\$9,350	\$9,350		\$93,495
Mercury Liaison Coordinator Specialist, Washington DC	1	11	\$52,468	50	\$26,234	\$6,559		\$32,793	\$16,396	\$3,279	\$6,559	\$6,559		\$32,793
Mercury Policy Analyst Coordinator, Raleigh, NC	1	11	\$50,541	50	\$25,271	\$6,318		\$31,588	\$31,588					\$31,588
Mercury Quality and Standards Coordinator, Raleigh, NC	1	11	\$50,541	100	\$50,553	\$12,638		\$63,191		\$63,191				\$63,191
Mercury Program Coordinator, Raleigh, NC	1	11	\$50,541	100	\$50,553	\$12,638		\$63,191		\$6,319	\$28,436	\$28,436		\$63,191
Environmental Protection Intern (10 month temporary position), Washington, DC	1	\$10.00	\$17,120	100	\$17,120	\$0		\$17,120	\$8,560				\$8,560	\$17,120
<i>MERCURY WORKGROUP</i>														
Subtotal	32	N/A	N/A	< 25%	N/A	N/A		\$0	N/A	N/A	N/A	N/A	N/A	\$0
On the Spot Awards	6						\$300		\$450	\$450	\$450	\$450		\$1,800
SUBTOTAL PERSONAL SERVICES									\$122,441	\$82,589	\$44,794	\$44,794	\$8,560	\$303,178
<b>II. COMMUNICATION and OUTREACH</b>	<b>Quantity</b>	<b>Category</b>	<b>Cost</b>						<b>Rulemaking</b>	<b>Technology</b>	<b>Monitoring</b>	<b>Compliance</b>	<b>Admin. Duties</b>	<b>Subtotal</b>
Meeting Costs	10	meetings	\$100						\$200	\$200	\$200	\$200	\$200	\$1,000
Travel	21	trips	\$900						\$4,725	\$4,725	\$4,725	\$4,725		\$18,900
Employee Learning and Development	38	employees	\$105						\$998	\$998	\$998	\$998		\$3,990
Print Media	1	amount	\$1,000						\$200	\$200	\$200	\$200	\$200	\$1,000
SUBTOTAL COMMUNICATIONS									\$6,123	\$6,123	\$6,123	\$6,123	\$400	\$24,890
<b>III. OFFICE TECHNICAL SUPPLIES</b>	<b>Quantity</b>	<b>Cost</b>							<b>Rulemaking</b>	<b>Technology</b>	<b>Monitoring</b>	<b>Compliance</b>	<b>Admin. Duties</b>	<b>Subtotal</b>
Blackberry	2	\$600							\$240	\$240	\$240	\$240	\$240	\$1,200
Laptop	2	\$700							\$280	\$280	\$280	\$280	\$280	\$1,400
Facility		\$0							N/A	N/A	N/A	N/A	N/A	\$0
SUBTOTAL DIRECT COSTS									\$520	\$520	\$520	\$520	\$520	\$2,600
<b>IV. COOPERATIVE AGREEMENT</b>	<b>Quantity</b>	<b>Cost</b>							<b>Rulemaking</b>	<b>Technology</b>	<b>Monitoring</b>	<b>Compliance</b>	<b>Admin. Duties</b>	<b>Subtotal</b>
Cooperative Agreement	1	\$30,000									\$15,000	\$15,000		\$30,000
SUBTOTAL COOPERATIVE AGREEMENTS											\$15,000	\$15,000		\$30,000
<b>TOTAL</b>									<b>\$129,083</b>	<b>\$89,232</b>	<b>\$66,437</b>	<b>\$66,437</b>	<b>\$9,480</b>	<b>\$360,668</b>

## References

- <sup>1</sup> "Frequent Questions About Mercury." 13 Apr. 2005. U.S. Environmental Protection Agency. 15 Jun. 2005 <[www.epa.gov/mercury/faq.htm#1](http://www.epa.gov/mercury/faq.htm#1)>.
- <sup>2</sup> "Mercury and its Many Forms." 25 Jan. 2002. California Poison Control System. 11 Jun. 2005 <[www.calpoison.org/public/mercury.html](http://www.calpoison.org/public/mercury.html)>.
- <sup>3</sup> Wright, Karen. "Our Preferred Poison: A little mercury is all that humans need to do away with themselves quietly, slowly, and surely." *Discover* Sept. 2005. 18 Jun. 2005 <[www.discover.com/issues/mar-05/features/our-preferred-poison/](http://www.discover.com/issues/mar-05/features/our-preferred-poison/)>.
- <sup>4</sup> "Mercury and its Many Forms." 25 Jan. 2002. California Poison Control System. 11 Jun. 2005 <[www.calpoison.org/public/mercury.html](http://www.calpoison.org/public/mercury.html)>.
- <sup>5</sup> "Leahy and Snowe Offer Bill to Cut Mercury Pollution." 6 Apr. 2005. Press Release Office of U.S. Senator Patrick Leahy. 7 Aug. 2005 <<http://leahy.senate.gov/press/200504/040605.html>>.
- <sup>6</sup> Trasande, Leonardo, J. Landrigan, and Clyde Schechter. "Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain." *Environmental Health Perspectives* 113.5 (May 2005). 5 December 2005 <<http://ehp.niehs.nih.gov/members/2005/7743/7743.pdf>>.
- <sup>7</sup> Mercury Damage Costs Billions, Study Finds: Lower IQs Caused by Prenatal Exposure Lead to Lost Wages." 8 Feb. 2005 Associated Press. 7 August 2005 <[www.msnbc.msn.com/id/7047325](http://www.msnbc.msn.com/id/7047325)>.
- <sup>8</sup> U.S. Congress. S.730 Mercury Emission Act of 2005 (Introduced in Senate.) Washington, DC. Apr. 2005.
- <sup>9</sup> "Mercury and its Many Forms." 25 Jan. 2002. California Poison Control System. 11 Jun. 2005 <[www.calpoison.org/public/mercury.html](http://www.calpoison.org/public/mercury.html)>.
- <sup>10</sup> "Learn About Mercury and Its Effects." *Mercury Contamination in Fish*. National Resources Defense Council. <[www.nrdc.org/health/effects/mercury/effects.asp](http://www.nrdc.org/health/effects/mercury/effects.asp)>.
- <sup>11</sup> Ibid.
- <sup>12</sup> Wright, Karen. "Our Preferred Poison: A little mercury is all that humans need to do away with themselves quietly, slowly, and surely." *Discover* Sept. 2005. 18 Jun. 2005 <[www.discover.com/issues/mar-05/features/our-preferred-poison/](http://www.discover.com/issues/mar-05/features/our-preferred-poison/)>.
- <sup>13</sup> Cocca, Paul. "Mercury Maps: Linking Air Deposition and Fish Contamination on a National Scale." 14 Jan. 2005. U.S. Environmental Protection Agency. 7 Aug. 2005 <[www.epa.gov/waterscience/maps/fs.htm#back](http://www.epa.gov/waterscience/maps/fs.htm#back)>.
- <sup>14</sup> "Water Quality Conditions in the U.S.: A Profile from the 2000 National Water Quality Inventory." Aug. 2002. U.S. Environmental Protection Agency. 7 Aug. 2005 <[www.epa.gov/305b/2000report/factsheet.pdf](http://www.epa.gov/305b/2000report/factsheet.pdf)>.
- <sup>15</sup> Murray, M. "Additional Thoughts of Mercury Release Inventories in the U.S." Nov. 2004. National Wildlife Federation. 7 Aug. 2005 <[www.epa.gov/region5/air/mercury/meetings/Nov04/Murray-sources.pdf](http://www.epa.gov/region5/air/mercury/meetings/Nov04/Murray-sources.pdf)>.
- <sup>16</sup> Ibid.
- <sup>17</sup> Ibid.
- <sup>18</sup> U.S. Congress. S.730 Mercury Emission Act of 2005 (Introduced in Senate.) Washington, DC. Apr. 2005.
- <sup>19</sup> Ibid.
- <sup>20</sup> Evers, David. "Mercury Connections: The extent and effects of mercury pollution in northeastern North America." *BioDiversity Research Institute. Biogeographical Patterns of Environmental Mercury in the Northeastern North America.*, Ecotoxicology, 2005, Vol. 14 no. 1 and 2. <[www.briloon.org/mercury/BRIMercury.pdf](http://www.briloon.org/mercury/BRIMercury.pdf)>.
- <sup>21</sup> "EPA Fact Sheet: National Listing of Fish Advisories." Aug. 2004. U.S. Environmental Protection Agency. 16 Jun. 2005 <[www.epa.gov/waterscience/fish/advisories/factsheet.pdf](http://www.epa.gov/waterscience/fish/advisories/factsheet.pdf)>.
- <sup>22</sup> Ibid.
- <sup>23</sup> Lazaroff, Cat. "Supporters of Stronger Mercury Controls Claim Moral Victory. September 13, 2005. Accessed through <http://www.earthjustice.org/news/display.html?ID=1046>.
- <sup>24</sup> Kuehn, Bridget M. "Medical Groups Sue EPA Over Mercury Rule." *The Journal of American Medical Association*, Vol. 294, No.4, 27 Jul. 2005. <<http://0-jama.ama-assn.org.library.lanec.edu/cgi/content/extract/294/4/415>>.
- <sup>25</sup> Press Release, New York State Attorney General Elliot Spitzer. "Eleven States Sue EPA to Block Second Mercury Rule." May 18, 2005. The Office of New York State Attorney General Elliot Spitzer. 15 Sep. 2005. <[www.oag.state.ny.us/press/2005/may/may18d\\_05.html](http://www.oag.state.ny.us/press/2005/may/may18d_05.html)>.

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- <sup>26</sup> “Mercury Emissions from Coal-fired Power Plants: The Case for Regulatory Action,” 1 Oct. 2003. Northeast States for Coordinated Air Use Management. 9 Aug. 2005  
<[bronze.nescaum.org/airtopics/mercury/rpt031104mercury.pdf](http://bronze.nescaum.org/airtopics/mercury/rpt031104mercury.pdf)>.
- <sup>27</sup> U.S. Congress. S.730 Mercury Emission Act of 2005 (Introduced in Senate.) Washington, DC. Apr. 2005. Sec.3.a.1.C.
- <sup>28</sup> Ibid. Sec.3.c.1.D.
- <sup>29</sup> Ibid. Sec.3.a.2.A.
- <sup>30</sup> Ibid. Sec.3.a.2.B.
- <sup>31</sup> “Mercury Laws and Regulations.” 12 May 2005. U.S. Environmental Protection Agency. 9 Sep. 2005.  
<[www.epa.gov/mercury/regs.htm](http://www.epa.gov/mercury/regs.htm)>.
- <sup>32</sup> “Clean Air Mercury Rule – Basic Information.” 25 May 2005. U.S. Environmental Protection Agency. 13 Sep. 2005. <[www.epa.gov/air/mercuryrule/basic.htm](http://www.epa.gov/air/mercuryrule/basic.htm)>.
- <sup>33</sup> Testimony of James Inhofe, “Clear Skies Act of 2005.” 2 Feb. 2005. Senate Environment and Public Works. 15 Sep. 2005. <<http://inhofe.senate.gov/pressreleases/climateupdate.htm>>.
- <sup>34</sup> Energy Information Administration, *Analysis of Alternative Mercury Control Strategies*. Washington D.C. National Energy Information Center, January 2005.
- <sup>35</sup> Schwartz, Joel. “Clear Skies, Hazy Logic.” 23 Apr. 2003. Mercatus Center, American Enterprise Institute. 15 Sep. 2005. <<http://www.mercatus.org/regadar/topnews/archives/005689.php>>.
- <sup>36</sup> Schwartz, Joel. “Clear Foolishness.” 23 Mar. 2005. American Enterprise Institute. 15 Sep. 2005. <[www.aei.org/research/nri/publications/pubID.22171,projectID.22/pub\\_detail.asp](http://www.aei.org/research/nri/publications/pubID.22171,projectID.22/pub_detail.asp)>.
- <sup>37</sup> “Energy and Research.” 2005. The Heritage Foundation. 15 Sep. 2005.  
<[www.heritage.org/Research/Features/Issues2004/EnergyEnviro.cfm](http://www.heritage.org/Research/Features/Issues2004/EnergyEnviro.cfm)>.
- <sup>38</sup> “EPA’s Action Development Process: Guidance for EPA Staff on Developing Quality Actions.” U.S. Environmental Protection Agency. 7 May 2003.
- <sup>39</sup> “Controlling Power Plant Emissions: Mercury Specific: Activated Carbon Injection (ACI).” 19 Aug. 2005. U.S. Environmental Protection Agency. 19 Aug. 2005  
<[www.epa.gov/mercury/control\\_emissions/tech\\_merc\\_specific.htm](http://www.epa.gov/mercury/control_emissions/tech_merc_specific.htm)>
- <sup>40</sup> Ibid.
- <sup>41</sup> Srivastava, R.K. and Staudt, J.E. “Preliminary Estimates of Performance and Cost of Mercury Emission Control Technology Applications on Electric Emission Control Technology Applications on Electric Utility Boilers: An Update.” Jun. 2004. U.S. Environmental Protection Agency. 19 Sep. 2005  
<[http://www.epa.gov/mercury/control\\_emissions/preliminary\\_estimates.pdf](http://www.epa.gov/mercury/control_emissions/preliminary_estimates.pdf)>
- <sup>42</sup> Feeley, T. J. et al., “Field Testing of Mercury Control Technologies for Coal-Fired Power Plants” U.S. Department of Energy, National Energy Technology Laboratory Mercury R&D Program Review, May 2005.
- <sup>43</sup> Srivastava, R.K. and Staudt, J.E. “Preliminary Estimates of Performance and Cost of Mercury Emission Control Technology Applications on Electric Emission Control Technology Applications on Electric Utility Boilers: An Update.” Jun. 2004. U.S. Environmental Protection Agency. 19 Sep. 2005
- <sup>44</sup> Srivastava, R.K. et al., “Effect of SCR Catalyst on Mercury Speciation.” Paper # 7. U.S. Environmental Protection Agency. 19 Sep. 2005 <[http://www.epa.gov/mercury/control\\_emissions/scr\\_catalyst.pdf](http://www.epa.gov/mercury/control_emissions/scr_catalyst.pdf)>
- <sup>45</sup> Ibid.
- <sup>46</sup> “Air Pollution Prevention and Control Division: Control of Mercury Emissions from Coal-Fired Electricity Utility Boilers.” U.S. Environmental Protection Agency. 17 Jul. 2005 <http://epa.gov/ttn/atw/utility/hgwhitepaperfinal.pdf>.
- <sup>47</sup> Ibid.
- <sup>48</sup> Based on cost estimates from Srivastava, R.K and Staudt, K.E (2004) outlining different costs with facilities with different technology configurations and burning different coal types.
- <sup>49</sup> Srivastava, R.K. and Staudt, J.E. “Preliminary Estimates of Performance and Cost of Mercury Emission Control Technology Applications on Electric Emission Control Technology Applications on Electric Utility Boilers: An Update.” Jun. 2004. U.S. Environmental Protection Agency. 19 Sep. 2005  
<[http://www.epa.gov/mercury/control\\_emissions/preliminary\\_estimates.pdf](http://www.epa.gov/mercury/control_emissions/preliminary_estimates.pdf)>
- <sup>50</sup> Ibid.
- <sup>51</sup> Environmental Technology Verification Program. 6 Jan. 2004. Environmental Protection Agency. 4 Aug. 2005  
<[www.epa.gov/etv/verifications/vcenter1-11.html](http://www.epa.gov/etv/verifications/vcenter1-11.html)>.
- <sup>52</sup> Ibid.

- 
- <sup>53</sup> U.S. Occupational Health and Safety Administration. "Backup Report No. ID-140." Evaluation of a Solid Sorbent Passive Dosimeter for Collecting Mercury Vapor. 2 Aug. 2005 <[www.osha-slc.gov/dts/sltc/methods/inorganic/id140/id140bkr.html](http://www.osha-slc.gov/dts/sltc/methods/inorganic/id140/id140bkr.html)>.
- <sup>54</sup> Appendix C: Ambient Atmospheric Monitoring and Stack Testing. Massachusetts Department of Environmental Protection. 1 Aug. 2005 <[www.mass.gov/dep/files/mercury/appc.htm](http://www.mass.gov/dep/files/mercury/appc.htm)>.
- <sup>55</sup> Ibid.
- <sup>56</sup> 4.18 Analysis of Mercury in Precipitation and Air. Norwegian Institute for Air Research. 1 Aug. 2005 <[www.nilu.no/projects/ccc/manual/documents/04\\_18-Analysis%20of%20mercury%20in%20precipitation%20and%20air.htm](http://www.nilu.no/projects/ccc/manual/documents/04_18-Analysis%20of%20mercury%20in%20precipitation%20and%20air.htm)>.
- <sup>57</sup> Continuous Emissions Monitoring Fact Sheet. 25 Oct. 2002. Environmental Protection Agency. 18 Sept. 2005 <[www.epa.gov/airmarkets/monitoring/factsheet.html](http://www.epa.gov/airmarkets/monitoring/factsheet.html)>.
- <sup>58</sup> Ibid.
- <sup>59</sup> Mallowney, Robert L., Jr. Field Experience Using Low Cost Fuel Cells for CEMS. 9 Jan. 2001. AIR-WORLD Environmental, Inc. 18 Sept. 2005 <[www.earthvision.net/ColdFusion/News\\_Page1.cfm?NewsID=14973](http://www.earthvision.net/ColdFusion/News_Page1.cfm?NewsID=14973)>.
- <sup>60</sup> Ibid.
- <sup>61</sup> Ibid.
- <sup>62</sup> Ibid.
- <sup>63</sup> Ibid.
- <sup>64</sup> Davis, Robert. Guest Dialog: The Cost of Inaccurate CEM Calibration Gases. 1 May 2005. Pollution Engineering. 18 Sept. 2005. <[www.poleng.com/CDA/ArticleInformation/features/BNP\\_Features\\_Item/0,6649,149989,00.html](http://www.poleng.com/CDA/ArticleInformation/features/BNP_Features_Item/0,6649,149989,00.html)>
- <sup>65</sup> The Cost of Inaccurate CEM Calibration Gases. Scott Specialty Gases. 18 Sept. 2005 <[www.scotecatalog.com/ScottGas/welcome.nsf/Subjects/ArticleSpecApps\\_032005](http://www.scotecatalog.com/ScottGas/welcome.nsf/Subjects/ArticleSpecApps_032005)>.
- <sup>66</sup> United States. Senate. Mercury Emission Act of 2005. 109th Cong., 1st sess. S. 730. Washington, DC, 2005.
- <sup>67</sup> Schmid, Volker. Continuous Monitoring of Mercury Emissions from Stationary Sources. Oct. 2002. Clean Air Engineering. 4 Aug. 2005 <[www.cleanair.com/Reference/Library/publications/MercuryMonitoring.pdf](http://www.cleanair.com/Reference/Library/publications/MercuryMonitoring.pdf)>.
- <sup>68</sup> Mrs. Nora Lopes, Toxic Release Inventory Coordinator, Region 2. Telephone Interview. 20 September 2005.
- <sup>69</sup> Mrs. Nora Lopes, Toxic Release Inventory Coordinator, Region 2. Telephone Interview. 20 September 2005.
- <sup>70</sup> Mr. Michael Smith, Minnesota Pollution Control Agency. Telephone Interview. 20 September 2005.
- <sup>71</sup> U.S. EPA. Enforcement and Compliance History Online. Washington, DC, 2005.
- <sup>72</sup> Mrs. Nora Lopes, Toxic Release Inventory Coordinator, Region 2. Telephone Interview. 20 September 2005.
- <sup>73</sup> United States Environmental Protection Agency (EPA). Science and Technology: Mercury. Washington, DC, 2005.
- <sup>74</sup> New York State Department of Environmental Conservation. Bureau of Air Quality Surveillance. New York, NY, 2005.
- <sup>75</sup> Minnesota Pollution Control Agency. Environmental Analysis and Outcomes Division. St. Paul, MN, 2005.
- <sup>76</sup> Mrs. Nora Lopes, Toxic Release Inventory Coordinator, Region 2. Telephone Interview. 20 September 2005.
- <sup>77</sup> Personal Phone Conversation, Bill Werhum, Assistant Administrator of the Office of Air and Radiation. 8 Oct. 2005.
- <sup>78</sup> EPA Organizational Structure. 12 Jul. 2005. Environmental Protection Agency. 8 Oct. 2005. <[www.epa.gov/epahome/organization.htm](http://www.epa.gov/epahome/organization.htm)>.
- <sup>79</sup> Air and Radiation Organizational Chart. 3 Oct. 2005. Environmental Protection Agency. 8 Oct. 2005. <[www.epa.gov/air/oarofcs.html](http://www.epa.gov/air/oarofcs.html)>.
- <sup>80</sup> Acid Rain Program. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/airmarkets/arp/](http://www.epa.gov/airmarkets/arp/)>.
- <sup>81</sup> Nitrous Oxides Reduction under the Acid Rain Program. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/airmarkets/arp/nox/index.html](http://www.epa.gov/airmarkets/arp/nox/index.html)>.
- <sup>82</sup> OAQPS Organization: Policy Analysis and Communications Staff. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/od/pacs.html](http://www.epa.gov/oar/oaqps/organization/od/pacs.html)>.
- <sup>83</sup> OAQPS Organization: Planning, Resources, and Regional Management Staff. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/od/prrms.html](http://www.epa.gov/oar/oaqps/organization/od/prrms.html)>.
- <sup>84</sup> Acid Rain Program: Clean Air Markets: Acid Rain Program. 9 Oct 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/airmarkets/arp/](http://www.epa.gov/airmarkets/arp/)>.
- <sup>85</sup> OAQPS Organization: Emissions, Monitoring, and Analysis Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/emad/director.html](http://www.epa.gov/oar/oaqps/organization/emad/director.html)>.

- 
- <sup>86</sup> OAQPS Organization: Emissions Standards Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/esd/director.html](http://www.epa.gov/oar/oaqps/organization/esd/director.html)>.
- <sup>87</sup> OAQPS Organization: Information Transfer and Program Integration Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/itpid/director.html](http://www.epa.gov/oar/oaqps/organization/itpid/director.html)>.
- <sup>88</sup> Small Business Environmental Home Page. 14 July 2004. Environmental Protection Agency Small Business Contacts and Projects. 9 Oct. 2005. <[www.smallbiz-enviroweb.org/contacts/epacont.html#Office%20of%20Enforcement%20and%20Compliance%20Assurance](http://www.smallbiz-enviroweb.org/contacts/epacont.html#Office%20of%20Enforcement%20and%20Compliance%20Assurance)>
- <sup>89</sup> Earth Justice Policy and Legislation. 2005. Earth Justice. 9 Oct. 2005. <[www.earthjustice.org/policy/profiles/display.html?Department=Environmental%20Protection%20Agency](http://www.earthjustice.org/policy/profiles/display.html?Department=Environmental%20Protection%20Agency)>.
- <sup>90</sup> Office of Air and Radiation: Office of Program Management Operations. 13 Jun. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/air/opmo.html](http://www.epa.gov/air/opmo.html)>.
- <sup>91</sup> Federal Wage System Job Grading Standard for Supervisors. Dec. 1992. Office Of Personnel Management. 9 Oct. 2005. <[www.opm.gov/fedclass/fwssupv.pdf](http://www.opm.gov/fedclass/fwssupv.pdf)>.
- <sup>92</sup> Organization: Emissions, Monitoring, and Analysis Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/emad/director.html](http://www.epa.gov/oar/oaqps/organization/emad/director.html)>.
- <sup>93</sup> OAQPS Organization: Emissions Standards Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/esd/director.html](http://www.epa.gov/oar/oaqps/organization/esd/director.html)>.
- <sup>94</sup> OAQPS Organization: Planning, Resources, and Regional Management Staff. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/od/prrms.html](http://www.epa.gov/oar/oaqps/organization/od/prrms.html)>.
- <sup>95</sup> OAQPS Organization: Information Transfer and Program Integration Division. 9 Oct. 2005. Environmental Protection Agency. 9 Oct. 2005. <[www.epa.gov/oar/oaqps/organization/itpid/director.html](http://www.epa.gov/oar/oaqps/organization/itpid/director.html)>.
- <sup>96</sup> U.S. Congress. S.730 Mercury Emission Act of 2005 (Introduced in Senate.) Washington, DC. Apr. 2005.
- <sup>97</sup> United States Environmental Protection Agency. Salary Table 2005. Washington, D.C. 2005.
- <sup>98</sup> Ibid.
- <sup>99</sup> Ibid.
- <sup>100</sup> Environmental Careers Organization. Frequently Asked Questions. 2005. 19 October 2005. <[http://www.eco.org/site/c.dnJLKPNnFkG/b.942909/k.791F/Frequently\\_Asked\\_Questions.htm#How\\_much\\_do\\_the\\_internships\\_pay\\_](http://www.eco.org/site/c.dnJLKPNnFkG/b.942909/k.791F/Frequently_Asked_Questions.htm#How_much_do_the_internships_pay_)>
- <sup>101</sup> United States Environmental Protection Agency. Salary Table 2005. Washington, D.C. 2005.
- <sup>102</sup> Ibid.
- <sup>103</sup> Harris, Emma. Personal Interview. 3 November 2005.
- <sup>104</sup> "Clean Air Mercury Rule – Basic Information." 25 May 2005. U.S. Environmental Protection Agency. 13 Sep. 2005. <[www.epa.gov/air/mercuryrule/basic.htm](http://www.epa.gov/air/mercuryrule/basic.htm)>.
- <sup>105</sup> "Clear Skies." 7 Feb. 2005. U.S. Environmental Protection Agency. 13 Sep. 2005. <[www.epa.gov/clearskies/](http://www.epa.gov/clearskies/)>.
- <sup>106</sup> "Clean Air Mercury Rule." 25 May 2005. U.S. Environmental Protection Agency. 13 Sep. 2005. <[www.epa.gov/air/mercuryrule/index.htm](http://www.epa.gov/air/mercuryrule/index.htm)>.
- <sup>107</sup> Ibid.
- <sup>108</sup> Samuelsohn, Darren. "CLEAN AIR: Nine states Sue EPA over Mercury Rule" Greenwire: AIR, WATER & CLIMATE, 2005, Vol. 10 No. 9.
- <sup>109</sup> Mascia, Jennifer. "Environment: EPA's Mercury Rule Falls Short, Activists Say." IPS-Inter Press Service. 18 Mar. 2005.
- <sup>110</sup> McCarthy, James. "Congressional Research Service Report: EPA's Cap-and-Trade Rule for Utility Mercury Emissions." Washington D.C.: Congressional Research Service. 19 Apr. 2005.
- <sup>111</sup> Ibid
- <sup>112</sup> Congressional Research Service, *Memorandum: EPA's Cap-and-Trade rule for Mercury Emissions*. April 19, 2005
- <sup>113</sup> Mercury Workshop Group. "S.730, The Mercury Emission Act of 2005." MPA report. Columbia University, 2005.
- <sup>114</sup> Ibid.
- <sup>115</sup> EPA Organizational Structure. 12 Jul. 2005. Environmental Protection Agency. 8 Oct. 2005. <[www.epa.gov/epahome/organization.htm](http://www.epa.gov/epahome/organization.htm)>.
- <sup>116</sup> Air and Radiation Organizational Chart. 3 Oct. 2005. Environmental Protection Agency. 8 Oct. 2005. <[www.epa.gov/air/oarofcs.html](http://www.epa.gov/air/oarofcs.html)>.

---

<sup>117</sup> Small Business Environmental Home Page. 14 July 2004. Environmental Protection Agency Small Business Contacts and Projects. 9 Oct. 2005. <[www.smallbiz-enviroweb.org/contacts/epacont.html#Office%20of%20Enforcement%20and%20Compliance%20Assurance](http://www.smallbiz-enviroweb.org/contacts/epacont.html#Office%20of%20Enforcement%20and%20Compliance%20Assurance)>.