

# **Northern States Power's Voluntary Mercury Reduction Plan**

May 8, 2000

## What NSP Intends to Do

### 1. Product Inventory and Phase Out

NSP is in the process of updating the Generating Plant, Service Center and Building mercury product surveys conducted in 1998 and obtaining mercury inventories for the Minnesota generating plants and other sites which did not previously complete a survey. NSP's goal is to ensure that all inventories accurately list all devices on site, which contain mercury, with accurate estimates of the amount of mercury per device.

As part of the 2000 inventories, NSP will also classify each type of mercury containing device according to the risk of environmental release by assigning one of three risk levels. The risk level will be determined by field personnel who are familiar with the equipment and are defined as follows:

- High Risk – Mercury containing device, which is moved frequently and may release Hg if dropped or bumped.
- Medium Risk – Mercury containing device, which is moved infrequently but may release Hg if dropped or bumped.
- Low Risk – Mercury containing device which is stationary and will not release Hg under any foreseeable circumstance.

In addition, the cost to remove mercury containing devices and replace with non-mercury containing equipment is being estimated. This includes determining the cost differential if any plus associated labor costs. Other issues, such as availability and reliability of non-mercury devices, are being taken into consideration. NSP will share the completed product inventory information with the Minnesota Pollution Control Agency. NSP will use the inventory information obtained on risk level and the cost to replace mercury containing devices to develop a mercury phase-out plan, which will emphasize replacement of high risk equipment as a priority.

During 2000, NSP will begin labeling the mercury containing devices that were identified in the inventories with small mercury labels. This will raise awareness that mercury is present in devices helping to ensure that the equipment is handled appropriately and disposed of properly.

NSP generating plants, service centers and office buildings have been phasing out products that contain mercury for many years. NSP's Facilities Department has been installing non-mercury thermostats in NSP offices and service centers since May 1996. NSP generating plants have removed devices that contain high levels of mercury, including flow and level meters that contained up to 14 pounds of mercury per meter. The NSP High Bridge Plant pursued the removal of mercury containing equipment in the 1980's, with the quantity shipped for recycling in 1990 and prior totaling 5,700 pounds. Both the Allen S. King Plant and the Riverside Plant have made the decision to

purchase only non-mercury equipment for their sites. Riverside made this decision five years ago and the Allen S. King Plant, as part of its mercury reduction efforts, shipped 183 pounds between 1991 and 1997. All removed mercury containing devices were shipped to the NSP Chestnut Hazardous Waste Storage Facility where they were placed in bulk containers and shipped off-site for recycling of the mercury. The amount of mercury shipped from NSP sites and recycled from 1990 and before, and from 1991 through 1997, is contained in Appendix A along with fluorescent and HID lamp recycling data for 1995 through 1999 and NSP's mercury containing device inventory data from 1998 and 1999.

## 2. Emissions Sampling

NSP intends to conduct mercury emissions sampling on most, if not all, of its Minnesota coal-fired boilers in 2000 and 2001. It is anticipated that sampling for speciated mercury at the inlet and outlet will be conducted with the Ontario Hydro method. This information will be used to assess earlier results of tests conducted in the early 90's and for estimating NSP's Hg emissions as well as to help guide research efforts.

## 3. Electric Power Research Institute Funding

NSP will continue its support of the Electric Power Research Institute's (EPRI) programs aimed at understanding mercury in the environment and control of mercury from coal-fired boilers in the year 2000. EPRI is an electric utility research organization funded by electric utilities. EPRI has an extensive research program and has been a leader in the development of potential mercury control technologies for many years.

## 4. Energy and Environmental Research Center Funding

NSP will continue its support of the Energy and Environmental Research Center's (EERC) Center for Air Toxic Metals (CATM) program for the year 2000. The CATM was established in 1992 at the EERC at the University of North Dakota. CATM is a partnership among government, industry, and academia that conducts research on the behavior of air toxic metals to develop methods for prevention and control of air toxic metal emissions from the combustion of fossil fuels. Ongoing research at CATM focuses on understanding mercury transformation mechanisms of air toxic metals to determine the effectiveness of control devices and to identify new control technologies, and to inform the public of research findings. NSP has been a member of CATM since its inception, with continuing contributions of \$25,000 per year. CATM has an annual operating budget of more than \$1,400,000 per year, so NSP's contribution is highly leveraged for state-of-the-art air toxic metals research. NSP intends to continue its membership in this organization as a mean to advance the scientific understanding of mercury releases from coal-fired facilities and their potential control.

## 5. Ash Study

NSP will participate in a collaborative project with EPRI entitled "Potential for the Release of Contaminants to the Environment from Field-Scale Use of Cementitious Fly Ash for Soil Stabilization." This is directly related to measuring the level of Hg in runoff and percolation.

#### 6. Control Technology Research

NSP intends to partner with the EPRI to research mercury control technologies on one or two NSP boilers. This research is expected to be conducted in the 2000/2001 time frame.

#### 7. Sherco Units 1 and 2 Study

NSP intends to conduct mercury sampling on Sherco units 1 and 2 in 2001, to determine if increasing the SO<sub>2</sub> removal rate has any impact on the removal of mercury across the wet scrubbers. This will not be done if one of the boilers chosen in item 6 is Sherco units 1 or 2 or if it is determined to be unlikely to provide additional reduction of mercury.

#### 8. Coal Sampling and Analysis

NSP will continue to collect and analyze coal samples for mercury on a monthly basis in 2000.

#### 9. Repowering

NSP has committed to "repower" Black Dog units 1 and 2 with natural gas combined – cycle technology with a maximum capacity of 275 mW's. The repowered units are expected to be in operation in mid-2002. Relying on new natural gas generation for this additional capacity should offset mercury emissions within the region. These units have the potential to offset 35 pounds mercury annually assuming they offset generation from the NSP system.

#### 10. Conversion to Natural Gas Studies

NSP has committed to evaluate the feasibility of converting High Bridge units 3 and 4 and Riverside units 7 and 8 to natural gas. These studies will be conducted no later than July 1, 2001.

#### 11. Fluorescent Lamps

NSP is currently determining the feasibility of reducing the amount of mercury purchased in lamps by changing to low mercury fluorescent lamps. The issue being researched is whether the service life of low mercury lamps is comparable to regular fluorescent lamps. If the change-out frequency is significantly higher, there may be more risk of environmental release with low mercury lamps since they would be handled much more frequently and there would be, therefore, an increased potential for breakage. All fluorescent lamps are currently being recycled and breakage represents the main route of potential environmental release from this product.

#### 12. General Employee Hazardous Waste Training

NSP conducts General Employee Hazardous Waste Training on an annual basis for all employees who receive employee Right-to-Know training. More than 1,500 employees receive this training annually. During this training in 2000, employees are being informed about NSP's voluntary mercury reduction efforts, the health and environmental hazards of mercury and how they can help prevent mercury from entering the environment. This training emphasizes that each and every employee can play an

important role by using careful work practices, properly disposing of mercury containing devices and immediately reporting all mercury spills.

### 13. Thermostat Pilot

In summer 2000, NSP's Electric Marketing will run a test pilot to research a load management program to evaluate the functionality of remotely controlled setback thermostats. If the research pilot proves successful, NSP may evaluate the feasibility of replacing existing residential thermostats with the new thermostats. If the program is implemented, it will promote proper disposal of household waste containing mercury and may decrease energy consumption.

### 14. Fluorescent Light Bulb Rebates

Since 1995, NSP has provided a program to assist small business and residential customers with fluorescent lamp recycling. NSP pays for mercury recovery costs at county collection centers located in NSP's service territory. As well, coupons are issued annually in the newspaper, which allow customers to recycle up to 10 bulbs at participating hardware stores for fifty cents off the price charged by the store.

NSP will increase its commitment to these programs by increasing the amount spent on recycling efforts by \$60,000 in 2000 to support program awareness. Coupons will be issued bi-annually and advertising campaigns may be used to increase customer awareness of the program. NSP will contact those counties, in NSP's service territory, that are not currently participating in the program to reassess their program participation.

Since 1995, the recycling program has recycled more than 560,000 lamps, recovering approximately 30 pounds of mercury.

### 15. Information Dissemination

NSP will develop various mechanisms to help inform our customers about mercury and what they can do. Selected NSP customer communications vehicles will focus on mercury and identify mercury containing products typically in use in a residential home along with detailing alternatives and proper disposal techniques. NSP will also incorporate information about mercury on its website.

### 16. Hg Sniffing dog

NSP hopes to partner with the MPCA to fund the purchase of a dog specially trained to detect mercury. The dog will be used to detect mercury mainly in sink traps at industrial and institutional sites. A dog employed in Sweden and brought to 20 university locations has located 10 tons of mercury in sinks, cupboards and unused instruments.

### 17. NSP-Gas: Evaluation of Town Border Stations

NSP Gas, in conjunction with Northern Natural Gas and Viking Gas, will investigate the use of equipment that may have contained mercury at its Town Border Stations.

# **What NSP Has Done**

## **1. Inventories**

### **1998 Release Inventory**

A multi-media inventory of mercury releases for 1998 is contained in Appendix B.

### **1998 Product Inventory Data**

On March 2, 1998, NSP provided a mercury inventory of products, mercury waste shipments and fluorescent / HID lamp recycling information to Mr. Ed Swain at the Minnesota Pollution Control Agency. The inventory included information on the number of mercury containing devices found at eight NSP generating plants and NSP service centers and office buildings. This also included data on the amount of mercury per device and the total quantity of mercury at each of the generating sites and at the NSP service centers and offices buildings as a group. However, because some of the devices were in operation and / or difficult to access, this information represented estimates in both the number of devices and the amount of mercury per device. Mercury waste shipment information was also provided for these same facilities for both 1990 and before, and 1991 to 1997. Fluorescent / HID lamp recycling information was provided for all NSP facilities which shipped lamps in 1995 through 1999. This data has been included in this document as Appendix A. Also included in Appendix A is mercury waste shipment information for 1998 and 1999.

## **2. Coal Consumption**

NSP uses low sulfur coals from Montana and Wyoming which have relatively low mercury concentrations, 0.05 ppm Hg, dry basis (weighted average for the 1999 NSP system) compared to other U.S. coals. In fact, the coals NSP consumes are among the lowest 23% of all coal mercury contents listed in the EPA 's national database for the 1999 Mercury Information Collection Request based on data through third quarter, 1999. NSP's annual coal consumption is about 12 million tons (9 million tons, dry basis), corresponding to about 935 lb/year mercury. If NSP were to use "average" (median) U.S. coal, the amount of mercury would be over 70 percent higher. Because NSP's coal mercury contents are already so low, it does not appear that any significant opportunity exists to further reduce mercury by coal switching.

## **3. NSP Gas**

NSP Gas has taken a proactive approach towards mercury and actively removed mercury containing equipment from use because of the risks to human health and the environment. Knowing that equipment used in the metering of gas has the possibility of containing mercury, NSP has done a preliminary investigation of its gas operations to

determine what types of equipment have contained mercury in the past and whether any equipment is currently in use that could contain mercury. Several of these devices and results of preliminary investigations are discussed below.

#### Regulators

NSP's preliminary investigation of the use of regulators in its system has determined that there are no regulators that contain mercury in use at this time. It is estimated that internal weight-style regulators, those that can contain mercury, were removed from the system and replaced with non-mercury alternatives in the 1960's and 1970's. These regulators were confined to district regulator stations and town border stations and were only used in above ground applications, not in vault applications due to the possibility of mercury mixing with water. Information from our preliminary investigation indicates that mercury containing regulators were not used in residential or small commercial settings.

#### Manometers

Manometers are used extensively in the gas industry to test pressure and, until the early 1990's, the traditional mercury containing "U" shaped tube was used by NSP Gas. In 1990 and 1991 the decision was made to replace these devices with non-mercury spring gauge manometers. Extensive research was conducted to identify reliable alternatives for both low pressure and high pressure manometers and establish transportation and calibration methods which would assure the accuracy of these instruments. By 1996, the conversion was nearly complete and all of the removed mercury containing devices had been carefully shipped to the NSP Chestnut Hazardous Waste Storage Facility where they were placed in bulk containers and shipped off-site to a mercury recycling facility.

#### Orifice Meters

Preliminary investigations of the use of orifice meters in the NSP system has identified that, at one time, orifice meters containing mercury had been used. Orifice meters determine and use the difference in mercury levels across the orifice plate to calculate gas consumption. NSP's investigation thus far indicates that there are no orifice meters containing mercury still in use in the NSP Gas system.

#### Customer-Owned Residential Devices

K&B Service provides service to NSP's customers who subscribe to NSP's Advantage Service Program. They remove from service approximately 5-10 mercury containing thermostats per week. JR Recycling disposes of the mercury waste for K&B Service.

K&B also provides service to NSP customers for flame sensors and regulators (flow controllers). These devices, encountered by K&B, generally do not contain mercury.

## Current Practices

### 1. Procurement Review

In 1995, NSP established a Hazardous Materials Procurement Control Program, which requires that NSP's Safety and Environmental Departments evaluate products prior to purchase. As part of this program, a list of "Targeted Ingredients" was developed. These are ingredients that have been targeted for elimination from company use because of health or environmental concerns. Mercury is a targeted ingredient. Products containing targeted ingredients will be disapproved for purchase or allowed to be purchased on a restricted base only if a less hazardous alternative is not available. Product evaluations are done using the manufacturer's Material Safety Data Sheet (MSDS) so, if a product contains less than 1.0% mercury it may not be identified and eliminated through this process. NSP's new Chemical Management Program, which is described below, will be designed to remove these contaminants from the products we purchase and use.

### Chemical Management

In 1999, the Chemical Management Team obtained approval from NSP officers to move forward with a Chemical Management program. Implementation of the program will begin in 2000. This program will standardize the chemical products being used at NSP, providing greater control and tracking. As part of this program, NSP will evaluate products as indicated above. As well, NSP will be going one step further and asking suppliers and manufacturers to provide NSP with information on products which contain mercury at levels which are below the MSDS reportable threshold of 1%.

### Sodium Hydroxide (Caustic) and Sulfuric Acid

One example of where NSP has already reduced environmental mercury by reducing the amount of mercury inadvertently purchased as a contaminant, is through its bulk chemicals contract. NSP uses large volumes of sodium hydroxide and sulfuric acid to process the water, used to create steam in our generating facilities. By adding contract language which limits the amount of mercury allowed in sodium hydroxide to 5 ppb and the amount allowed in sulfuric acid to 100 ppb, mercury releases to the environment have been reduced.

### 2. Demand Side Management/ Conservation Improvement Program

Since 1985, NSP's Conservation Improvement Program (CIP) has saved 11,500 GWh's of energy at a cost of \$294 million. These efforts have avoided emission releases of approximately 380 pounds of mercury.

NSP has filed its 2000 CIP plan with the Minnesota Department of Commerce outlining measures that will save more than 191,000 MWh's of energy with a budget of \$33 million. The plan has been filed but has not been officially approved. If fully

implemented the plan could avoid an approximate additional 6 pounds of mercury from being released.

### 3. Advantage Service

NSP Gas offers a service program that provides maintenance and equipment to the consumer. NSP Gas Advantage Service deals primarily with water heaters, furnaces, air conditioners, and humidifiers. Advantage service repairs and/or replaces this equipment when needed; much of the equipment does not contain mercury, but those that do, are disposed of using a recycling company.

## **NSP Wisconsin**

Northern States Power Company-Wisconsin (NSPW) has implemented efforts similar to those of NSP-Minnesota to reduce the amount of mercury it uses in its operations or that is released to the environment. These efforts fall into two broad categories: removal and replacement of mercury containing equipment and air emission reductions. Both are summarized below.

### **1. Removal and Replacement of Mercury Containing Equipment**

Since 1996 over 700 pounds of Hg have been removed from NSPW generating plants. Equipment containing mercury has been replaced with non-mercury containing devices. NSPW is currently updating its inventory of mercury containing equipment at its generating plants and service centers. Voluntary phase-out of mercury containing equipment will continue consistent with the overall NSP system Voluntary Mercury Reduction Plan.

### **2. Mercury Emission Reductions**

NSPW's solid fuel fired generating plants rely primarily on the use of alternate fuels, principally biomass (e.g. wood waste and shredded railroad ties), as their dominant fuel source. Wood waste and shredded railroad ties contain very low amounts of mercury. Though coal is used only at NSPW's Bay Front plant, the amounts consumed are small in comparison to alternate fuels and the coal that is burned (low sulfur coal from Wyoming) has relatively low concentrations of mercury. Use of alternate fuels at French Island and Bay Front has resulted in a sustained 30% reduction in mercury emissions. The recent conversion of Bay Front boilers 1 and 2 to supplemental natural gas firing will further reduce mercury emissions further.

### **3. Additional Actions**

In addition to the efforts described above, NSPW also financially supports research on the environmental impacts of mercury deposition in Wisconsin. These efforts were initially focused on quantifying the impact of atmospheric constituents, including mercury, on Wisconsin's lake resources. Over the last several years these studies have been re-directed towards assessing the ecological risk of mercury exposure on the Common Loon. This species is particularly susceptible to impacts from mercury uptake in the environment. This cutting edge research has been jointly funded by the Wisconsin Department of Natural Resources, the Electric Power Research Institute and the Wisconsin Utilities Association, including NSPW.

In the future, NSPW plans to adopt those elements of the NSP Voluntary Mercury Reduction Plan that are cost effective and logistically possible in Wisconsin. These elements include, but are not limited to:

- 1) Review and evaluation of mercury speciation stack test results conducted at Bay Front in cooperation with the Wisconsin Department of Natural Resources and Frontier

GeoScience in October 1995 as well as additional speciation testing conducted by Mastardi Platt under the direction of EPA in 1999

- 2) Supporting research on reliable, cost-effective mercury emission control technology
- 3) Use of company approved procurement and chemical management procedures to minimize or eliminate use of mercury in products used by NSPW
- 4) Fuel switching when cost effective, and
- 5) Implementation of customer outreach programs to enhance recycling of mercury, potentially including thermostat replacement and fluorescent light bulb rebate initiatives.

NSPW also participates in the Wisconsin Department of Natural Resources sponsored mercury stakeholder group. NSPW supports the creation of a Wisconsin Mercury Advisory Council charged with developing a comprehensive strategy to achieve realistic mercury reduction goals through voluntary efforts. Subgroups within this Council would represent the general public, the paper industry, health care, dental, electrical manufacturing, chemical manufacturing, transportation, government, utilities, environmental groups and other stakeholders. Effective use of this Council could result in recommendations for voluntary actions which, when implemented, would substantially reduce the amount of mercury in the environment.

## **NRG**

In October 1999, NRG began participating in a pilot program initiated by the Minnesota Pollution Control Agency (MPCA) and the Office of Environmental Assistance (OEA) to heighten consumer awareness of mercury in the household waste stream. The program allows consumers to take their mercury thermometers to County Household Hazardous Waste Facilities (HHWF) across the state and exchange them for digital electronic models. NRG is promoting the program and supplying 1,500 thermometers to HHWF's in the 11 counties serve by NRG Resource Recovery. NRG will evaluate the success of the program over the next several months.

NRG's participation in the thermometer exchange is an initial effort in a broader campaign to heighten consumer awareness of all hazardous wastes that may become part of the waste stream. The program, which uses the slogan "Every Waste Has Its Place", will continue public education efforts designed to reduce the amount of mercury and other hazardous materials in the municipal solid waste received by its resource recovery facilities. Key to this initiative will be continued collaboration with the county HHWF's, the MPCA and the OEA.

## Appendix B

# NSP' s 1998 Multi-Media Mercury Inventory

A S King			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
Coal	1,437,831 tons	.038ppm, dry <sup>a</sup>	109 <sup>a</sup>	
Air		1.827 e-6 #/MBtu <sup>c</sup>	33.8 <sup>b</sup>	48.5 <sup>c</sup>
Ash Landfilled	40,680 tons	0.75 ppm <sup>d</sup>	76 <sup>d</sup>	
Ash/slag Utilized	37,055 tons	0.03 ppm <sup>d</sup>	3 <sup>d</sup>	
Total Inputs			109	
Total Releases			112.8	127.5
Leachate	645,640 gallons	0.0008 ppm <sup>d</sup>	0.004 <sup>d</sup>	
Ash Discharge Water		< 0.0001 ppm <sup>l</sup>	0	

<b>Black Dog</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
<b>Coal</b>		0.032 ppm, dry <sup>a</sup>		
unit 1	1,779 tons		0.11 <sup>a</sup>	
unit 2	6,568 tons		0.42 <sup>a</sup>	
unit 3	311,304 tons		19.9 <sup>a</sup>	
unit 4	613,703 tons		39.3 <sup>a</sup>	
<b>Air</b>				
unit 1		3.097 e-6 #/MBtu <sup>c</sup>	0.025 <sup>b</sup>	0.75 <sup>c</sup>
unit 2		2.6 e-6 #/Mbtu <sup>c</sup>	0.33 <sup>b</sup>	0.39 <sup>c</sup>
unit 3		3.097 e-6 #/MBtu <sup>c</sup>	4.6 <sup>b</sup>	17.4 <sup>c</sup>
unit 4		3.097 e-6 #/MBtu <sup>c</sup>	9.0 <sup>b</sup>	32.9 <sup>c</sup>
Ash Landfilled	12,304 tons	fly ash: 0.10 ppm <sup>d</sup>	7 <sup>d</sup>	
Ash Utilized	24,295 tons	bottom ash: 0.3 ppm <sup>d</sup>	34 <sup>d</sup>	
Total Inputs			59.73	
Total Releases			54.96	92.44
Leachate				
Ash Discharge Water		< 0.0001 ppm <sup>j</sup>	0	

<b>High Bridge</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
<b>Coal</b>		.036 ppm, dry <sup>a</sup>		
unit 3/4	169,514 tons		12.2 <sup>a</sup>	
unit 5	342,083 tons		24.6 <sup>a</sup>	
unit 6	589,570 tons		42.4 <sup>a</sup>	
<b>Air</b>				
unit 3/4		3.923 e-6 #/MBtu <sup>c</sup>	11.9 <sup>c</sup>	12.2 <sup>b</sup>
unit 5		3.923 e-6 #/MBtu <sup>c</sup>	23.8 <sup>c</sup>	24.6 <sup>b</sup>
unit 6		3.923 e-6 #/MBtu <sup>c</sup>	40.8 <sup>c</sup>	42.4 <sup>b</sup>
Ash Landfilled	10,475 tons	fly ash: 0.09 ppm <sup>d</sup>	2 <sup>d</sup>	
Ash Utilized	29,764 tons	bottom ash: 0.03 ppm <sup>d</sup>	19 <sup>d</sup>	
Total Inputs			79.2	
Total Releases			97.5	100.2
Leachate		N/A		
Ash Discharge Water	32,231,803 gallons <sup>k</sup>	0.0004 ppm <sup>l</sup>	0.1	

<b>Mn Valley</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
Coal	3,657	0.116 ppm, dry <sup>a</sup>	0.8 <sup>a</sup>	
Air		3.923 e-6 #/Mbtu <sup>f</sup>	0.8 <sup>l</sup>	0.32 <sup>f</sup>
Leachate				
Ash Discharge Water		< 0.0002 ppm <sup>l</sup>	0	

<b>Red Wing</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
Inlet	206,723 tons	0.44 ppm <sup>g</sup>	181.9 <sup>g</sup>	
Air		0.021 #/hr <sup>c</sup>	325.9 <sup>c</sup>	
Ash Landfilled	57,315 tons	2.53 ppm <sup>d</sup>	235 <sup>d</sup>	
Ash Utilized				
Total Inputs			181.9	
Total Releases			560.9	
Leachate	1,644,000 gallons	0.0005 ppm <sup>d</sup>	0.007 <sup>d</sup>	
Ash Discharge Water		N/A		

<b>Riverside</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
<b>Coal</b>				
unit 6/7	646,968 tons	0.041 ppm, dry <sup>a</sup>	53 <sup>a</sup>	
unit 8	844,527 tons	0.043 ppm, dry <sup>a</sup>	72.6 <sup>a</sup>	
<b>Air</b>				
unit 6/7		4.867e-6 #/MBtu <sup>c</sup>	55.0 <sup>c</sup>	53 <sup>b</sup>
unit 8		3.087e-6 #/MBtu <sup>c</sup>	47.9 <sup>c</sup>	72.6 <sup>b</sup>
Ash Landfilled				
unit 6/7	8,402 tons	bottom ash: 0.03 ppm <sup>d</sup> fly ash: 0.22 ppm <sup>d</sup>		
unit 8	18,428 tons	bottom ash: 0.03 ppm <sup>d</sup> fly ash: 0.74 ppm <sup>d</sup>		
Ash Utilized				
unit 6/7	17,417 tons	bottom ash: 0.03 ppm <sup>d</sup> fly ash: 0.22 ppm <sup>d</sup>		
unit 8	20,157 tons	bottom ash: 0.03 ppm <sup>d</sup> fly ash: 0.74 ppm <sup>d</sup>		
Ash Landfilled or Utilized			10 <sup>d</sup>	
Total Inputs			125.6	
Total Releases			112.9	135.6
Leachate		N/A		
Ash Discharge Water		< 0.0005 ppm <sup>l</sup>	0	

<b>Sherco</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
<b>Coal</b>				
unit 1	2,290,633	0.035 ppm, dry <sup>a</sup>	160.3 <sup>a</sup>	
unit 2	2,696,518	0.035 ppm, dry <sup>a</sup>	188.75 <sup>a</sup>	
unit 3-NSP	2,120,396	0.038 ppm, dry <sup>a</sup>	161.15 <sup>a</sup>	
unit 3-SMMPA	1,383,778	0.038 ppm, dry <sup>a</sup>	105.17 <sup>a</sup>	
Lime S3 Blr Hrs	8,181.46 hours	.00056 #/hour <sup>h</sup>	4.6 <sup>h</sup>	
<b>Air</b>				
unit 1		3.923e-6 #/MBtu <sup>c</sup>	157.2 <sup>c</sup>	64.1 <sup>b</sup>
unit 2		3.923e-6 #/MBtu <sup>c</sup>	185.3 <sup>c</sup>	75.5 <sup>b</sup>
unit 3-NSP		5.107e-6 #/MBtu <sup>c</sup>	191.1 <sup>c</sup>	88.6 <sup>b</sup>
unit 3-SMMPA		5.107e-6 #/MBtu <sup>c</sup>	123.7 <sup>c</sup>	57.8 <sup>b</sup>
Ash Landfilled				
unit 1 and 2	389,876 tons	bottom ash: 0.03 ppm <sup>d</sup> fly ash: 0.08 ppm <sup>d</sup>	112 <sup>d</sup>	
unit 3	312,902 tons	bottom ash: 0.02 ppm <sup>d</sup> fly ash: 0.07 ppm <sup>d</sup>	42 <sup>d</sup>	
Ash Utilized				
unit 1 and 2	0			
unit 3	12,504 tons	bottom ash: 0.02 ppm <sup>d</sup> fly ash: 0.07 ppm <sup>d</sup>	2 <sup>d</sup>	
Total Inputs			619.97	
Total Releases			813.3	442.0
Leachate		N/A		
Cooling Tower Blowdown Water	849,400,000 gallons	0.0004 mg/l <sup>e</sup>	2.84	

<b>Wilmarth</b>			Best Estimate	Alternate Estimate
	Quantity	Hg Concentration	lbs Hg/yr	lbs Hg/yr
Inlet	204,103 tons	0.40 ppm <sup>g</sup>	163 <sup>g</sup>	
Air		.000015 #/MBtu <sup>c</sup>	36 <sup>c</sup>	
Ash Landfilled				
Ash Utilized	59,934 tons	3.81 ppm <sup>d</sup>	339 <sup>d</sup>	
Total Inputs				
Total Releases				
Leachate	1,762,710 gallons	0.0009 ppm <sup>d</sup>	0.12 <sup>d</sup>	
Ash Discharge Water		N/A		

- a) ICR Fuel Analysis, 1999
- b) based on a) and removal rates as determined by stack tests
- c) Stack Test Emission Rate
- d) based on ash or leachate analysis
- e) based on an average of three samples
- f) Based on High Bridge Stack Test Emission Rate
- g) Fuel Analysis, 1998
- h) Lime analysis
- i) based on a) and f)
- j) based on priority pollutant monitoring
- k) Process water directed to sanitary sewer in 1998 under MCES permit #0576
- l) Based on an average of MCES permit monitoring results 1Q '98- 3Q '99.

N/A- Not Applicable