

Attachment 1

Coal Combustion Waste Storage and Water Quality: Hearing Before the Subcomm. on Water Resources & Environment of the H. Comm. on Transportation & Infrastructure, 111th Cong. (Apr. 30, 2009) (written testimony of Eric Schaeffer, Executive Director, Environmental Integrity Project (EIP), including four attachments: EIP, Selenium Monitoring Results at Select Facilities; EIP, Arsenic Monitoring Results at Select Facilities; EIP, Selenium Bar Chart; and EIP, Arsenic Bar Chart)

Joint Testimony of Eric Schaeffer, Director, Environmental Integrity Project
and Lisa Evans, Attorney, Earthjustice
before the Subcommittee on Water Resources and the Environment
of the Committee on Transportation and Infrastructure
U.S. House of Representatives

April 30, 2009

Thank you, Mr. Chairman, for the opportunity to testify before the Subcommittee on Water Resources and Environment today. My name is Eric Schaeffer, and I am Director of the Environmental Integrity Project, a nonprofit and nonpartisan organization that advocates for more effective enforcement of federal environmental laws. I also served as director of the USEPA's civil enforcement program from 1997 to 2002. The testimony that follows is offered on behalf of myself and my colleague Lisa Evans, a senior attorney at Earthjustice and one of the nation's leading experts on coal ash. Our testimony will make the following points:

- 1) Coal ash is a hazardous material that tends to leak toxic metals into groundwater and surface water, especially when the ash is saturated or stored in wet ponds.
- 2) The discharge of wastewater from coal ash ponds, as well as the runoff from so-called dry landfills, can release arsenic, selenium and other pollutants in amounts known to be toxic to human health and aquatic life in our rivers and lakes. Despite the risks, discharges of toxic metals are generally not restricted under Clean Water Act permits at power plants and are often not even monitored.

- 3) Air pollution control equipment installed to comply with the Clean Air Act will generate thousands of tons of scrubber sludge at a typical power plant. USEPA and industry data show that the wastewater discharged from scrubber sludge treatment systems can release toxic metals like selenium in concentrations that are hundreds of times higher than water quality standards designed to protect aquatic life.
- 4) USEPA has promised to develop federal safeguards for the disposal of coal ash, but is also evaluating whether to set limits on the toxic discharges from ash and sludge treatment systems. The monitoring data indicate that such limits are overdue, and there is little time to lose.

Coal Ash is Hazardous

Coal contains toxic metals like arsenic, boron, cadmium, chromium, lead, and selenium. The National Research Council (NRC) observed in a 2006 report, Managing Coal Residue in Mines, burning coal increases the concentration of these pollutants; if the ash is saturated, these pollutants are likely to leak into groundwater or surface water. The NRC examined the growing practice of depositing ash in mines to reduce acid runoff and warned that, “the presence of high concentration levels in many leachates may increase the health or environmental risks near some mine sites.” In fact, the USEPA has determined in recent reports that coal ash, when tested with a reliable leach test, exceeds the toxicity characteristic (the threshold for a hazardous waste determination) under the Resource Conservation and Recovery Act for both selenium and thallium.

Most ash is disposed of in landfills or in large ash ponds like the one that collapsed at the Tennessee Valley Authority's Kingston plant in Tennessee just before Christmas. While catastrophic releases remain a real risk at some disposal sites, the leak or discharge of toxic metals from the sites is a daily event at many locations. The USEPA has identified at least 67 proven or likely instances in which groundwater, creeks, wetlands or lakes have been seriously contaminated by arsenic, boron, selenium, and other metals released from ash disposal sites.

Many additional confirmed cases of contamination from coal ash are not on the USEPA's list, including ones that resulted in the destruction of drinking water supplies; the Agency acknowledged in 2000 that the threats from coal ash are likely to be far larger, due to the lack of monitoring at so many coal ash sites. For example nearly two-thirds of the ash ponds in America did not have groundwater monitoring as of 1999, and little has changed since then to require monitoring at these sites.

The U.S. electric power industry generates about 130 million tons of ash, scrubber sludge and other combustion residues annually according to the USEPA, or about 1,000 pounds per person. This volume of waste would fill 1 million train cars, and USEPA predicts that volume will swell to some 175 million tons annually in just six more years. That's comparable to the amount of household garbage that we generate in the U.S. every year, with one important difference: in most states, municipal landfills are subject to significantly more regulation than coal ash dump sites. Leaks from these unregulated operations may not only contaminate drinking water wells, but can also reach rivers and streams through adjacent aquifers.

Discharge of Toxic Metals from Coal Ash

While toxic metals held in ash ponds, landfills, and treatment systems can leak into groundwater, the wastewater residue from such operations is also routinely discharged into wetlands, creeks, rivers and lakes. Based on annual industry reports to the USEPA's Toxics Release Inventory, power plants are the second largest discharger of metals and metal compounds, releasing more than 2 million pounds in 2008. The actual volume may be significantly larger, since these discharges are not regulated by the USEPA, and are not routinely monitored or reported at many plants.

Our analysis of the limited data that are available through the USEPA indicates that power plants routinely discharge some toxic metals – particularly selenium – in concentrations that exceed water quality standards. For example, selenium is a toxic pollutant found in coal ash that is deadly to fish, and which can also damage the liver and other soft tissues in humans. USEPA has determined that chronic exposure to selenium at levels above 5 micrograms per liter – or about 5 parts per billion – is harmful to freshwater fish and other aquatic life. Some states have also adopted standards to limit acute (short-term) exposures to no more than 20 micrograms.

Data compiled from permit applications, monitoring reports, and sampling conducted for the USEPA identified at least thirty sites in which routine long-term discharges of selenium exceed 20 micrograms, and sometimes 100 micrograms (See attached Selenium chart). Selenium water quality standards are meant to protect receiving waters, and do not necessarily apply to the actual discharge of wastewater from pipes. But we have already learned the hard way that releasing selenium into rivers and lakes can decimate fish populations and make the surviving species unsafe to eat. For

example, according to the USEPA, the discharge of selenium from a power plant wiped out 16 of 20 fish species in Belews Lake in North Carolina in the 1980s, while selenium contamination from Texas power plants in approximately the same decade led the state to recommend limiting consumption of fish.

Discharge of Toxic Metals from Scrubber Sludge

U.S. power plants that haven't already done so are scrambling to install scrubbers to reduce emissions of sulfur dioxide, in anticipation of Clean Air Act deadlines or to comply with enforcement increases. That is a welcome trend, since scrubbers can remove 95% of the sulfur compounds that cause acid rain and promote formation of fine particles that trigger asthma attacks, heart disease, and premature death. Less welcome is the news that alarming amounts of some of the metals that are stripped out of the smokestack are ending up in our waterways.

Scrubbers generate sludges that need to be periodically treated or dewatered to remove contaminants and reduce the need for additional landfill space. The limited monitoring data available from the USEPA show that selenium levels in wastewater that is discharged from scrubber sludge can be sky-high, reaching concentrations in excess of 1000 parts per billion, or hundreds of times higher than the USEPA's recommended water quality standard of 5 parts per billion.

Release of Arsenic and Other Pollutants

The limited monitoring data available show that power plants also release other pollutants at levels that exceed drinking water standards or limits meant to protect

recreational uses like swimming and fishing. The USEPA has established a maximum contaminant level of 10.0 micrograms per liter for arsenic in drinking water. States like Tennessee use the same threshold in waters used for recreational purposes, recognizing that arsenic becomes increasingly concentrated as it moves up the food chain, which could potentially make some fish unsafe to eat. USEPA data identify at least 20 power plants where arsenic levels in wastewater discharges routinely exceed 20 micrograms per liter, or at least twice the recommended federal standard for drinking water or recreational waters. Again, this is likely an understatement, as so few monitoring data actually exist.

EPA Needs to Regulate Before It Is Too Late

Air pollution controls create mountains of ash and sludge, and these already staggering volumes will grow rapidly as companies move to comply with new Clean Air Act requirements. But cleaner air should not mean dirtier water, and the USEPA needs to establish strict standards to make sure that we are not just trading one problem for another.

- After decades of delay, the USEPA has promised to propose standards for safe disposal of coal ash no later than the end of this year. Those standards should recognize that coal ash is a hazardous waste. In addition, those standards should apply to scrubber sludges and other types of combustion residue, and address potential risks to both human health and the environment. In particular, the regulations should prevent both the contamination of drinking water, and the

pollution of surface waters from adjacent aquifers from both existing and retired coal ash dump sites.

- USEPA standards should also apply to the disposal of coal ash in mines, quarries and other sites that have escaped virtually any common sense safeguards due to exemptions in state laws that are exploited in the absence of federal action.
- Wet storage of coal ash should be phased out as quickly as possible, as the highest threats to human health and the environment occur when coal ash is placed in water.
- USEPA is evaluating the need to set limits on toxic discharges from coal plants – the data it has gathered so far, and the expected growth in waste from new air pollution control equipment, indicate that there is little time to lose. USEPA should move immediately to require more extensive monitoring of the discharge of arsenic, selenium, and other toxic pollutants from power plants and should set discharge limits, including zero discharge limits, consistent with water quality criteria for toxic substances.
- In at least some cases, power plants may be violating federally enforceable permit requirements or rules that limit discharges that contribute to a violation of water quality standards. USEPA's enforcement program, working with state agencies, should investigate and take action where serious violations can be established.

Thank you again for the opportunity to testify and for your attention to this important issue, and I will be pleased to answer any questions that you may have.

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration Flow Maximum)	Primary Source	EPA Docket ID
AL	TVA	Widows Creek	008	FGD Waste Pond	Direct Discharge to Tennessee River	3.88	9.9	1	131	131	4.2390	10.8159	NPDES Permit No. AL0003875 App. (Apr. 2004)	EPA-HQ-OW-2006-0771-1797.84
AL	TVA	Widows Creek	SP-2	FGD Waste-water	Direct Discharge to Widows Creek	1.68	Data Not Available	1	236	236	3.3066	N/A	Sample (9/11/2007)	EPA-HQ-OW-2006-0771-1733
FL	Tampa Electric	Big Bend	130	FGD Waste-water	Discharge through Internal Outfalls D0011, D0012, D0013, and D0014 to Discharge Canal to Hillsborough Bay ¹	0.25	0.313	4	2,798.5	4,911	5,8347	7,3051	ECHO Quarterly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.7
GA	Georgia Power	Bowen	01A	Ash Pond	Through Outfall 01 to Etowah River ²	Data Not Available	Data Not Available	1	37	37	N/A	N/A	Sample (11/20/2006)	EPA-HQ-OW-2006-0771-0592.45

Selenium Monitoring Results at Select Facilities

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State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/l)	READING: MAXIMUM SAMPLE VALUE (µg/l)	LBS/DAY (Mean Concentration on Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
GA	Georgia Power	Yates	01	Ash Pond	Direct Discharge to Chattahoochee River	21.6	Data Not Available	1	59	59	10.6283	N/A	Sample (12/4/2006)	EPA-HQ-OW-2006-0771-0592.67;-0592.55
GA	Georgia Power	Yates	01	Ash Pond	Direct Discharge to Chattahoochee River	21.6	Data Not Available	1	32	32	5.7645	N/A	Sample (12/5/2005)	EPA-HQ-OW-2006-0771-0378;-0592.55
IL	Ameren	Meredosia	004	Ash Pond	Direct Discharge to Illinois River	0.2	0.6	1	26	26	0.0434	0.1301	NPDES Permit No. IL0000116 App. (2002)	EPA-HQ-OW-2006-0771-1797.57
IN	Duke Energy	Cayuga	002	Ash Pond	Direct Discharge to Wabash River	1.25	3.6	24	<20	50	<0.2085	0.6005	NPDES Permit No. IN0002763 App. (Feb. 2006)	EPA-HQ-OW-2006-0771-1797.17

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration on Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
IN	Vectren	A.B. Brown	004	Ash Pond	Direct Discharge to Unnamed Tributary to Ohio River	1.4	1.4	1	130	130	1.5178	1.5178	ECHO Sample (3/31/2008)	EPA-HQ-OW-2006-0771-0341
KY	AEP	Big Sandy	001	Ash Pond	Direct Discharge to Blaine Creek	6.421	12.13	6	27	35	1.4458	2.7314	NPDES Permit No. KY00000221 App. (Sept. 2005)	EPA-HQ-OW-2006-0771-1797.8
KY	Louisville Gas & Electric	Mill Creek	002	Ash Pond	Data Not Available	Data Not Available	Data Not Available	4	58.3	75	N/A	N/A	Quarterly Monitoring (2006)	EPA-HQ-OW-2006-0771-0416.15
MD	Mirant	Brandywine	002	Discharge from Ash Disposal Facility	Data Not Available	Data Not Available	Data Not Available	5	20.4	35	N/A	N/A	ECHO Monthly Monitoring (2008)	
MD	Mirant	Brandywine	006	Discharge from Ash Disposal Facility	Data Not Available	Data Not Available	Data Not Available	8	25.4	59	N/A	N/A	ECHO Monthly Monitoring (2008)	

Selenium Monitoring Results at Select Facilities

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State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration on Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
NC	Duke Energy	Cliffsde	002	Ash Pond	Direct Discharge to Broad River	7.33103	14.3233	12	22.4	30.2	1.3695	2.6758	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.18
NC	Duke	Marshall	004	FGD Waste-water	Through Outfall 002 (ash basin) to Lake Norman (i.e., Catawba River) ³	1.02119	1.21443	5	86	200	0.7324	0.8710	ECHO Monthly Monitoring (8/2008 to 12/2008)	EPA-HQ-OW-2006-0771-1742
NC	Progress Energy Carolinas	Asheville Steam Plant	001	Ash & FGD Waste-water	Direct Discharge to French Broad River	1.9175	5.215	12	62.1	91.3	0.9931	2.7009	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.3
NC	Progress Energy	Roxboro	010	FGD Waste-water	Through Outfall 003 (discharge canal) to Hyco Lake ⁴	0.578	1.265	9	209.5	510	1.0099	2.2102	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1556; 0300.9

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/l)	READING: MAXIMUM SAMPLE VALUE (µg/l)	LBS/DAY (Mean Concentration on Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
OH	AEP and Buckeye	Cardinal ⁵	019	Ash and FGD Leachate	Direct Discharge to Blockhouse Hollow Run	9.398	16.85	5	68	100	5.3297	9.5558	ECHO Monthly Monitoring, NPDES Permit No. OH001258 1 App. (Aug. 2008 - Dec. 2008)	EPA-HQ-OW-2006-0771-1797.15
OH	American Electric Power and Buckeye Power	Cardinal	019	Ash and FGD Leachate	Direct Discharge to Blockhouse Hollow Run	11	18	1	53	53	4.8621	7.9562	NPDES Permit No. OH001258 1 App. (Jan. 2007)	EPA-HQ-OW-2006-0771-1797.15

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	READING: LBS/DAY (Mean Concentration on Flow Average)	READING: LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
OH	AEP and Duke Energy	Conesville	601	Ash and FGD Waste Pond	Through Outfall 001 to Muskingum River ⁶	13.61	22.9	1	25	25	2.8376	4.7745	NPDES Permit No. OH005956 1 App. (Jan. 2007)	EPA-HQ-OW-2006-0771-1797.20
OH	Dayton Power & Light	J.M. Stuart	013	Ash Pond	Final Outfall to Ohio River	11.6818	21.8762	12	52.9	95.4	5.1537	9.6513	ECHO Monthly Monitoring (2008)	
PA	Reliant Energy	Cone-maugh	007	Mixed	Direct Discharge to Conemaugh River	0.228	0.395	11	159.6	560	0.3035	0.5258	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-0123
PA	EME Homer City	Homer City	027	FGD Waste-water	Direct Discharge to Blacklick Creek	0.11	0.17	12	591.7	2,600	0.5428	0.8389	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-0683
TN	TVA	Allen	001	Ash Pond	Direct Discharge to McKellar Lake	9.56	9.79	1	30.5	30.5	2.4317	2.4902	ECHO Monthly Monitoring (Aug. 2008)	EPA-HQ-OW-2006-0771-1797.1

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/l)	READING: MAXIMUM SAMPLE VALUE (µg/l)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
TN	TVA	Allen	001	Ash Pond	Direct Discharge to McKellar Lake	8.21	11.52	1	38	38	2.6019	3.6508	NPDES Permit No. TN000535 5 App. (Oct. 2004)	EPA-HQ-OW-2006-0771-1797.1
TN	TVA	Cumberland	001	Ash & FGD Waste Pond	Through DSN002 to Cumberland River ⁷	19.7	32.9	1	44	130	7.2290	12.0727	NPDES Permit No. TN000578 9 App. (May 2005)	EPA-HQ-OW-2006-0771-1797.21
TN	TVA	Gallatin	001	Ash Pond	Direct Discharge to Cumberland River	25.17	28.2	3	29	39	6.0875	6.8203	ECHO Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.30

Selenium Monitoring Results at Select Facilities

EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/l)	READING: MAXIMUM SAMPLE VALUE (µg/l)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
TN	TVA	Gallatin	001	Ash Pond	Direct Discharge to Cumberland River	22.1	88.5	13	26	40	4.7921	19.1899	EPA-HQ-OW-Permit No. TN000542 2006-8 App. (May 2004) 1797.30
TN	TVA	Kingston	001	Ash Pond	Through Plant Intake Canal to Clinch River	24.7	42.2	1	24	24	4.9438	8.4466	EPA-HQ-OW-Permit No. TN000545 2006-2 App. (Dec. 2002) 1797.45
VA	Dominion	Chesterfield	004	Ash Pond	Direct Discharge to James River, Farrar Gut	7.7	10.5	4	23	27	1.4770	2.0141	EPA-HQ-OW-Permit No. VA000414 2006-6 App. (Aug. 2001) 1797.16
WI	Wisconsin Electric	Pleasant Prairie	102	FGD Waste-water	Through Outfall 001 to Lake Michigan ⁸	0.0648	0.0648	35	6,488.5	18,000	3.5065	3.5065	EPA-HQ-OW-FGD Monitoring Data (2007) 2006-0771-0699; 1542.1; 1542.2; 1803.1

Selenium Monitoring Results at Select Facilities
EPA Recommended Chronic Freshwater Criteria for Aquatic Life = 5 µg/L; EPA Recommended Chronic Saltwater Criteria for Aquatic Life = 71 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration on Flow Maximum)	Primary Source	EPA Docket ID
WV	Appalachian Power	John B. Amos	001	Ash Pond	Direct Discharge to Little Scary Creek	0.16	8.43	12	24.3	31.1	0.0324	1.7084	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-0589-2
WV	Appalachian Power	Mountaineer	001	Ash Pond	Direct Discharge to Ohio River	3	7.7	12	77.8	152	1.9465	4.9960	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.64
WV	Ohio Power	Mitchell	004	Ash Pond	Direct Discharge to Fish Creek (to Ohio River)	1.872	11.913	12	53.1	94.7	0.8290	5.2756	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1736

¹ There was no monitoring data available from the applicable Discharge Canal at the Big Bend facility for selenium.

² There was no monitoring data available for Outfall 01 on ECHO from the Bowen facility for selenium.

³ The ECHO database provided selenium readings from Outfall 002 of 11.6 µg/L (maximum) and 6.53 (average of 5 months) for the Marshall facility. These readings are lower than those from Outfall 004, but still higher than the recommended 5 µg/L limit.

⁴ The Roxboro Power Plant does not monitor or report selenium discharges from Outfall 003 to EPA's ECHO database.

⁵ EPA's ECHO database did provide selenium values for the months of January to August of 2008 in addition to the months on this chart for AEP's Cardinal Power Plant. However, because the numbers reported for those months were abnormally high (25,150 - 98,050 µg/L), EIP excluded these values from the average.

⁶ Selenium readings from Outfall 001 in the same Conesville permit application were 67 µg/L (maximum daily) and 1.7 µg/L (mean of 44 samples).

⁷ The selenium concentration from DSN002 in the same permit application was 1 µg/L with an average flow reading fo 2,485 MGD. Therefore, although the concentration of selenium in the effluent from DSN002 appears to be lower, the amount of selenium being discharged into the Cumberland River was roughly the same as what was coming out of Outfall 001 - an average of 20.724 lbs/day.

⁸ There was no selenium monitoring data available from Outfall 001 for the Pleasant Prairie facility.

Federal Drinking Water Standard = 10 µg/L, TN Recreational Criteria = 10 µg/L, EPA Recommended Human Health (Consumption of Organism) = 0.14 µg/L

Arsenic Monitoring Results from Select Facilities

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration Flow Maximum)	Primary Source	EPA Docket ID
AL	AL Power	Gadsden	002	Ash Pond	Direct Discharge to Coosa River	2.42	7.89	12	50.3	184	1.0152	3.3098	ECHO Monthly Monitoring (2008)	
AL	AL Power	Gaston	004	Ash Pond	Direct Discharge to Coosa River	13	29.4	4	32.8	43	3.5561	8.0422	ECHO Quarterly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.24
AL	TVA	Widows Creek	SP-2	FGD Effluent	Direct Discharge to Widows Creek	N/A	N/A	1	46.7	46.7	N/A	N/A	Sample (9/11/2007)	EPA-HQ-OW-2006-0771-1733
AL	TVA	Widows Creek	001	Ash Pond	Direct Discharge to Tennessee River	24.15	51.84	11	36	55	7.2506	15.5641	NPDES Permit No. AL8640006690 App. (Apr. 2004)	EPA-HQ-OW-2006-0771-1797.84
KY	TVA	Paradise	001	Ash Pond	Direct Discharge to Jacobs Creek	25.5	36.5	1	23	23	4.8913	7.0013	NPDES Permit No. KY0004201 App. (Feb. 2002)	EPA-HQ-OW-KY0004201 2006-0771-1797.66
IN	Duke	Wabash River	002	Ash	Direct Discharge to Wabash River	7.01	9.81	12	118.7	181	6.9395	9.7113	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.81

Federal Drinking Water Standard = 10 µg/L, TN Recreational Criteria = 10 µg/L, EPA Recommended Human Health (Consumption of Organism) = 0.14 µg/L

Arsenic Monitoring Results from Select Facilities

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration Flow Maximum)	Primary Source	EPA Docket ID
MO	Ameren	Sioux	006	Ash Pond	Discharge to Mississippi River via Poelling Lake	2.4	2.8	1	20	20	0.4003	0.4670	NPDES Permit No. MO0000353 Application	EPA-HQ-OW-2006-0771-1797.78
NC	Duke	Buck	002	Ash Pond	Direct Discharge to Yadkin River	0.1	9.7	4	42.2	57.9	0.0352	3.4138	ECHO Quarterly Monitoring (2007)	EPA-HQ-OW-2006-0771-1797.13
NC	Duke	Dan River	002	Ash Pond	Direct Discharge to Dan River	0.2	1.7	11	35	59.9	0.0584	0.4962	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.22
NC	Duke	River-bend	002	Ash Pond	Direct Discharge to Catawba River (Mountain Island Lake)	1.4	7.8	5	31.1	69.4	0.3631	2.0231	Echo Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.74
NC	Progress	Asheville	001	Ash Treatment System	Direct Discharge to French Broad River	1.9	10.6	12	38.3	66.5	0.6069	3.3858	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-0300.2
NC	Progress	Cape Fear	005	Ash Pond	Discharge to Unnamed Tributary to Cape Fear River via Outfall 007	0.6	0.6	2	121	128	0.6055	0.6055	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.14

Federal Drinking Water Standard = 10 µg/L, TN Recreational Criteria = 10 µg/L, EPA Recommended Human Health (Consumption of Organism) = 0.14 µg/L

Arsenic Monitoring Results from Select Facilities

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	Flow Maximum (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration Flow Maximum)	Primary Source	EPA Docket ID
NC	Progress	Mayo	002	Ash	Direct Discharge to Mayo Lake	6.525	15.31	4	33.3	45	1.8121	4.2518	ECHO Quarterly Monitoring (2008)	EPA-HQ-OW-2006-0771-0300.26
OH	AEP	Cardinal	19	Ash Pond	Direct Discharge to Blockhouse Hollow Run	9.398	77.09	12	182.6	320	14.3117	117.3965	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.15
SC	Santee Cooper (SCPSA)	Grainger	001	Ash Pond	Discharge to Waccamaw River ²	0.52	2.8	10	31.8	72	0.1379	0.7426	ECHO Monthly Monitoring (2008)	
SC	Santee Cooper (SCPSA)	Jefferies	003	Ash Pond	Discharge to Tailrace Canal ³	3.299	3.426	10	52.8	103	1.4527	1.5086	ECHO Monthly Monitoring (2008)	
TN	TVA	Allen	001	Ash Pond	Direct Discharge to McKellar Lake	8.21	11.52	1	43	43	2.9442	4.1312	NPDES Permit No. TN005355 App. (Oct. 2004)	EPA-HQ-OW-2006-0771-1797.1
TN	TVA	Gallatin	001	Ash Pond	Direct Discharge to Cumberland River	22.1	88.5	13	18	34	3.3176	13.2853	NPDES Permit No. TN5640006677 App. (May 2004)	EPA-HQ-OW-2006-0771-1797.30

Federal Drinking Water Standard = 10 µg/L, TN Recreational Criteria = 10 µg/L, EPA Recommended Human Health (Consumption of Organism) = 0.14 µg/L

State	Company	Plant	Outfall	Waste Type	Receiving Water	Flow Average (mgd)	# of Samples	READING: MEAN SAMPLE VALUE (µg/L)	READING: MAXIMUM SAMPLE VALUE (µg/L)	LBS/DAY (Mean Concentration Flow Average)	LBS/DAY (Mean Concentration Flow Maximum)	Primary Source	EPA Docket ID	
TN	TVA	Johnsonville	001	Ash Pond	Direct Discharge to Tennessee River	20.5	35.3	5	153	243	26.1578	45.0425	NPDES Permit No. 9640006681 App. (May 2003)	EPA-HQ-OW-2006-0771-1797.42
TN	TVA	Kingston	001	Ash Pond	Discharge to Clinch River via Plant Intake Canal	24.7	42.2	1	90	90	18.5394	31.6746	NPDES Permit No. TN8640006682 App. (Dec. 2002)	EPA-HQ-OW-2006-0771-1797.45
TN	TVA	Kingston	007	Ash Pond Seepage	Discharge to Clinch River via Plant Intake Canal	0.51	0.51	1	31	31	0.1319	0.1319	NPDES Permit No. TN8640006682 App. (Dec. 2002)	EPA-HQ-OW-2006-0771-1797.45
VA	Dominion Energy	Bremo	002	Ash Pond	Direct Discharge to James River	1.945	7.9056	1	158	158	2.5629	10.4171	NPDES Permit No. VA0004138 App. (Feb. 2005)	EPA-HQ-OW-2006-0771-1797.12
WV	AEP	Amos	001	Ash Pond	Direct Discharge to Little Scary Creek (to Kanawha River)	0.16	8.9	12	24.3	49	0.0324	1.8037	ECHO Monthly Monitoring (2008)	EPA-HQ-OW-2006-0771-1797.41
WV	Ohio Power	Mitchell	Sample Point 4	Ash Pond Effluent	Ash Pond Directly Discharges to Fish Creek	9.663 ⁴	9.663 ⁴	1	138	138	N/A	N/A	Oct. 2007 Sample	EPA-HQ-OW-2006-0771-1736; 0139.1

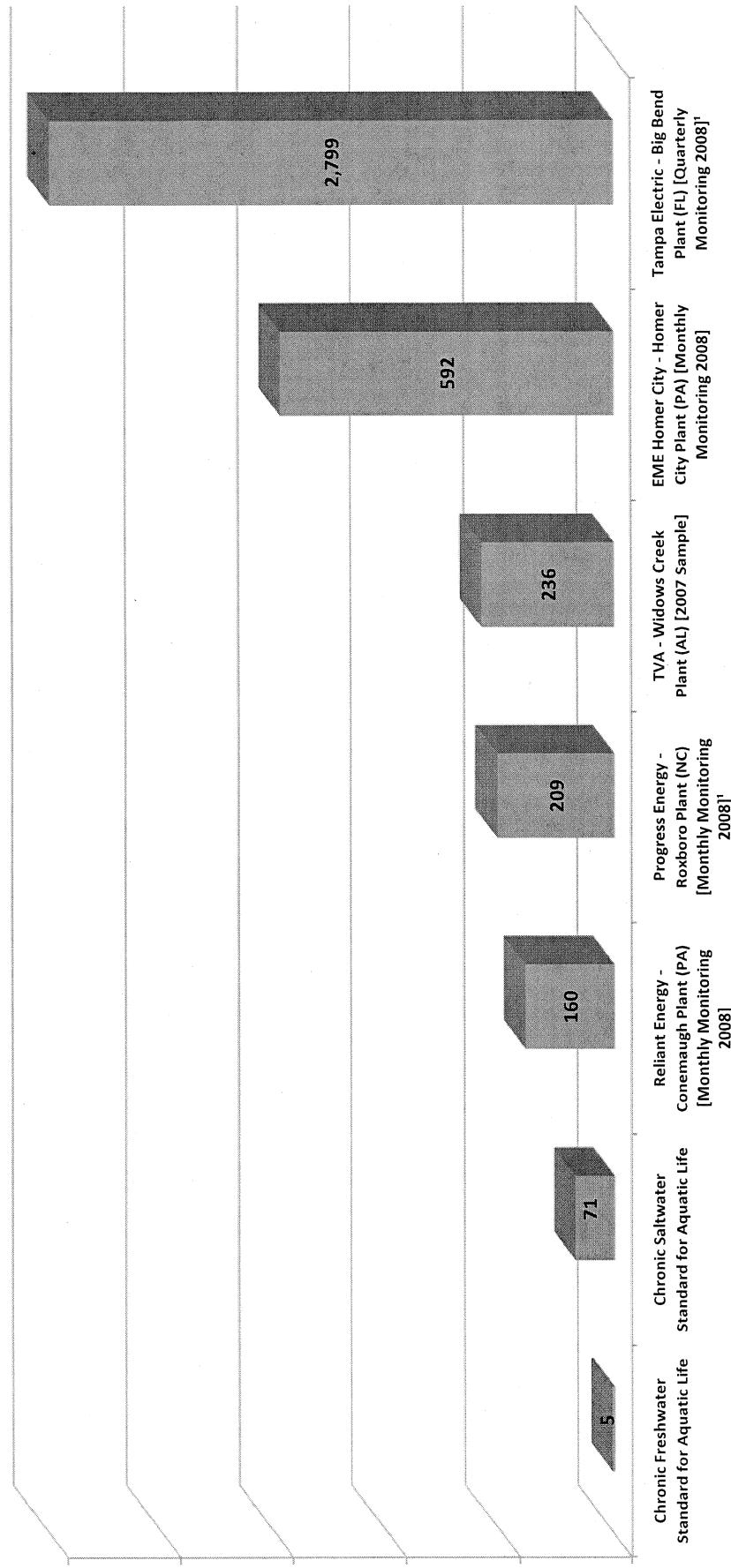
¹The ECHO database did not provide arsenic concentration readings for the applicable months from Outfall 007 at the Cape Fear facility.

² The Grainger plant discharges to the Waccamaw River, but ECHO data did not confirm whether Outfall 001 discharges directly into the Waccamaw.

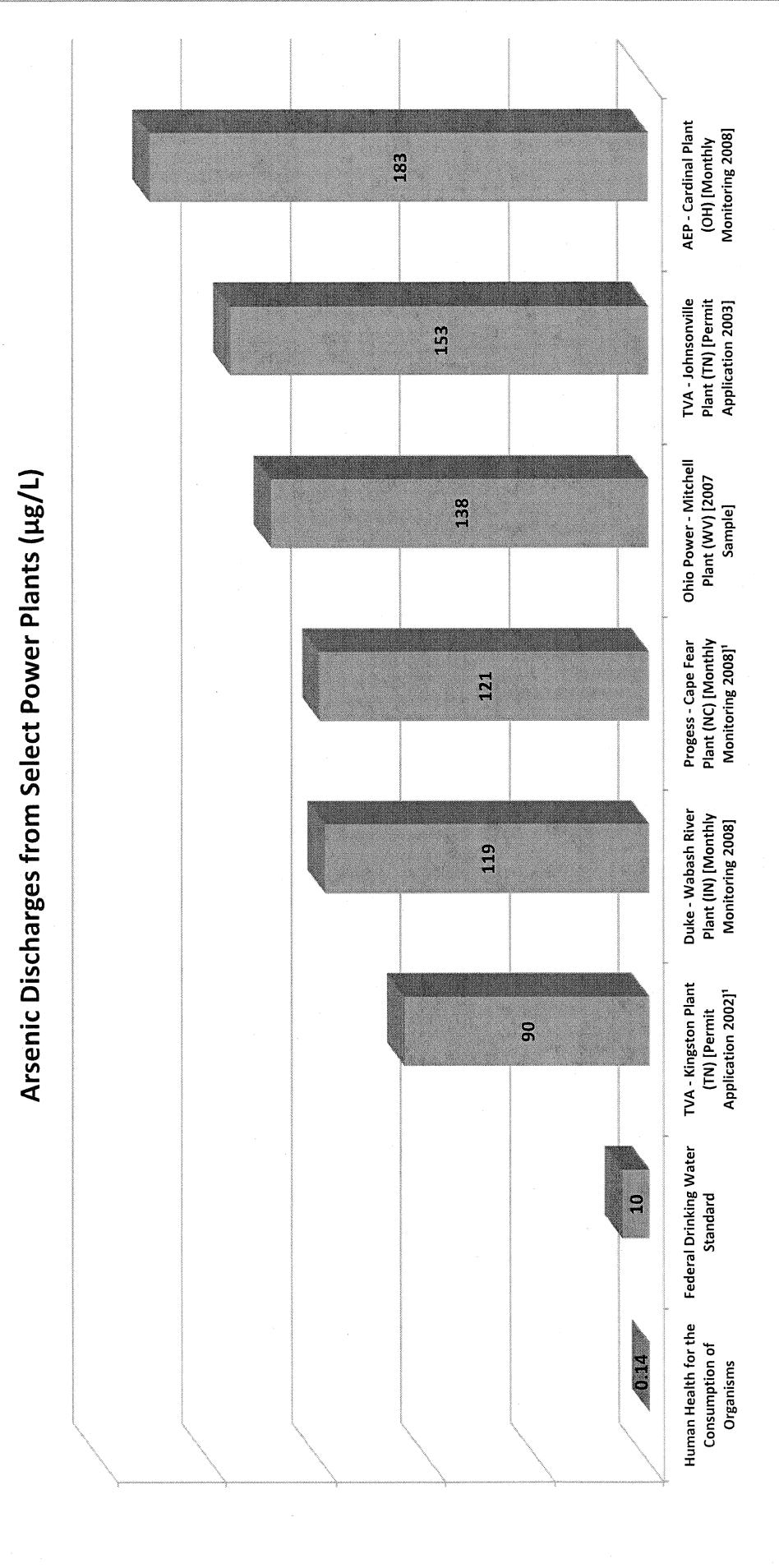
³ The Jeffries plant discharges to the Tailrace Canal, but ECHO data did not confirm whether Outfall 003 discharges directly into the Tailrace Canal.

⁴ This sample did not measure flow. EPA's ECHO database reports maximum flow of 9.663 MGD in October of 2007 from Discharge from ash pond.

Selenium Discharges from Select Power Plants (µg/L)



¹Data reports that scrubber sludge from the Big Bend and Roxboro facilities are mixed with other effluents before final discharge. Concentrations in final discharge will likely be lower.



¹Data reports that effluent from the Cape Fear and TVA Kingston ash ponds may be mixed with other effluents before final discharge. Concentrations in final discharge will likely be lower.