APPENDIX 4.B

PROBABLE ENVIRONMENTAL COSTS (PEC)

The following appendices comprise Appendix 4.B:

Appendix 4.B.1 Summary of Probable Environmental Costs Included in Pre-Screening

Appendix 4.B.2. Narrative Discussion of Environmental Pollutants and Future Changes in Environmental Laws, Regulations or Standards

Appendix 4.B.3: Probable Environmental Cost Calculations

Note: Cooling Towers & Fish Impingement costs are included in the capital and operating costs utilized to pre-screen new supply-side alternatives. The PEC of greenhouse gas restrictions is shown in Appendix 4.B.1 Summary of Probable Environmental Costs Included in Pre-Screening

APPENDIX 4.B.1 SUMMARY OF PROBABLE ENVIRONMENTAL COSTS INCLUDED IN PRE-SCREENING

Resource Type: Pulverized Coal and FBC – Utility Costs and Probable Environmental Costs<u>Highly Confidential</u>****

	SCPC Pittsburg Bit WFGD (1)	SCPC ILL #6 WFGD (2)	SCPC ILL #6 WFGD CO2 Capture (3)	SCPC PRB SDA (4)	USCPC PRB WFGD (5)	USCPC PRB WFGD CO2 Capture (6)	Fluidized Bed Combustion (FBC) (7)
Expected Capacity Factor	[redacted]						
Avg Heat Rate (Btu/kWh)							
Technology Emission Rates							
NOx (lbs/mmBtu)							
NOx Seasonal (lbs/mmBtu)							
SO2 (lbs/mmBtu)							
Hg (lbs/TBtu)							
CO2							
Emissions (Lbs/MWh)							
NOx							
NOx Seasonal							
SO2							
Hg							
CO2							
Utility Cost ($/MWh)							
NOx							
NOx Seasonal							
SO2							
Hg							
Total Utility Cost ($/MWh)							
Probable Environmental Cost ($/MWh)							
CO2							
Combustion By-Product Landfill							
Other Air Emissions (VOC's, HAP's)							
Zebra Mussels							
Total Probable Environmental Cost ($/MWh)							

HC

Resource Type: Integrated Gasification Combined Cycle – Utility Costs and Probable Environmental Costs **Highly Confidential**

	IGCC ILL #6 CoP (8)	IGCC ILL #6 CoP CO2 Capture (9)	IGCC ILL #6 Shell (10)	IGCC ILL #6 Shell CO2 Capture (11)	IGCC ILL #6 GE Radiant (12)	IGCC ILL #6 GE Radiant CO2 Capture (13)
Expected Capacity Factor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg Heat Rate (Btu/kWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Technology Emission Rates	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx (lbs/mmBtu)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx Seasonal (lbs/mmBtu)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SO2 (lbs/mmBtu)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hg (lbs/TBtu)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CO2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Emissions (Lbs/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx Seasonal	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SO2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hg	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CO2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Utility Cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NOx Seasonal	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SO2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hg	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Utility Cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Probable Environmental Cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CO2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Combustion By-Product Landfill	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Other Air Emissions (VOC's, HAP's)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Zebra Mussels	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Probable Environmental Cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

HC

Resource Type: Nuclear – Utility Costs and Probable Environmental Costs**Highly Confidential**

	Nuclear - U.S. EPR (14)	Nuclear - G.E. ABWR (15)	Nuclear - G.E. ESBWR (16)	Nuclear - Westinghouse AP1000 (17)
Expected Capacity Factor	[redacted]			
Avg Heat Rate (Btu/kWh)				
Technology Emission Rates				
NOx (lbs/mmBtu)				
NOx Seasonal (lbs/mmBtu)				
SO2 (lbs/mmBtu)				
Hg (lbs/TBtu)				
CO2				
Emissions (Lbs/MWh)				
NOx				
NOx Seasonal				
SO2				
Hg				
CO2				
Utility Cost ($/MWh)				
NOx				
NOx Seasonal				
SO2				
Hg				
Total Utility Cost ($/MWh)				
Probable Environmental Cost ($/MWh)				
CO2				
Combustion By-Product Landfill				
Other Air Emissions (VOC's, HAP's)				
Zebra Mussels				
Total Probable Environmental Cost ($/MWh)				

HC

Resource Type: Combined Cycle – Utility Costs and Probable Environmental Costs**Highly Confidential**

	CT/Combined Cycle (PG7001H) (18)	CT/CC (19)
Expected Capacity Factor	[redacted]	
Avg Heat Rate (Btu/kWh)		
Technology Emission Rates		
NOx (lbs/mmBtu)		
NOx Seasonal (lbs/mmBtu)		
SO2 (lbs/mmBtu)		
Hg (lbs/TBtu)		
CO2		
Emissions (Lbs/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
CO2		
Utility Cost ($/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
Total Utility Cost ($/MWh)		
Probable Environmental Cost ($/MWh)		
CO2		
Combustion By-Product Landfill		
Other Air Emissions (VOC's, HAP's)		
Zebra Mussels		
Total Probable Environmental Cost ($/MWh)		

HC

Resource Type: Energy Storage and Fuel Cells – Utility Costs and Probable Environmental Costs**<u>Highly Confidential</u>**

	Compressed Air Energy Storage System (30)	Fuel Cells (Phosphoric Acid Fuel Cells) (31)	Molten Carbonate Fuel Cells (32)	Solid Oxide Fuel Cells - Ambient Pressure (33)	Proton Exchange Membrane (34)	NaS Batteries (35)
Expected Capacity Factor	[redacted]					
Avg Heat Rate (Btu/kWh)						
Technology Emission Rates						
NOx (lbs/mmBtu)						
NOx Seasonal (lbs/mmBtu)						
SO2 (lbs/mmBtu)						
Hg (lbs/TBtu)						
CO2						
Emissions (Lbs/MWh)						
NOx						
NOx Seasonal						
SO2						
Hg						
CO2						
Utility Cost ($/MWh)						
NOx						
NOx Seasonal						
SO2						
Hg						
Total Utility Cost ($/MWh)						
Probable Environmental Cost ($/MWh)						
CO2						
Combustion By-Product Landfill						
Other Air Emissions (VOC's, HAP's)						
Zebra Mussels						
Total Probable Environmental Cost ($/MWh)						

HC

Resource Type: Combustion Turbines – Utility Costs and Probable Environmental Costs**Highly Confidential**

	GE PG7121 Heavy Duty (20)	CT Conventional (21)
Expected Capacity Factor	[redacted]	
Avg Heat Rate (Btu/kWh)		
Technology Emission Rates		
NOx (lbs/mmBtu)		
NOx Seasonal (lbs/mmBtu)		
SO2 (lbs/mmBtu)		
Hg (lbs/TBtu)		
CO2		
Emissions (Lbs/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
CO2		
Utility Cost ($/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
Total Utility Cost ($/MWh)		
Probable Environmental Cost ($/MWh)		
CO2		
Combustion By-Product Landfill		
Other Air Emissions (VOC's, HAP's)		
Zebra Mussels		
Total Probable Environmental Cost ($/MWh)		

HC

Resource Type: Combustion Turbines – Utility Costs and Probable Environmental Costs**<u>Highly Confidential</u>**

	GE PG7121 Heavy Duty (20)	CT Conventional (21)
Expected Capacity Factor	[redacted]	
Avg Heat Rate (Btu/kWh)		
Technology Emission Rates		
NOx (lbs/mmBtu)		
NOx Seasonal (lbs/mmBtu)		
SO2 (lbs/mmBtu)		
Hg (lbs/TBtu)		
CO2		
Emissions (Lbs/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
CO2		
Utility Cost ($/MWh)		
NOx		
NOx Seasonal		
SO2		
Hg		
Total Utility Cost ($/MWh)		
Probable Environmental Cost ($/MWh)		
CO2		
Combustion By-Product Landfill		
Other Air Emissions (VOC's, HAP's)		
Zebra Mussels		
Total Probable Environmental Cost ($/MWh)		

HC

Resource Type: Small Scale Alternatives – Utility Costs and Probable Environmental Costs**Highly Confidential**

	Internal Combustion Engines - Oil (36)	Internal Combustion Engines - Natural Gas-Spark (37)	Internal Combustion Engines - Natural Gas (38)	Small Scale CT Duel-Fuel Natural Gas (39)	Small Scale CT Duel-Fuel Oil (40)
Expected Capacity Factor	[redacted]				
Avg Heat Rate (Btu/kWh)					
Technology Emission Rates					
NOx (lbs/mmBtu)					
NOx Seasonal (lbs/mmBtu)					
SO2 (lbs/mmBtu)					
Hg (lbs/TBtu)					
CO2					
Emissions (Lbs/MWh)					
NOx					
NOx Seasonal					
SO2					
Hg					
CO2					
Utility Cost ($/MWh)					
NOx					
NOx Seasonal					
SO2					
Hg					
Total Utility Cost ($/MWh)					
Probable Environmental Cost ($/MWh)					
CO2					
Combustion By-Product Landfill					
Other Air Emissions (VOC's, HAP's)					
Zebra Mussels					
Total Probable Environmental Cost ($/MWh)					

HC

Resource Type: Solar – Utility Costs and Probable Environmental Costs**Highly Confidential**

	Solar Parabolic Trough w/Thermal Storage (22)	Dish/Stirling Engine 100% Solar (23)	Photovoltaic Flat Plate Thin Film (24)
Expected Capacity Factor	[redacted]		
Avg Heat Rate (Btu/kWh)			
Technology Emission Rates			
NOx (lbs/mmBtu)			
NOx Seasonal (lbs/mmBtu)			
SO2 (lbs/mmBtu)			
Hg (lbs/TBtu)			
CO2			
Emissions (Lbs/MWh)			
NOx			
NOx Seasonal			
SO2			
Hg			
CO2			
Utility Cost ($/MWh)			
NOx			
NOx Seasonal			
SO2			
Hg			
Total Utility Cost ($/MWh)			
Probable Environmental Cost ($/MWh)			
CO2			
Combustion By-Product Landfill			
Other Air Emissions (VOC's, HAP's)			
Zebra Mussels			
Total Probable Environmental Cost ($/MWh)			

HC

Resource Type: Wind & Biomass – Utility Costs and Probable Environmental Costs<u>Highly Confidential</u>****

	Wind (25)	Biomass Stoker-Fired Stoker (26)	Biomass Fluidized Bed (27)
Expected Capacity Factor	[redacted]		
Avg Heat Rate (Btu/kWh)			
Technology Emission Rates			
NOx (lbs/mmBtu)			
NOx Seasonal (lbs/mmBtu)			
SO2 (lbs/mmBtu)			
Hg (lbs/TBtu)			
CO2			
Emissions (Lbs/MWh)			
NOx			
NOx Seasonal			
SO2			
Hg			
CO2			
Utility Cost ($/MWh)			
NOx			
NOx Seasonal			
SO2			
Hg			
Total Utility Cost ($/MWh)			
Probable Environmental Cost ($/MWh)			
CO2			
Combustion By-Product Landfill			
Other Air Emissions (VOC's, HAP's)			
Zebra Mussels			
Total Probable Environmental Cost ($/MWh)			

HC

Resource Type: Waste to Energy – Utility Costs and Probable Environmental Costs Highly Confidential****

	Landfill Gas (28)	Animal-Waste (29)
Expected Capacity Factor	[redacted]	[redacted]
Avg Heat Rate (Btu/kWh)	[redacted]	[redacted]
Technology Emission Rates	[redacted]	[redacted]
NOx (lbs/mmBtu)	[redacted]	[redacted]
NOx Seasonal (lbs/mmBtu)	[redacted]	[redacted]
SO2 (lbs/mmBtu)	[redacted]	[redacted]
Hg (lbs/TBtu)	[redacted]	[redacted]
CO2	[redacted]	[redacted]
Emissions (Lbs/MWh)	[redacted]	[redacted]
NOx	[redacted]	[redacted]
NOx Seasonal	[redacted]	[redacted]
SO2	[redacted]	[redacted]
Hg	[redacted]	[redacted]
CO2	[redacted]	[redacted]
Utility Cost ($/MWh)	[redacted]	[redacted]
NOx	[redacted]	[redacted]
NOx Seasonal	[redacted]	[redacted]
SO2	[redacted]	[redacted]
Hg	[redacted]	[redacted]
Total Utility Cost ($/MWh)	[redacted]	[redacted]
Probable Environmental Cost ($/MWh)	[redacted]	[redacted]
CO2	[redacted]	[redacted]
Combustion By-Product Landfill	[redacted]	[redacted]
Other Air Emissions (VOC's, HAP's)	[redacted]	[redacted]
Zebra Mussels	[redacted]	[redacted]
Total Probable Environmental Cost ($/MWh)	[redacted]	[redacted]

HC

APPENDIX 4.B.2. NARRATIVE DISCUSSION OF ENVIRONMENTAL POLLUTANTS AND FUTURE CHANGES IN ENVIRONMENTAL LAWS, REGULATIONS OR STANDARDS

In accordance with 4 CSR 240-22.040(2)(B)(1), this section identifies a list of environmental pollutants for which additional environmental laws or regulations may be imposed at some point within the planning horizon. Environmental laws or regulations may impact air emissions, water discharges, or disposal of materials generated. The following sections summarize pollutants which could result in compliance costs that could have a significant impact on utility rates.

In accordance with 4 CSR 240-22.070(2)(C), this section also identifies future changes in environmental laws, regulations or standards.

AIR IMPACTS

NATIONAL AMBIENT AIR QUALITY STANDARDS

The Clean Air Act (CAA) requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants. These commonly found air pollutants (also known as "criteria pollutants") are particulate matter (PM), ground-level ozone, carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), and lead. EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health is called primary standards. Another set of limits intended to prevent environmental and property damage is called secondary standards.[i]

Particulate Matter

EPA revised the air quality standards for PM in 2006. The 2006 standards tightened the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$, and retained the annual fine particle standard at 15 $\mu g/m^3$. EPA retained the existing 24-hour PM_{10} standard of 150 $\mu g/m^3$ but revoked the annual PM_{10} standard.

The CAA requires EPA to review the latest scientific information and standards every five years. Before new standards are established, policy decisions undergo rigorous review by the scientific community, industry, public interest groups, the general public and the Clean Air Scientific Advisory Committee (CASAC).[ii]

On March 29, 2007, the EPA issued a rule defining requirements for state plans to clean the air in areas with levels of fine particle pollution that do not meet national air quality standards. State plans under this final rule are known as the Clean Air Fine Particle Implementation Rule.

Once an area is designated as nonattainment, the Clean Air Act requires the state to submit an implementation plan to EPA within three years. For the 1997 fine particle standards, state plans were due in April 2008.

States must meet the $PM_{2.5}$ standard by 2010. However, in their 2008 implementation plans, states may propose an attainment date extension for up to five years. Those areas for which EPA approves an extension must achieve clean air as soon as possible, but no later than 2015.

For each nonattainment area, the CAA requires the state to demonstrate that it has adopted all reasonably available control measures, considering economic and technical feasibility and other factors, that are needed to show that the area will attain the fine particle standards as expeditiously as practicable. The rule includes a presumption that for power plants subject to the Clean Air Interstate Rule (CAIR), compliance with CAIR would satisfy these requirements for sulfur dioxide and nitrogen oxides (with certain conditions).

Five main types of pollutants contribute to fine particle concentrations: direct $PM_{2.5}$ emissions; sulfur dioxide; nitrogen oxides; ammonia; and volatile organic compounds. However, the effect of reducing emissions of each of these pollutants varies by area, depending on the fine particle composition, emission levels, and other area-specific factors. For this reason, the final rule establishes the following policies for evaluating and controlling sources of these emissions:

- $PM_{2.5}$ direct emissions (including organic carbon, elemental carbon and crustal material) must be evaluated for emission reduction measures in all nonattainment areas.

- Sulfur dioxide must be evaluated for emission reduction measures in all nonattainment areas.

- Nitrogen oxides (NOx) must be evaluated for emission reduction measures in each area unless the state and EPA demonstrate that NOx is not a significant contributor to $PM_{2.5}$ concentrations in a specific area.

- Volatile organic compounds are not required to be evaluated for emission reduction measures in each area unless the state or EPA demonstrates that VOCs significantly contribute to $PM_{2.5}$ concentrations in a specific area.

- Ammonia is not required to be evaluated for emission reduction measures in each area unless the state or EPA demonstrates that ammonia significantly contributes to $PM_{2.5}$ concentrations in a specific area.[iii]

The final revised standards are being implemented. EPA's review for future revisions to the PM standard has already started. Non-attainment of a revised standard could ultimately result in regulations requiring additional PM reduction technologies, emission limits or both on fossil-fueled units. $PM_{2.5}$ may also require additional NOx and SO_2 control as precursors.

Ozone

Ground-level or "bad" ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC.[iv]

On March 12, 2008, EPA significantly strengthened the NAAQS for ground-level ozone. EPA's final rule revises both ozone standards: the *primary* standard, designed to protect human health; and the *secondary* standard, designed to protect welfare (such as vegetation and crops). The existing primary and secondary standards, set in 1997, are identical: an 8hour standard of 0.08 parts per million (ppm). (In practice, because of rounding, an area meets the standard if ozone levels are 0.084 ppm or lower.)

EPA set the primary (health) standard to a level of 0.075 ppm. EPA is also strengthening the secondary 8-hour ozone standard to the level of 0.075 ppm making it identical to the revised primary standard.

The CAA requires EPA to designate areas as attainment (meeting the standards), nonattainment (not meeting the standards), or unclassifiable (insufficient data to classify) after the Agency sets a new standard, or revises an existing standard. The following schedule will apply to the revised ozone standards:

- States must make recommendations to EPA no later than March 2009 for areas to be designated attainment, nonattainment and unclassifiable.

- EPA will issue final designations of attainment, nonattainment and unclassifiable areas no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, EPA will issue designations no later than March 2011.

- States must submit State Implementation Plans outlining how they will reduce pollution to meet the standards by a date that EPA will establish in a separate rule. That date will be no later than three years after EPA's final designations.

If EPA issues designations in 2010, then these plans would be due no later than 2013.

States are required to meet the standards by deadlines that may vary based on the severity of the problem in the area. [v]

EPA revisions to the ozone standards could result in the non-attainment of the standard in many areas. This could ultimately result in regulations requiring additional NOx reduction technologies, emission limits or both on fossil-fueled units.

Carbon Monoxide

Carbon monoxide is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, other non-road engines, industrial processes, residential wood burning, and natural sources such as forest fires. [vi]

EPA's main approaches to reduce CO have been to establish NAAQS, to require national controls for motor vehicle emissions, and to require reductions from large industrial facilities.

EPA set two national health protection standards for CO: a one-hour standard of 35 parts per million and an eight-hour standard of 9 parts per million. Across the nation, air quality stations measure the levels of CO and other pollutants in the air. These measurements are compared to the standards. Areas that have CO levels that are too high must develop and carry out plans to reduce CO emissions.

Starting in the early 1970's, EPA has set national standards that have considerably reduced emissions of CO and other pollutants from motor vehicles, including tailpipe emissions, new vehicle technologies, and clean fuels programs. Since 1970, CO emissions from on-road vehicles have been reduced by over 40 percent. [vii]

Revisions to the CO standard upon review may occur. Non-attainment of a revised standard could ultimately result in regulations requiring additional CO reduction technologies, emission limits or both on fossil-fueled units.

Sulfur Dioxide and Nitrogen Oxides (Acid Rain Program)

The overall goal of the Acid Rain Program (ARP) is to achieve significant environmental and public health benefits through reductions in emissions of SO_2 and NO_x—the primary causes of acid rain.[viii]

The ARP set a goal of reducing annual SO_2 emissions by 10 million tons below 1980 levels. To achieve these reductions, the law required a two-phase tightening of the restrictions placed on fossil fuel-fired power plants.

Phase I began in 1995 and affected mostly coal-burning electric utility plants located in 21 eastern and midwestern states. Emissions data indicate that 1995 SO_2 emissions at these units nationwide were reduced by almost 40 percent below their required level.

Phase II, which began in the year 2000, tightened the annual emissions limits imposed on these large, higher emitting plants and also set restrictions on smaller, cleaner plants fired by coal, oil, and gas.

The ARP also called for a 2 million ton reduction in NO_x emissions by the year 2000. A significant portion of this reduction has been achieved by coal-fired utility boilers installing low NO_x burner technologies to meet new emissions standards.[ix]

Clean Air Interstate Rule

On March 10, 2005, EPA issued the Clean Air Interstate Rule (CAIR), a rule that will dramatically reduce air pollution that moves across state boundaries. CAIR will permanently cap emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) in the eastern United States. When fully implemented, CAIR will reduce SO_2 emissions in these states by over 70 percent and NO_x emissions by over 60 percent from 2003 levels.[x]

Through the use of the proven cap-and-trade approach, CAIR achieves substantial reductions of SO_2 and NO_x emissions and will assist the eastern U.S. meet EPA's protective air quality standards for ozone or fine particles. SO_2 and

NO_x contribute to the formation of fine particles and NO_x contributes to the formation of ground-level ozone.

CAIR covers 28 eastern states and the District of Columbia. States must achieve the required emission reductions using one of two compliance options: 1) meet the state's emission budget by requiring power plants to participate in an EPA-administered interstate cap and trade system that caps emissions in two stages, or 2) meet an individual state emissions budget through measures of the state's choosing.

CAIR provides a Federal framework requiring states to reduce emissions of SO_2 and NOx. EPA anticipates that states will achieve this primarily by reducing emissions from the power generation sector. The CAA requires that states meet the new national, health-based air quality standards for ozone and $PM_{2.5}$ standards by requiring reductions from many types of sources. Some areas may need to take additional local actions. CAIR reductions will lessen the need for additional local controls.[xi]

On July 11, 2008, the D.C. Circuit Court of Appeals vacated the CAIR in its entirety and sent it back to EPA to promulgate a rule that is consistent with its opinion. Until the Court's mandate is issued and potential subsequent appeals resolved it is difficult to anticipate how EPA will react. On remand CAIR could be rewritten by EPA with possibly greater emission reductions, no interstate allowance trading, not use the Title IV SO_2 allowances, change the NO_x fuel factor adjustment, include additional states potentially Kansas, or ultimately trigger a legislative response.

BART

On June 15, 2005, the EPA finalized amendments to the July 1999 regional haze rule. These amendments apply to the provisions of the regional haze rule that require emission controls known as best available retrofit technology, or BART, for industrial facilities emitting air pollutants that reduce visibility by causing or contributing to regional haze.

The pollutants that reduce visibility include $PM_{2.5}$, and compounds which contribute to $PM_{2.5}$ formation, such as NO_x, SO_2, and under certain conditions volatile organic compounds, and ammonia.

The BART requirements of the regional haze rule apply to facilities built between 1962 and 1977 that have the potential to emit more than 250 tons a year of visibility-impairing pollution. Those facilities fall into 26 categories, including utility and industrial boilers, and large industrial plants such as pulp mills, refineries and smelters.

Under the 1999 regional haze rule, states are required to set periodic goals for improving visibility in the 156 natural areas. As states work to reach these goals, they must develop regional haze implementation plans that contain enforceable measures and strategies for reducing visibility-impairing pollution.

States were to develop their implementation plans by December, 2007. States identified the facilities that will have to reduce emissions under BART and then set BART emissions limits for those facilities.[xii]

Revisions to the SO_2 standard is expected because it is well past EPA's 5 year review. Non-attainment of a revised standard could ultimately result in regulations requiring additional SO_2 reduction technologies, emission limits or both on fossil-fueled units.

Revisions to the NO_x standard is expected because it is well past EPA's 5 year review. Non-attainment of a revised standard could ultimately result in regulations requiring additional NO_x reduction technologies, emission limits or both on fossil-fueled units.

Future BART progress goals could require could result in additional SO_2, NO_x and PM controls or reduction technologies on fossil-fired units.

<u>Lead</u>

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles and industrial sources. Due to the phase out of leaded gasoline, metals processing is the major source of lead emissions to the air today. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

EPA set identical health-protection (primary) and welfare-protection (secondary) national air quality standards for lead in 1978. Across the nation, there are monitoring stations that measure the levels of lead and other pollutants in the air. These measurements are compared to the national standards. Areas that have lead levels that are too high must develop and implement a plan to reduce the levels.

Thirty years ago, cars and trucks were the major contributors of lead emissions to the air. Due to EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have dramatically declined (95 percent between 1980 and 1999), and levels of lead in the air have decreased by 94 percent between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13 percent of lead emissions.

The large reductions in lead emissions from motor vehicles have changed the nature of the air quality lead problem in the United States. Industrial processes, particularly primary and secondary lead smelters and battery manufacturers, are now responsible for most of lead emissions and all violations of the lead air quality standards. Emissions from industrial processes have decreased by only 6 percent since 1988. EPA's lead air quality monitoring strategy now focuses on areas surrounding these industrial sources.[xiii]

On May 1, 2008, EPA proposed to substantially strengthen the national ambient air quality standards (NAAQS) for lead. EPA is proposing to revise the level of the primary (health-based) standard from 1.5 micrograms per cubic meter (µg/m3), to within the range of 0.10 µg/m3 to 0.30 µg/m3, measured as total suspended particulates (TSP). The Agency is taking comment on alternative levels up to 0.50 µg/m3 and down below 0.10 µg/m3. EPA proposes to revise the secondary (welfare-based) standard to be identical in all respects to the primary standard.

In conjunction with proposing to strengthen the lead NAAQS, EPA is proposing to improve the existing lead monitoring network by requiring monitors to be placed near large sources of lead emissions and in urban areas with more than 1 million people. EPA is proposing to require all new lead monitors to be operational by January 1, 2010, or if a very large number of new monitors are necessary, to require that half of the new monitors be operational by January 1, 2010, with the other half operational by January 1, 2011.

EPA will issue final standards in September 2008 and anticipates the following implementation schedule:

- States would make recommendations for areas to be designated attainment, nonattainment, or unclassifiable by September 2009.
- EPA would issue final designations of attainment, nonattainment and unclassifiable areas no later than September 2011.
- States would submit State Implementation Plans outlining how they will reduce pollution to meet the standards no later than Spring 2013.
- States would be required to meet the standards no later than Fall 2016.[xiv]

Non-attainment of a revised standard could ultimately result in regulations requiring additional lead reduction technologies, emission limits or both on coal units.

POTENTIAL FUTURE NAAQS POLLUTANTS:

1. Carbon Dioxide

President's Executive Order

On May 14, 2007, President Bush directed EPA and the Departments of Energy, Transportation, and Agriculture to take steps toward regulations that would cut gasoline consumption and reduce greenhouse gas emissions from motor vehicles, and through Executive Order 13432, he outlined a cooperative means of doing so. The President asked that, in undertaking this regulatory effort, we use as a starting point the "Twenty in Ten" plan announced in his State of the Union address to reduce U.S. gasoline consumption by 20 percent over the next ten years.

Control of Greenhouse Gases Under the Clean Air Act

The Supreme Court in *Massachusetts v. EPA* only reached the question of whether greenhouse gases emitted from new motor vehicles are air pollutants under the CAA; according to the Court, they are. Importantly, the Court did not answer whether the Agency *must* regulate greenhouse gas emissions, and if it chooses to do so, how and when. The Supreme Court's decision did not automatically turn greenhouse gases into regulated pollutants. It is up to the EPA Administrator to make requisite findings, including an endangerment finding and issue regulations under the CAA before the greenhouse gas "air pollutants" are actually regulated pollutants. EPA will address the question of an endangerment finding at the same time that it proposes regulatory action using the President's "Twenty in Ten" plan as a starting point.

This distinction between unregulated air pollutants – which greenhouse gases currently are – and regulated air pollutants (such as NOx, lead, and other pollutants currently subject to EPA regulation) is important. Specifically, the Clean Air Act and EPA's regulations require PSD permits to contain emissions limitations for "each pollutant subject to regulation" under the Act. For nearly 30 years, EPA has consistently interpreted the term "subject to regulation under the Act" to describe pollutants that are presently subject to a statutory or regulatory provision that requires actual control of emissions of that pollutant.

In 2002, EPA codified this interpretation in regulations by defining the term "regulated NSR pollutant." This definition references pollutants regulated in three principal program areas:

1. Pollutants for which the Administrator has established National Ambient Air Quality Standards (NAAQS),

2. Pollutants subject to New Source Performance Standards (NSPS), and

3. Class I or II substances under title VI of the Act.

It also covers any pollutant "that otherwise is subject to regulation under the Act." Because EPA has not established a NAAQS or NSPS for CO2, classified CO2 as a titleVI substance, or otherwise regulated CO2 under any other provision of the Act, CO2 is not currently a "regulated NSR pollutant" as defined by EPA regulations. We are aware that, if in response to the *Massachusetts* decision, the Agency ultimately regulates greenhouse gas emissions from mobile sources, such greenhouse gases will become "regulated pollutants." However, right now greenhouse gases are not "regulated pollutants".

Accordingly, in the meantime, and under the Agency's historic interpretation of the PSD permit program requirements, greenhouse gas emissions are not yet regulated pollutants and therefore are not subject to emissions limitations in PSD permits. EPA simply lacks the legal authority under the PSD program to impose emissions limitations for greenhouse gas emissions on power plants.

The Agency continues to evaluate the potential effects of the Supreme Court decision on the mobile and stationary source provisions of the Clean Air Act. This work includes an analysis of the implications of the interplay between a mobile source rule that regulates greenhouse gases and the PSD program. We are also looking more broadly at the various sections and titles of the Clean Air Act, and the interplay between them, as we develop a thoughtful approach to responding to *Massachusetts v. EPA*. Just as the challenge of global climate change requires a coordinated effort among many nations, it also requires that we avoid a piecemeal approach to regulation. Given the complexity of issues involved, it would be premature to attempt to address climate change in a single PSD permitting action, particularly when carbon dioxide is not yet a regulated pollutant. [xv]

Advance Notice of Proposed Rulemaking on Regulating Greenhouse Gases

On July 11, 2008, the EPA released an Advance Notice of Proposed Rulemaking (ANPR) inviting public comment on the benefits and ramifications of regulating greenhouse gases (GHGs) under the Clean Air Act (CAA). This only solicits comments but could be seen as a first step in EPA regulating GHGs. This ANPR in itself does not give EPA the authority to regulate GHGs.

The ANPR is one of the steps EPA has taken in response to the U.S. Supreme Court's decision in *Massachusetts v. EPA.* The Court found that the Clean Air Act (CAA) authorizes EPA to regulate tailpipe greenhouse gas emissions if EPA determines they cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare.

The ANPR reflects the complexity and magnitude of the question of whether and how greenhouse gases could be effectively controlled under the Clean Air Act. A decision to regulate GHG emissions under one section of the CAA could or would lead to regulation of GHG emissions under other sections of the Act, including sections establishing permitting requirements for major stationary sources of air pollutants.

The document summarizes much of EPA's work and lays out concerns raised by other federal agencies during their review of this work. EPA is publishing this notice at this time because it is impossible to simultaneously address all the agencies' issues and respond to the agency's legal obligations in a timely manner.

Key Issues for Discussion and Comment in the ANPR:

- Descriptions of key provisions and programs in the CAA, and advantages and disadvantages of regulating GHGs under those provisions
- How a decision to regulate GHG emissions under one section of the CAA could or would lead to regulation of GHG emissions under other sections of the Act, including sections establishing permitting requirements for major stationary sources of air pollutants
- Issues relevant for Congress to consider for possible future climate legislation and the potential for overlap between future legislation and regulation under the existing CAA
- Scientific information relevant to, and the issues raised by, an endangerment analysis
- Information regarding potential regulatory approaches and technologies for reducing GHG emissions

EPA will accept public comment on the ANPR for 120 days following publication in the Federal Register. After that EPA could continue with the rulemaking process with promulgating proposed and final rules.[xvi]

Proposed CO_2 Sequestration Regulations

On July 15, 2008, EPA proposed new federal requirements under the Safe Drinking Water Act (SDWA) for the underground injection of carbon dioxide (CO_2) for the purpose of long-term underground storage, or geologic sequestration (GS). The regulation is proposed under the authority of SDWA to ensure protection of underground sources of drinking water from injection related activities. The Agency is seeking comments on the proposed rule for 120 days.

While the elements of the proposal are based on the existing regulatory framework of EPA's Underground Injection Control (UIC) Program, modifications address the unique nature of CO_2 injection for GS. The relative buoyancy of CO_2, its corrosivity in the presence of water, the potential presence of impurities in captured CO_2, its mobility within subsurface formations, and large injection volumes anticipated at full scale deployment warrant specific requirements tailored to this new practice.

EPA's proposal applies to owners or operators of wells that will be used to inject CO_2 into the subsurface for the purpose of long-term storage. It will also affect state agencies that choose to administer the program in the future. The proposed rule is the proposed framework for permitting GS wells, but does not require any facilities to capture and/or sequester CO_2.

EPA's proposed rule would establish a new class of injection well—Class VI—and technical criteria for geologic site characterization; area of review and corrective action; well construction and operation; mechanical integrity testing and monitoring; well plugging; post-injection site care; and site closure for the purposes of protecting underground sources of drinking water.

The elements of the proposal build upon the existing UIC regulatory framework, with modifications based on the unique nature of CO_2 injection for GS, including:

- Geologic site characterization to ensure that GS wells are appropriately sited;
- Requirements to construct wells with injectate-compatible materials and in a manner that prevents fluid movement into unintended zones;
- Periodic re-evaluation of the area of review around the injection well to incorporate monitoring and operational data and verify that the CO_2 is moving as predicted within the subsurface;

- Testing of the mechanical integrity of the injection well, ground water monitoring, and tracking of the location of the injected CO2 to ensure protection of underground sources of drinking water;

- Extended post-injection monitoring and site care to track the location of the injected CO_2 and monitor subsurface pressures; and

- Financial responsibility requirements to assure that funds will be available for well plugging, site care, closure, and emergency and remedial response.

The proposal discusses long term liability for GS operations and seeks comment on this issue as part of the proposed rulemaking. The proposal also includes public participation requirements that would be associated with the issuance of permits for GS wells.

When finalized, the GS rule will provide certainty to industry and the public about requirements that would apply to GS by providing consistency in requirements across the nation, and transparency regarding the requirements that apply to owners and operators. Many components of the proposed rule provide flexibility by allowing the permitting authority discretion to set certain permit criteria that are appropriate to local geologic settings.[xvii]

CO_2 could be listed as a criteria pollutant and require a standard be developed. Non-attainment of a standard could ultimately result in regulations requiring CO_2 reduction technologies, emission limits or both on fossil-fired units.

Climate change legislation or regulations could require CO_2 control technology, retiring units, or fuel shifting.

a. Legislation possibilities range from: carbon tax to allowance either granted or auctioned, safety valve to no safety valve, early implementation at lower baselines to later implementation at greater baselines.
b. Regulation possibilities are the same as legislation.

2. Mercury

In December 2000, EPA announced its finding that it was "appropriate and necessary" to regulate coal- and oil-fired electric utilities under section 112 of the Clean Air Act. This finding, known as the Utility Air Toxics Determination, triggered a requirement for EPA to propose regulations to control air toxics emissions, including mercury, from these facilities.

On January 30, 2004, EPA proposed a rule with two basic approaches for controlling mercury from power plants. One approach would require power plants to meet emissions standards reflecting the application of the "maximum achievable control technology" (MACT) determined according to the procedure set forth in section 112(d) of the Clean Air Act. A second approach proposed by EPA would create a market-based "cap and trade" program that. EPA proposed to pursue the cap and trade approach either under Section 111 or Section 112 of the Clean Air Act.

The January 30, 2004 EPA proposed rule also proposed to revise the Agency's December 2000 finding that is "appropriate and necessary" to regulate utility hazardous air emissions using the MACT standards provisions (section 112) of the Clean Air Act. This action would give EPA the flexibility to consider a more efficient and more cost effective way to control mercury emissions.

On March 15, 2005, EPA issued the final Clean Air Mercury Rule (CAMR), which builds on EPA's Clean Air Interstate Rule (CAIR) to significantly reduce mercury emissions from coal-fired power plants. When fully implemented, these rules will reduce utility emissions of mercury from 48 tons a year to 15 tons, a reduction of nearly 70 percent.

The CAMR establishes "standards of performance" limiting mercury emissions from new and existing utilities and creates a market-based cap-and-trade program that will reduce nationwide utility emissions of mercury in two distinct phases. In the first phase, due by 2010, emissions will be reduced by taking advantage of "co-benefit" reductions – that is, mercury reductions achieved while reducing SO_2 and NO_x under CAIR. In the second phase, due in 2018, utilities will be subject to a second cap, which will reduce emissions to 15 tons upon full implementation.

On May 31, 2006 EPA issued its determination that regulation of electric utility steam generating units under section 112 of the Clean Air Act was neither necessary nor appropriate (the section 112 rule).

On February 8, 2008, The United States Court of Appeals for the District of Columbia Circuit vacated EPA's rule removing power plants from the CAA list of sources of hazardous air pollutants. At the same time, the court vacated the CAMR. EPA is reviewing the court's decisions and evaluating its impacts. [xviii]

In May 2008, petitions for rehearing of the matter by the full court were denied. The time for an appeal to the Supreme Court has not expired. If all appeals are denied, it is likely that the EPA will develop MACT standards for mercury emissions. These MACT standards, if adopted, could impact both KCP&L's new and existing facilities requiring mercury control technologies to be installed.

3. Hazardous Air Pollutants

The CAA requires EPA to regulate emissions of toxic air pollutants from a published list of industrial sources referred to as "source categories." As required under the Act, EPA has developed a list of source categories that must meet control technology requirements for these toxic air pollutants. The EPA is required to develop regulations (also known as rules or standards) for all industries that emit one or more of the pollutants in significant quantities.[xix]

Future additional regulation of HAPs could require Maximum Achievable Control Technology Standards (MACT) for HAPs for fossil-fired units.

4. Multi-Pollutant Impacts

Future EPA revisions to the New Source Performance Standards (NSPS) could require near PSD limits for new units or major modifications of fossil-fired units.

Future multi-pollutant legislation or regulations could require additional control technology or reduced emissions at all fossil-fired units.

a. Legislation possibilities include criteria pollutants, HAPs, or CO2 emission reductions without grandfathering units.
b. Regulation possibilities include a regulatory response to criteria pollutants, HAPs, or CO2 emission reductions without grandfathering units.

Future New Source Review (NSR) enforcement actions could result in penalties and additional controls or greater emission reductions at impacted fossil-fired units.

WATER IMPACTS

1.1.1 CLEAN WATER ACT SECTION 316(A) THERMAL DISCHARGE REGULATIONS OR POLICY

1.1.2 HAWTHORN AND IATAN NPDES PERMITS

Hawthorn Station

The Hawthorn Station current NPDES permit expired on July 27, 2005. KCPL submitted a renewal application within the required time limit in 2000. The current permit remains in effect until MDNR issues a new NPDES permit.

The EPA submitted an interim objection letter to MDNR concerning the issuance of the Hawthorn draft NPDES permit on July 11, 2005. As a result of EPA's interim objection the MDNR has placed a hold on the issuance of the Hawthorn NPDES permit. The objection is based on a disagreement between MDNR and

EPA on thermal discharges to the Missouri River. The Hawthorn permit defines a specific limit, i.e., exceedance, for thermal discharge in btu/day based on a state Water Quality Standard (WQS) discharge temperature of 90°F. However, the MDNR permit defines a violation in thermal discharge based on a complex formula involving discharge temperature, river volume, etc. It is this difference between exceedance and violation that is the basis for the disagreement between has EPA and MDNR. KCP&L's river plants at times exceed the WQS limits but not the calculated limits as defined in the permit as a violation.

The EPA has collected information on the Missouri River intake temperature from numerous utility plants located upstream of the state of Missouri which indicates that the Missouri River temperature currently is in the 88-89 ^{0} F temperature range as it enters the state of Missouri.

Iatan Station

The Iatan Station current NPDES permit (Number MO-0082996) expires on February 5, 2009. The Iatan NPDES permit (issued February 6, 2004) is similar to that of the existing Hawthorn permit in that Iatan has a daily maximum thermal discharge of 6.7×10^{10} (67×10^{9}) Btu's. As with Hawthorn, when the maximum daily thermal discharge is exceeded a formula (based on river volume) is applied to determine if a violation has occurred.

Future regulations or policy could be issued that restricts thermal discharges requiring alternative cooling technologies to be installed at coal fired units using once through cooling.

1.1.3 Clean Water Act Section 316(b) Fish Impingement Regulations

EPA is developing regulations under §316(b) of the Clean Water Act. Section 316(b) requires that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Industrial facilities use large volumes of cooling water from lakes, rivers, estuaries or oceans to cool their plants, including steam electric power plants, pulp and paper makers, chemical manufacturers, petroleum refiners, and manufacturers of primary metals like iron and steel and aluminum.

Cooling water intake structures cause adverse environmental impact by pulling large numbers of fish and shellfish or their eggs into a power plant's or factory's cooling system. There, the organisms may be killed or injured by heat, physical stress, or by chemicals used to clean the cooling system. Larger organisms may be killed or injured when they are trapped against screens at the front of an intake structure.[xx]

The final rule requires protection against these losses. For example, impingement requirements call for the number of organisms pinned against parts of the intake structure to be reduced by 80 to 95 percent from uncontrolled levels. Entrainment requirements call for the number of aquatic organisms drawn into the cooling system to be reduced by 60 to 90 percent from uncontrolled levels. Large power plants have flexibility to comply and to ensure energy reliability. The rule provides several compliance alternatives, such as using existing technologies, selecting additional fish protection technologies (such as screens with fish return systems), and using restoration measures.[xxi]

Effective July 9, 2007, EPA suspended the section 316(b) rule. The Second Circuit's decision remanded key provisions of the Phase II requirements, including the determination of BTA and the performance standard ranges. This suspension responds to the Second Circuit's decision, while EPA considers how to address the remanded issues.

EPA did not suspend the requirement that permitting authorities develop BPJ controls for existing facility cooling water intake structures that reflect the best technology available for minimizing adverse environmental impact.[xxii]

On April 11, 2008, the Supreme Court granted certiorari to hear the following question "whether CWA 316(b) authorizes EPA to compare costs with benefits in determining the best technology available for minimizing adverse environmental impacts at cooling water intake structures." The Court is currently being briefed on this issue.

EPA is currently, on remand, developing future section 316(b) regulations which could severely restrict cooling water inlet structures potentially requiring closed cycle cooling technologies instead.

1.1.4 ZEBRA MUSSEL INFESTATION

Zebra mussels first entered Missouri during the flood of 1993 along the Mississippi River. Since that time they have invaded the waters of the Lower Mississippi and several reservoirs in the South. They have moved upstream on the Arkansas River into Oklahoma, at one time shutting down the Ark One nuclear plant. In Oklahoma, they have been transported to several reservoirs from the Arkansas River including Kaw Reservoir, Keystone Reservoir, Oologh Lake and Shiatook Lake. In Kansas, they have infested El Dorado, Cheney and Perry Reservoirs, the Walnut River and Winfield City Lake. Zebra mussel's were found in Missouri in the Lake of the Ozarks and Lake Taneycomo. Nebraska has reported zebra mussel's in the Missouri River and at Base Lake, Offutt Air Force Base.

KCP&L has been monitoring for zebra mussel's at our generation facilities since 1993, when we held the first regional zebra mussel conference at our headquarters. From March to October we pull monthly samples from the lakes and the Missouri River that are sent to Wolf Creek to be analyzed for the presence of zebra mussel veligers, the immature stage of their life cycle. We also visually inspect the equipment. We have found none to date. In the Spring and Fall, we also cooperate with the Missouri Conservation Department and Kansas Wildlife and Parks to boat the Missouri River and search for adult zebra mussel's. We also do shoreline sampling and visual inspections of equipment at the lake plants. We have found no zebra mussel's in these searches.

1.1.5 Total Maximum Daily Loads (TMDL)

A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its quality is affected. Under the Clean Water Act Section 303(d) requires states to list impaired waters for which the necessary pollution controls have not yet been required and for which a TMDL study has not been written. The state is required to develop a TMDL for all waters on the 303(d) list. Each TMDL document will include allocations of the acceptable load for all sources of the pollutant. It will also include an implementation plan to identify how the load will be reduced to a level that will protect water quality.

If a water body is determined to be impaired, a watershed management plan will be developed that will include the TMDL calculation. Missouri has established acceptable standards for drinking water, fishing, swimming, aquatic life and other designated uses. Waters that don't meet these standards are placed on the 303(d) list.

A stream is considered impaired when it fails to meet Water Quality Standards established by the Clean Water Commission. Section 303(d) of the federal Clean Water Act requires states to identify and list all impaired waters. The list is revised and updated every two years. After studying the scientific data, waters are added or subtracted from the list depending on the status of their health. MDNR is currently required to develop TMDLs for 171 impaired water bodies for approval by the EPA. MDNR completed and approved 131 TMDLs since 1999.

Once a TMDL is assigned to a water body, a facility's NPDES permit on renewal will incorporate the TMDL. TMDL that will impact our facilities include temperature, mercury, TSS or example. We will continue to monitor the 303(d) list.

The 2004/2006 316(d) list does not list the Missouri River as impaired. The 2002 316(d) list included the Missouri River for PCB and chlordane. MDNR did make the following comments regarding mercury. General observations of mercury data would indicate that contamination of certain fish may be a state-wide problem. Generally, waters that have mercury levels sufficient to contaminate fish are considered eligible for placement on the 303(d) List. However, listing only the few waters with data available may create a misconception that only those waters are affected. Likewise, listing all of the state's waters could cause a belief that all waters contain fish unsafe to eat. Neither scenario is likely true. Furthermore, the listing may cause an excessive focus on sources of mercury within Missouri when most of the mercury in fish sampled in this state comes from sources outside of the state via atmospheric deposition. Because of the complexity of the problem, the department is participating in a state mercury taskforce to inventory, track and recommend controls for mercury sources in Missouri. Placing a few or all waters on the 303(d) List may confuse, rather than facilitate, the ongoing efforts to address the broader-based mercury concern.

A thermal TMDL could also be applied.

Future TMDL standards for containments in discharges could restrict these discharges requiring equipment be installed to minimize or control the discharge.

Future effluent limitations regarding settling or holding ponds discharges could require compliance with lower standards or elimination of pond usage.

Future storm water effluent limitations on storm water discharge could require storm water settling basins be constructed to comply with the standards.

1.1.6 WASTE MATERIAL IMPACTS

PCBs

KCPL has been aggressive in removing PCB's from our systems since 1980. As a result our plants and substations are PCB free. It is estimated that our distribution system has less than five percent of the transformers with 50 to 500 ppm PCB's. Typically, we find the distribution contaminated equipment when it comes out of service. No contaminated equipment is put back into service but is disposed.

A couple of years ago, an international group developed an initiative to rid the world of certain contaminants that become persistent in the environment; that is they never deteriorate, and in some cases bioaccumulate. Goals were set by international treaty for the control and elimination of PCB's. The United States has ratified the treaty. The EPA has used the treaty as a device to increase PCB regulation. The most important aspect of the increased regulation for KCPL would be the necessity of inventorying all our PCB containing equipment. An inventory would require a walk down of our distribution system and testing of all devices that could contain PCB's. The effort for KCPL has been estimated as 133 crew years and $40,000,000.

COAL COMBUSTION PRODUCTS (CCP's)

CCPs are produced from the burning of fossil fuels. This includes all ash, slag, and particulates removed from flue gas. EPA conducted two regulatory determinations on the management and use of coal combustion products (CCPs), in 1993 and in 2000. In conducting these two regulatory determinations, EPA did not identify any environmental harm associated with the beneficial use of coal combustion products and concluded in both determinations that these materials did not warrant regulation as a hazardous waste. The beneficial use of coal combustion products can include both encapsulated and unencapsulated applications. EPA recognizes that unencapsulated uses of coal combustion product require proper hydrogeologic evaluation to ensure adequate groundwater protection. The 2000 regulatory determination recommended a separate review addressing the use of coal combustion wastes as fill for surface or underground mines, which is currently underway.[xxiii]

Since EPA issued its 2000 regulatory determination, additional information on the disposal of CCP in landfills and surface impoundments has become available. EPA is now making this information available for public review and comment.

The Agency will consider all the information provided through this notice, the comments and new information submitted on it, as well as the results of the peer review of the draft risk assessment as it continues the follow-up on its Regulatory Determination for CCW disposed of in landfills and surface impoundments.[xxiv]

The Office of Surface Mining Reclamation and Enforcement is sought comments on proposed regulations pertaining to permit application requirements and performance standards related to the placement of CCPs on sites with a surface coal mining operations permit or in the reclamation of abandoned mine lands.

In 2003, Congress directed the EPA to commission an independent study of the health, safety, and environmental risks associated with the placement of CCPs in active and abandoned coal mines in all major U.S. coal basins. As a result, the National Research Council (NRC) established the Committee on Mine Placement of Coal Combustion Wastes in September 2004. The NRC published the committee's findings on March 1, 2006, in a report entitled ``Managing Coal Combustion Residues in Mines".

The report states that the committee ``concluded that putting CCPs in coal mines as part of the reclamation process is a viable management option as long as (1) CCP placement is properly planned and is carried out in a manner that avoids significant adverse environmental and health impacts and (2) the regulatory process for issuing permits includes clear provisions for public involvement." In
The committee notes that the placement of CCPs in coal mines ``can assist in meeting reclamation goals (such as remediation of abandoned mine lands)" and ``avoids the need, relative to landfills and impoundments, to disrupt undisturbed sites." However, the committee cautioned that ``an integrated process of CCP characterization, site characterization, management and engineering design of placement activities, and design and implementation of monitoring is required to reduce the risk of contamination moving from the mine site to the ambient environment." In addition, the report states that ``comparatively little is known about the potential for minefilling to degrade the quality of groundwater and/or surface waters particularly over longer time periods." The committee recommended the establishment of ``enforceable federal standards" to govern the placement of CCPs in mines.[xxv]

Future regulations or legislation could require existing landfills to be closed and replaced with new landfills designed to more stringent standards.

Future regulations or legislation could require the existing use of mine reclamation for disposal of combustion waste products to be eliminated or designed to more stringent standards.

Future regulations or legislation could require existing ash handling ponds to be closed and replaced with dry ash handling or disposal.
Future regulations or legislation could require beneficial use of combustion waste products to be eliminated or limited requiring landfill disposal.

APPENDIX 4.B.3: PROBABLE ENVIRONMENTAL COST CALCULATIONS

(1) Combustion By-Product Restrictions**<u>Highly Confidential</u>**

Construction & Operating Costs for Landfills	
Operating Costs	[redacted]
Operating Cost	[redacted]
Lost Ash Product Sales Revenues (see chart below)	[redacted]
Total Cost Impact	[redacted]
Annual MWh's	[redacted]
Operating Cost ($/MWh)	[redacted]
Subjective Probability	[redacted]
Probable Environmental Cost - Operating ($/MWh)	[redacted]

Lost Ash Product Sales Revenues (Company Wide)			
Year	**$ x Millions**	**Tons To Sell**	**$/Ton**
2008	[redacted]	[redacted]	[redacted]
2009	[redacted]	[redacted]	[redacted]
2010	[redacted]	[redacted]	[redacted]
2011	[redacted]	[redacted]	[redacted]
2012	[redacted]	[redacted]	[redacted]
Avg	[redacted]	[redacted]	[redacted]

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(2) Other Air Pollutants**Highly Confidential**

	SCPC Pittsburg Bit WFGD (1)	SCPC ILL #6 WFGD (2)	SCPC ILL #6 WFGD CO2 Capture (3)	SCPC PRB SDA (4)	USCPC PRB WFGD (5)	USCPC PRB WFGD CO2 Capture (6)	Fluidized Bed Combustion (FBC) (7)
Other Air Emissions: Clean Coal for VOC's, HAP's	[redacted]						
Current Fuel Price ($/mmBtu)							
Clean Coal Price ($/mmBtu)							
Increased $/mmbtu							
Heat Rate (Btu/kWh)							
Cost Increase $/MWh							

	IGCC ILL #6 CoP (8)	IGCC ILL #6 CoP CO2 Capture (9)	IGCC ILL #6 Shell (10)	IGCC ILL #6 Shell CO2 Capture (11)	IGCC ILL #6 GE Radiant (12)	IGCC ILL #6 GE Radiant CO2 Capture (13)
Other Air Emissions: Clean Coal for VOC's, HAP's	[redacted]					
Current Fuel Price ($/mmBtu)						
Clean Coal Price ($/mmBtu)						
Increased $/mmbtu						
Heat Rate (Btu/kWh)						
Cost Increase $/MWh						

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(3) ZEBRA MUSSELS**HIGHLY CONFIDENTIAL**

Zebra Mussel Control					
	Hawthorn	Iatan	LaCygne	Montrose	Average
Capital Costs	[redacted]				
Fixed Charge Rate					
Annual Carrying Cost					
Annual O&M cost					
Total Annual Spending					
Annual MWh's					
$/MWh					
Subjective Probability					
Total Probable Environm					

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[i] http://www.epa.gov/air/urbanair/6poll.html

[ii] http://www.epa.gov/air/particlepollution/standards.html

[iii]
http://www.epa.gov/pmdesignations/1997standards/documents/Mar07/factsheet.htm

[iv] http://www.epa.gov/air/ozonepollution/basic.html

[v] http://www.epa.gov/air/ozonepollution/pdfs/2008_03_factsheet.pdf

[vi] http://www.epa.gov/air/urbanair/co/what1.html

[vii] http://www.epa.gov/air/urbanair/co/effrt1.html

[viii] http://www.epa.gov/airmarkets/progsregs/arp/index.html

[ix] http://www.epa.gov/airmarkets/progsregs/arp/basic.html

[x] http://www.epa.gov/cair/

[xi] http://www.epa.gov/cair/basic.html

[xii] http://www.epa.gov/air/visibility/fs_2005_6_15.html

[xiii] http://www.epa.gov/air/lead/

[xiv] http://www.epa.gov/air/lead/pdfs/20080627_ria_fs.pdf

[xv] Testimony Of Stephen L. Johnson Administrator U.S. Environmental Protection Agency Before the Committee on Oversight and Government Reform United States House of Representatives - November 8, 2007

[xvi] http://www.epa.gov/epahome/anprfs.htm

[xvii] http://www.epa.gov/safewater/uic/pdfs/fs_uic_co2_proposedrule.pdf

[xviii] http://www.epa.gov/mercury/control_emissions/decision.htm#Chronology

[xix] http://www.epa.gov/ttn/atw/eparules.html

[xx] http://www.epa.gov/waterscience/316b/basic.htm#316b

[xxi] http://www.epa.gov/waterscience/316b/phase2/phase2final-fs.htm

[xxii] http://www.epa.gov/fedrgstr/EPA-WATER/2007/July/Day-09/w13202.htm

[xxiii] http://www.epa.gov/epaoswer/osw/conserve/c2p2/resources.htm

[xxiv] http://www.epa.gov/epaoswer/other/fossil/noda07.htm

[xxv] http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/E7-4669.htm