8. Environmental

Highlights

- *There are many existing and potential new environmental regulations that could affect the operations of Ameren Missouri's power plants.*
- *Although the momentum for carbon legislation has recently subsided, the U.S. Environmental Protection Agency has been aggressively pursuing more stringent regulations of power plant air, water, and solid waste emissions.*
- *Two scenarios, moderate and aggressive, were constructed to evaluate different levels of more stringent environmental regulations.*
- *Both environmental scenarios evaluated require substantial capital investment.*

Environmental regulations are an important factor to consider in resource planning. The planning scenarios, developed in Chapter 2, include alternative regimes for limiting greenhouse gas emissions. In this IRP, it is assumed that any new coal plant will be built with carbon capture as well as meet other more stringent environmental regulations. However, there is still the question about the impacts of more stringent environmental regulations to Ameren Missouri's existing generation fleet, especially its coal assets. This chapter discusses the current major regulations affecting the power industry as well as potential new environmental regulations. In fact, the Environmental Protection Agency (EPA) is expected to issue new environmental regulations in the next 12 to 24 months related to air emissions, ash waste, and water. Ameren Missouri synthesized the potential new environmental regulations into two distinct scenarios and corresponding compliance paths characterized by environmental retrofits to its existing coal fleet. The costs and timing of those retrofits are included in the risk analysis in Chapter 9 and are instrumental to the retirement analysis of Meramec. Ameren Missouri also expanded its financing analysis in Chapter 10 to evaluate the impact of these large investments. Furthermore, the environmental scenarios act as a signpost for decision making and therefore are an important aspect of the strategy selection in Chapter 10.

8.1 Overview

Ameren Missouri is subject to various environmental laws and regulations enforced by federal, state (Missouri and Illinois) and local authorities. The following paragraphs identify the major federal environmental laws governing the operations of Ameren Missouri facilities. The State of Missouri, State of Illinois, and local authorities also have environmental laws and/or ordinances which are intended to implement various provisions of the federal statutes. Significant provisions of these acts affecting the power industry are discussed in this chapter.

In addition, a summary of possible future environmental initiatives that could affect the power industry is included. The information below has been prepared in good faith and there is no assurance or certainty regarding the future of the identified environmental initiatives or their potential requirements.

Major Air Environmental Laws

Current

Clean Air Act (1970, 1977 & 1990)

- Acid Rain Program
- Clean Air Interstate Rule (CAIR)
- Clean Air Transport Rule (CATR) (proposed)
- Other Clean Air Act Provisions
- National Ambient Air Quality Standards (NAAQS)

Possible Future Initiatives and Regulations

Global Climate Initiatives
Initiatives to Address Transported Air Pollutants
Maximum Achievable Control Technology (MACT) Standards for Mercury and Other Hazardous Air Pollutants (HAPs)
Regulation of Greenhouse Gases (GHGs) under the CAA

Major Water Environmental Laws

Current

Clean Water Act (1977; Federal Water Pollution Control Amendments, 1972)
Safe Drinking Water Act (1974, as amended)

Possible Future Initiatives and Regulations

Clean Water Act, Section 316 (a) Thermal Discharges
Clean Water Act, Section 316 (b) Entrainment and Impingement of Aquatic Organisms
Steam Electric Generator Effluent Guideline Limitations

Major Solid Waste Environmental Laws

Current

Resource Conservation and Recovery Act (RCRA-1976)
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund 1980), Superfund Amendments and Reauthorization Act (SARA-1986)
Toxic Substances Control Act (TSCA-1976)
Emergency Planning & Community Right-To-Know Act (EPCRA-1986)

Possible Future Initiatives and Regulations

Coal Combustion Residual (CCR) Regulation – proposed revisions to RCRA regulations

Ash Pond Closure Initiatives
Potential Limitation of Beneficial Use

Other Environmental Laws
National Environmental Policy Act of 1969 (NEPA)
National Historic Preservation Act (1966)
Endangered Species Act (ESA-1973)
Migratory Bird Treaty Act (1918, as amended)
Bald and Golden Eagle Protection Act (1940, as amended)
Rivers and Harbors Act (1899)
Local Ordinances and Regulations

8.2 Major Air Environmental Laws

8.2.1 Current Laws

Clean Air Act (1970, 1977 & 1990)

The Clean Air Act (CAA) established Ambient Air Quality Standards for SO_2, NO_x, particulate matter (PM), fine particulate matter (PM 2.5), ozone, carbon monoxide (CO) and lead. Ambient standards may be evaluated on a 5 year cycle. More stringent ambient standards continue to be developed through this process. Ambient Standards are managed through emission limits, ambient air monitoring, and air quality modeling conducted by each State as part of State Implementation Plans (SIP). Areas are analyzed and designated as Attainment or Nonattainment with each pollutant. Nonattainment areas are subject to increased pollution control measures.

The CAA also established:

- New Source Performance Standards (NSPS) for determining the pollution control requirements for new sources, including existing sources that become subject to new source requirements due to a “modification” as defined by the statute and relevant rules;
- Requirements to permit new pollution sources and ensure air quality is not deteriorated; the state of Missouri is authorized by the EPA to issue permits.
- National Emission Standards for Hazardous Air Pollutants (NESHAPS) for control of asbestos and other hazardous air pollutants ;
- New Source Review (NSR) programs that mandate review to determine if projects trigger permitting and additional pollution control equipment;
- Prevention of Significant Deterioration (PSD) program, that imposes control requirements on new and modified major sources to protect ambient air quality. These programs do not apply to various actions at existing major sources,

including routine repair & replacement of equipment, and changes which do not increase emissions;

- Maximum Achievable Control Technology (MACT) Standards for hazardous air pollutants; and
- The Acid Rain Program.

Acid Rain Program

The Acid Rain Program established a national cap-and-trade program for SO_2 emissions from generating units, established NO_x emission limits for different boiler types, i.e., tangential fired vs. cyclone fired units, and required the installation of Continuous Emissions Monitors (CEM) on all coal-fired power plants to measure SO_2, NO_x, oxygen (O_2) and carbon dioxide (CO_2) on a continuous basis.

The Acid Rain Program required an SO_2 emissions cap of 15,000,000 tons in 1995 reduced to 10,000,000 tons in 2000 and to 8,950,000 tons in 2010. In addition, generating units are issued thirty (30) years of SO_2 allowances (1 allowance = 1 ton of SO_2 emissions). The SO_2 allowances can be bought, sold, traded, or banked. Three percent of the SO_2 allowances were held back and available for purchase at an annual EPA SO_2 auction.

Clean Air Interstate Rule (CAIR)

The CAIR established a new cap-and-trade program with lower limits on annual SO_2 and seasonal NO_x emissions from generating units, as well as a new cap and trade program for annual NOx emissions. CAIR is a regional program and applies to electric generating units in 28 eastern states and the District of Columbia. For SO_2 emissions, CAIR established a cap of 5,000,000 tons nationally by 2010 and a cap of 3,500,000 million tons by 2015. CAIR has a two phase program for NO_x emissions; where NO_X emissions are capped annually, and seasonally in the 28 state CAIR region. Phase 1 began in 2009 and phase 2 was scheduled to begin in 2015. Prior to CAIR, the NO_x Budget Trading Program had created a seasonal NOx emission cap and trade program for twenty-two (22) eastern states including eastern Missouri. The NO_x Budget Trading Program set a very low ozone season (May – September) cap on NO_x emissions by state and created NO_x allowances for the ozone season each year.

Other Clean Air Act Provisions

Section 126 of the CAA allows downwind states to file petitions against upwind states to control emissions in order to achieve attainment with ambient air quality standards.

The Regional Haze Rule is another provision of the CAA. The goal of the Regional Haze Rule is to set visibility equivalent to natural background levels by 2064 in Class I areas. In addition, the Regional Haze Rule is the basis for Best Available Retrofit

Technology (BART) rule setting SO_2 & NO_x control requirements for certain large emission sources and power plants in each state.

Maximum Achievable Control Technology (MACT) Standards

Title III of the Clean Air Act Amendments of 1990 included a requirement for the EPA to establish Maximum Achievable Control Technology (MACT) standards for 188 hazardous air pollutants identified in the Act. The Clean Air Act mandates that compliance with a MACT standard is required within three years of the final rule. The EPA has established MACT standards for numerous source categories including reciprocating internal combustion engines and recently cement kilns. The EPA continues to set MACT standards for other source categories and is expected to propose standards for coal- and oil-fired electric generating units (EGUs) in 2011.

Clean Air Transport Rule (CATR)

On July 6, 2010, the EPA proposed a rule which would replace the 2005 CAIR. A December 2008 court decision kept the requirements of CAIR in place temporarily but directed the EPA to issue a new rule to implement the Clean Air Act requirements concerning the transport of air pollution across state boundaries. The CATR was developed in response to the court's concerns. The rule is planned to be finalized in the spring of 2011. It will become effective in 2012 and replace the CAIR. The CATR will be implemented in two phases. The first phase will begin in 2012. The second phase will begin in 2014. The rule would reduce emissions in 31 states and the District of Columbia. When fully implemented in 2014, SO_2 emissions would be limited to 2.6 million tons per year. NOx emissions would be limited to 1.3 million tons per year for the annual program and 600 thousand tons for the ozone season. The proposed rule contains three different approaches. The EPA's preferred approach is to allow intrastate trading and limited interstate trading of allowances among power plants but assures that each state will meet its pollution control obligations. Allowance allocations will not be determined until the final rule is issued. On January 4, 2011, the EPA released a Notice of Data Availability and proposed alternative allowance allocation methodologies. The allocation methodology will be chosen by the EPA and communicated to stakeholders in the final rule.

Revisions to the National Ambient Air Quality Standard (NAAQS) for NO_2

On January 22, 2010, the EPA revised the primary NAAQS for NO_2 by adding a one-hour 100 ppb standard. Because the EPA's main health concern was NO_2 concentrations attributable to mobile sources, the revisions included requirements for an expanded near-road NO_2 ambient monitoring network. However the standard also has an immediate impact on stationary sources seeking preconstruction permits. Attainment designations will be made by February, 2012. States with non-attainment areas that do not meet the standard are required to submit attainment plans by January, 2013. Compliance with the new NO_2 ambient standard is required by July, 2017.

Revisions to the National Ambient Air Quality Standard (NAAQS) for SO_2

The EPA adopted an SO_2 ambient standard of 75 ppb on June 2, 2010. The EPA also revoked the annual and 24-hour SO2 NAAQS. Attainment designations will be made by July, 2012. States with non-attainment areas will be made to submit attainment plans by June, 2013. Compliance with the new SO_2 standard is required by 2017. The EPA also adopted a new approach for determining compliance with the new SO_2 standard. Instead of actually measuring the SO_2 concentration in ambient air, the EPA stated that modeling of major SO_2 sources would be required in lieu of ambient monitoring data to establish that an area attains the new NAAQS. Because of the conservatism of the EPA's models and modeling requirements, such modeling is likely to result in designation of many more nonattainment areas and additional control requirements for power plants.

8.2.2 Possible Future Air Environmental Initiatives

Global Climate Initiatives

Future initiatives regarding greenhouse gas emissions and global warming are actively being considered in the U.S. Congress. On June 26, 2009, the United States House of Representatives passed the American Clean Energy and Security Act of 2009 (ACES). This legislation was introduced by Representatives Henry Waxman (D-CA) and Edward Markey (D-MA). The cap and trade portion of the bill requires electric utilities to cut 2005 CO_2 emissions 17% by 2020, 42% by 2030, and 83% by 2050. ACES requires electric utilities, large-industrial sources and other entities that emit 25,000 tons or more per year of CO_2-equivalents to have tradable federal allowances for each ton emitted into the atmosphere. ACES is estimated to cover over 85% of the United States emissions of greenhouse gases (GHGs). ACES allocates allowances to the electric utility sector based on historical emissions and retail sales. In addition ACES contains a provision allowing emitting sources to use certified offsets (reductions in CO2 emissions) from reductions made by sources in sectors not covered by the bill. However, the total quantity of offsets allowed in any year cannot exceed 2 billion tons, split evenly between domestic and international offsets. In addition, after 2017 entities that seek to use international offsets to meet their compliance obligation must submit 5 tons of offset credits for every 4 tons of emissions being offset. The bill also includes a Renewable Energy Standard that requires utilities to increase renewable energy generation to 20% by 2020.

The United States Senate began the hearing process to enact climate legislation. In 2010, the Senate passed climate legislation out of its Energy and Commerce Committee. However, the Senate leadership decided to not bring the bill to the floor for debate and vote in 2010.

While we cannot predict the date of enactment or the requirements of any climate change legislation, it is unlikely that some form of federal greenhouse gas legislation will become law prior to the next presidential election in 2012. If and when adopted, future climate change legislation is expected to have a significant impact on Ameren Missouri operations.

Regulation of Greenhouse Gases (GHG) under the CAA

With regard to greenhouse gas regulation under existing law, in April, 2007, the U.S. Supreme Court issued a decision that the EPA has the authority to regulate CO_2 and other greenhouse gases from automobiles as "air pollutants" under the CAA. This decision was a result of a Bush Administration ruling denying a waiver request by the state of California to implement such regulations. The Supreme Court sent the case back to the EPA, which must conduct a rulemaking process to determine whether greenhouse gas emissions contribute to climate change "which may reasonably be anticipated to endanger public health or welfare." In late 2009, the EPA issued a finding that greenhouse gases contribute to air pollution that may endanger public health or welfare. As a result of that finding, the EPA subsequently issued the Tailoring Rule which would delay smaller sources from being subject to controlling CO_2 emissions. The rule will took effect on January 1, 2011. On December 23, 2010, the EPA announced a Settlement Agreement with states and environmental groups regarding setting greenhouse gas (GHG) new source performance standards (NSPS) for new and existing coal-, gas- and oil-based power plants. In this settlement EPA plans to rely on a little used provision of the Clean Air Act, Section 111(d), that gives EPA the authority to establish performance standards to reduce emissions for which there is no ambient standard. The EPA has made it clear they want the states to take the lead on establishing the GHG emission standards for existing power plants, and the states have considerable flexibility. It should be noted that EPA's intent by this action is to have existing power plants reduce CO2 emissions, presumably through energy efficiency or other plant modifications or operating restrictions. EPA plans to propose standards for both new and modified boilers under Clean Air Act section 111(b) and for existing facilities under section 111(d) by July 26, 2011, and finalize the rules by May 26, 2012.

Revisions to the National Ambient Air Quality Standard (NAAQS) for Ozone

The EPA lowered the ambient standard for ozone from 85 ppb to 75 ppb in 2008. In January, 2009, the EPA proposed to lower the standard to a range between 60 ppb and 70 ppb. EPA was required to finalize nonattainment designations for the 2008 standard in March, 2010, however the EPA granted a petition for reconsideration in September, 2009, and proposed to lower the standard in January, 2010. The EPA originally planned to finalize the revision by the end of August, 2010, but extended that date to December, 2010. On December 8, 2010, the EPA proposed to delay the final rule until July 2011. The final rule in July will start a new round on nonattainment designations and

subsequent state attainment plans for future controls. Under the EPA's original proposed accelerated schedule: states make recommendations for areas to be designated attainment by January, 2011; the EPA makes final area designations by July, 2011; states with areas that do not meet the standard are required to submit attainment plans by December, 2013; compliance with the new standard will be required by 2014 to 2031 depending on the severity of the problem. The delay in the rule will push the schedule back about one year.

Revisions to the National Ambient Air Quality Standard (NAAQS) for Fine Particulate (PM2.5)

On Feb. 24, 2009, the D.C. Circuit Court of Appeals remanded to EPA several aspects of its 2006 decisions on the PM2.5 NAAQS. The Court stated that the EPA had not provided a legally sufficient explanation for its decision to keep the existing annual primary standard of 15 ìg/m3. As a result of the decision, the EPA has folded its response to the remand into the next regular review of the NAAQS. The EPA announced a schedule that calls for a proposal to revise the annual PM2.5 standard in February, 2011, and for a final rule in October, 2011, to satisfy the 5-year review requirement of the CAA. It is likely that the EPA would make nonattainment designations for the new annual PM2.5 standard in 2013 or 2014, and that compliance with the standard would be in 2018 or 2019.

Initiatives to Control Mercury and Other Hazardous Air Pollutants

In 2005, the EPA promulgated the Clean Air Mercury Rule (CAMR), which defined the mercury monitoring and control requirements for coal-fired power plants over the next ten years. In 2008, the rule was vacated by a Federal Court and remanded to the EPA. In 2009, the EPA dropped its challenge to the court decision. The EPA is planning to replace the CAMR rule with a MACT standard for mercury and other hazardous air pollution emissions from power plants and is required by a consent decree to propose regulations in March, 2011, and finalize regulations in November, 2011. A MACT standard essentially requires the application of the most effective demonstrated pollution reduction equipment commercially viable. It is unclear whether the planned technology for mercury control - namely Activated Carbon Injection - will be acceptable as MACT control for power plants. If it is not, then Flue Gas Desulfurization (FGD) or other technology may be required on all power plants. The EPA is also developing MACT standards for other hazardous air pollutants, such as metals, acids and organics, for power plant emissions. It is unclear at this time what additional technology will be required to control such emissions. EGUs could be required to install additional pollution control equipment including FGD for acid gases (HCl and HF), and particulate controls such as fabric filters for trace metals including

arsenic, chromium, lead and nickel. The EPA conducted an extensive information collection request to obtain emission data from existing units and will use that information to set the standard for each hazardous air pollutant of concern.

8.3 Major Water Environmental Laws

8.3.1 Current Laws

Clean Water Act (Amended 1972)

The Clean Water Act (CWA) establishes pollutant specific water quality standards for various water bodies and groundwater. In addition, the CWA includes provisions to prevent degradation of higher quality waters. This includes a regulatory program covering Total Maximum Daily Load (TMDL) of "pollutants" allowed into waters of the state. Protection of water resources for industrial facilities typically occurs through the National Pollutant Discharge Elimination System (NPDES) permit process. Technology and water quality based effluent limitations are applied to ensure water quality standards are met. In order to meet permit conditions it may be necessary to modify operations or install additional water pollution control equipment to meet a pollutant specific water standard.

Clean Water Act, Section 316 (a) Thermal Discharges

Section 316 (a) of the CWA requires limitations on thermal discharges from power plants and other industrial sources. Power plant cooling water discharges are regulated by EPA and the Missouri Department of Natural Resources (MODNR) through the NPDES permit program. Thermal effluent permit limitations and/or state water quality temperature standards may require the installation of technology - such as cooling towers, cooling lakes or separate discharge streams.

Clean Water Act, Section 316 (b) Entrainment and Impingement of Aquatic Organisms

Section 316 (b) of the CWA was established to protect fish and other aquatic habitat from detrimental impacts associated with industrial sources. At power plants, aquatic organisms can be impinged and entrained within cooling water intake structures/piping and condenser systems. The EPA and MODNR establish rules to limit adverse impacts associated with cooling water intake structure operation through the NPDES permit process. Rules can take the form of performance and/or design criteria, or the utilization of specific control technologies. The impingement and entrainment of threatened or endangered species at a cooling water intake structure can also result in the need for additional operational and physical changes.

Clean Water Act-Wetlands

Construction projects involving "dredge and fill" (earth disturbance) within identified wetlands/streams can require mitigation, based on the total number of acres impacted.

Mitigation involves establishment of replacement wetlands at a ratio of anywhere from 1:1 up to 4:1.

Clean Water Act-Spill Prevention Control and Countermeasures (SPCC) Program

The CWA requires spill prevention plans and containment systems be developed for substations and other electrical equipment installations where 1,320 gallons of oil or more in aggregate are present and there is potential for discharge into surface water. These EPA rules have been revised to clarify that electrical equipment is subject to these rules and are currently scheduled to become final in November 2011. Ameren Missouri has about 650 substations in Missouri that may be subject to these rules. Ameren Missouri has developed a program to assess the risk of oil spills to surface waters for these locations.

Safe Drinking Water Act (1974)

The Safe Drinking Water Act was established to protect the quality of drinking water. The Safe Drinking Water Act establishes monitoring frequency and standards for contaminants and requires public notifications and corrective actions when standards are exceeded. MODNR has primacy to establish regulations and enforce compliance.

8.3.2 Possible Future Water Environmental Initiatives

Clean Water Act, Section 316 (a) Thermal Discharges

Thermal discharges – Power plant cooling water discharges are regulated by the EPA and MODNR through the NPDES permit program. Currently the State of Missouri and the EPA are working on new NPDES permits for Ameren Missouri power plants. Early indications suggest there may be difficulties in meeting revised thermal effluent permit limitations and/or state water quality temperature standards. If these limitations cannot be met, a variance may be sought through section 316 (a) of the CWA, or the facility may be required to install cooling towers. The pursuit of a 316 (a) variance would require environmental field studies focused on aquatic impacts coupled with an evaluation of hydrologic/thermal modeling of cooling water plume characteristics. If a 316 (a) variance demonstration is not successful, existing power plants could be required to reduce generation under certain operating conditions, or undertake infrastructure retro-fits to accommodate the installation of cooling towers. Cooling tower retro-fits will require substantial engineering, design and construction, including possible replacement of condensers. Property acquisition may be necessary at some locations. Cooling tower installations would increase parasitic load requirements and decrease overall plant efficiency.

Clean Water Act, Section 316 (b) Entrainment and Impingement of Aquatic Organisms

The EPA is in the process of revising Section 316 (b) regulations as a result of court challenges to the rule which culminated in Supreme Court decisions in December, 2008, and April, 2009. The rules are designed to limit adverse impacts associated with cooling water intake structure operation through the NPDES permit process. Rules can take the form of performance and/or design criteria, or the utilization of specific control technologies. Control technologies may include the replacement and utilization of a different traveling screen design or other totally different technology. Modified traveling screen designs may incorporate the use of "fine mesh" screens with a low pressure spray wash system to return large and small aquatic organisms to the water body downstream of the intake structure. They may also require the installation of specialized fish collection systems (fish baskets) on the bottom of each traveling screen section. Regulatory agencies may require extensive environmental sampling/testing/studies to demonstrate compliance with performance standards. In order to reduce water approach velocities, and subsequent impingement and entrainment, it may also be necessary to modify and expand the physical size of the intake structure. The EPA may also have the discretion to mandate cooling tower retro-fits at all existing plant sites. The impingement and entrainment of threatened or endangered species at a cooling water intake structure can also result in the need for operational and physical modifications up to and including cooling tower retro-fits. The EPA is obligated by a Court settlement to propose revisions to the CWA 316(b) regulations by March 14, 2011, and finalize the regulations by July 27, 2012.

Clean Water Act, Effluent Guidelines Limitations

Effluent guidelines are established by the EPA to reduce the discharge of pollutants in wastewater from steam electric power plants using nuclear or fossil fuels. The guidelines form the "backbone" for state regulation for Ameren's power plants. The existing steam electric effluent guidelines were last revised in 1982. The EPA conducted a detailed study report in 2008 and determined that steam electric ash ponds and flue gas desulfurization systems are the source of many wastewater pollutants. The EPA is in the process of evaluating the existing effluent limit guidelines (ELGs) for steam electric power plants. In 2010, the EPA issued an information collection request (ICR) to collect data about steam electric power generating plant water discharges. Ameren completed and submitted a response to the ICR in September 2010.

In response to challenges by Environmental groups, the EPA agreed to a consent in November, 2010. The consent required the EPA to propose revisions to the effluent guideline limitations by July 23, 2012, and finalize the revisions by January 31, 2014. States will be required to implement the revisions through regulations and permits. It is expected that the revised effluent guideline limitations will be linked to the final coal

combustion residual (CCR) rule and there is a possibility that additional wastewater treatment will be required to meet more stringent effluent limitations. The scope of the impacts cannot be determined until the proposed revisions are released by the EPA.

8.4 Major Solid Waste Environmental Laws

8.4.1 Current Laws

Resource Conservation and Recovery Act (RCRA - 1976)

RCRA regulates generation, transportation, treatment, storage and disposal of hazardous wastes including solvents, lead, mercury, acids, caustics, and other chemicals; regulates underground storage tanks; and regulates the management of used oil. Currently, RCRA provides guidance on the proper management of solid wastes which includes coal combustion products (i.e. ash disposal).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA - 1980), Superfund Amendments Reauthorization Act (SARA - 1986)

CERCLA was initially established as a tax on the petroleum and chemical industries. Then SARA was added to increase the trust fund from $1.6 to $8.5 billion. The fund is used to respond to major chemical/petroleum accidents and cleanup historic hazardous waste sites. CERCLA requires release reporting for chemicals that are released into the environment that exceed listed reportable quantities in any twenty-four (24) hour period. In addition, CERCLA required the identification of former sites where hazardous waste had been disposed. The EPA identifies major sites for cleanup actions and places sites with highest risk on the National Priorities List (NPL). CERCLA established joint and several liability for certain categories of entities, such as owners and operators of property upon which hazardous substances are located. Such strict liability can extend to successor companies. Companies that did business with cleanup site owners can also be considered potentially responsible parties (PRPs).

Ameren Missouri has environmental clean-up liabilities under CERCLA for the clean-up of ten (10) former coal gas manufacturing facilities [manufactured gas plant (MGP) sites] in Missouri. In addition, Ameren Missouri has environmental cleanup liabilities under CERCLA for the clean-up of various other types of sites. These liabilities generally result from sending oil-filled electrical equipment with polychlorinated biphenyls (PCBs) to contractors that have caused releases in the course of their business and cannot pay for cleaning up their property; and substations built on former landfills and industrial sites that represent environmental concerns.

Toxic Substances Control Act (TSCA - 1976)

TSCA established regulations to track 75,000 industrial chemicals in the workplace and requires manufacturers to perform hazard assessments related to their products. Also,

TSCA requires specific labeling, inspection, storage, spill cleanup, and disposal requirements for PCBs greater than 50 parts per million (ppm).

Emergency Planning & Community Right-To-Know Act (EPCRA - 1986)

EPCRA was established to help communities protect public health & safety from chemical hazards. EPCRA set up State and Local Emergency Planning and Response Agencies and requires that chemical inventory reports be filed by covered facilities with the local fire department as well as local and state emergency response agencies identifying the locations of hazardous oil and listed chemicals above threshold quantities. EPCRA requires an annual Toxic Release Inventory (TRI) report for each covered facility which exceeds reporting thresholds for various chemical constituents that are released into the environment.

8.4.2 Possible Future Solid Waste Environmental Initiatives

Ash Pond Initiatives

The Tennessee Valley Authority (TVA) ash pond failure in December, 2008, has the potential to change the company's management of ash and other coal-combustion products because it has refocused Congress and the EPA's attention on ash. In 2000, EPA considered classifying ash as a hazardous waste, but decided to classify it as non-hazardous and intended to prepare guidance for State regulations. The electric industry had been working since that time to provide the EPA with information it wanted without additional regulation through the development of a plan that would include voluntary installation of groundwater monitoring at plants. On June 21, 2010, the EPA proposed regulations to regulate coal combustion residuals (CCR). The proposal included two regulatory options: (1) regulating CCRs as so-called "special wastes" under the hazardous waste program of RCRA Subtitle C; and (2) regulating CCRs as non-hazardous wastes under Subtitle D of RCRA. Under the Subtitle C option, the management of CCRs in surface impoundments would have to cease within five years of the effective date of the rules and the impoundments would have to close within two years after the cessation of operations (allowing a possible total of seven years for closing impoundments after the effective date of the rules). A hazardous waste classification for ash, even temporarily, could end most if not all beneficial uses for ash due to the potential user's avoidance of materials that have uncertain regulatory status. The EPA held several public hearings across the country and the public comment period closed on November 19, 2010. It is anticipated that the EPA will issue the final rule in late 2011. It is possible that the final rule could also include requiring closure of ash ponds within some time frame and removal of ash to landfills. The Company has begun building landfills to replace filled ponds, but some are only in the early planning phase and early closure of ponds would result in significant expenditures, in the tens of

millions of dollars per site, to deal with the loss of those pond assets, changes to schedules, as well as possible modifications to the plants.

Ash Pond Closure Initiatives

Historically, coal ash has typically been wet sluiced into ash ponds. Ash ponds are permitted as wastewater treatment devices under the Missouri water permit program and are subject to closure requirements when they are excluded from the water permit process. Ash pond closures may require an evaluation of groundwater conditions and the development of a closure plan that includes an impervious cap and vegetative cover. Sub-surface water conditions may warrant the installation of a groundwater collection and treatment system and/or the acquisition of additional properties. Long term monitoring of groundwater conditions and the integrity of the cap and vegetation may be required. Since there are no specific regulations regarding the requirements for ash pond closures, costs for closures remain uncertain. It is possible that permanent closures could cost millions of dollars at each power plant, and ongoing O&M costs could be in the hundreds of thousands of dollars per site annually. Also, the permanent closure of the ponds would require substantial capital and O&M costs for new wastewater treatment plants to treat low volume wastewater that had flowed to the ash ponds.

8.5 Other Environmental Laws

National Environmental Policy Act of 1969 (NEPA)

The NEPA was established to provide requirements for federal agencies issuing permits/licenses to ensure full review and disclosure of environmental risks involved in construction and operation of facilities- including cultural resources under the National Historic Preservation Act (NHPA) and threatened and endangered species under the Endangered Species Act (ESA). NEPA compliance is required for major construction projects including new generating plants and new gas pipelines or transmission lines. A full Environmental Impact Statement (EIS) is triggered if construction activity will be permitted by a Federal Agency *and* is deemed to have a significant impact on the environment. An Environmental Assessment (EA) is required for less significant construction.

National Historic Preservation Act (1966)

This Act established measures to ensure historic properties [significant landmarks, structures or buildings, and prehistoric (archeological) sites] are adequately safeguarded and protected, or mitigated for, from new construction activities.

Endangered Species Act (ESA - 1973)

ESA was established to protect rare and endangered species and their habitats from adverse impacts resulting from construction projects or other activities. Under NEPA, federally permitted projects must undergo review by United States Fish and Wildlife Service (USFWS) for assessment of potential impacts. Coordination with the state agency (Missouri Department of Conservation) and compliance with their regulations is also applicable to the Migratory Bird Treaty Act (1918)

Under this Act, all native birds are fully protected from "take," including their eggs and nests and parts (e.g. feathers), except for game species for which seasons/limits are established. The Act established penalties/fines for violations. USFWS is the primary federal agency with authority to enforce.

Bald and Golden Eagle Protection Act (1940)

This Act established full protection from "take" for the Bald and the Golden Eagle, including their nests and eggs and parts (e.g., feathers). The Act established penalties/fines for violations. USFWS is the primary federal agency with authority to enforce.

Rivers and Harbors Act (1899)

Under this Act, construction projects that cross navigable waterways (e.g., electric/gas transmission lines) must apply for a permit from the United States Army Corps of Engineers (USACE) under Section 10 of the Rivers and Harbors Act. Review of impacts under NHPA, ESA, CWA etc. are required under NEPA, should a Section 10 permit be required.

Local Ordinances

Ameren Missouri facilities are subject to many local environmental ordinances. For example, St. Louis County has a local noise ordinance which restricts noise from commercial or industrial operations to the surrounding environment. Construction activities, equipment specifications and noise attenuations are sometimes required to meet these standards.

8.6 Tritium and Other Noble Gases[1]

8.6.1 Overview

Tritium is a naturally occurring radioactive form of hydrogen that is produced in the atmosphere when cosmic rays collide with air molecules. As a result, tritium is found in very small or trace amounts in groundwater throughout the world. It is also a byproduct of the production of electricity by nuclear power plants. Tritium emits a weak form of radiation, a low-energy beta particle similar to an electron. The tritium radiation does not

[1] EO-2007-0409 – Commission Order for 4 CSR 240-22.040(1)(K)

travel very far in air and cannot penetrate the skin. A radiation dose from tritium is the same as from any other type of radiation, including natural background radiation and medical administrations.

Tritium is almost always found as a liquid and primarily enters the body when people eat or drink food or water containing tritium or absorb it through their skin. People can also inhale tritium as a gas in the air. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the soft tissues. Half of the tritium is excreted within approximately 10 days after exposure. Everyone is exposed to small amounts of tritium every day because it occurs naturally in the environment and the foods we eat. Workers in Federal weapons facilities; medical, biomedical, or university research facilities; or nuclear fuel cycle facilities may receive increased exposures to tritium.

Most of the tritium produced in nuclear power plants stems from a chemical, known as boron, absorbing neutrons from the plant's chain reaction. Nuclear reactors use boron, a good neutron absorber, to help control the chain reaction. Toward that end, boron either is added directly to the coolant water or is used in the control rods to control the chain reaction. Much smaller amounts of tritium can also be produced from the splitting of Uranium-235 in the reactor core, or when other chemicals (e.g., lithium or heavy water) in the coolant water absorb neutrons.

Like normal hydrogen, tritium can bond with oxygen to form water. When this happens, the resulting water (called "tritiated water") is radioactive. Tritiated water (not to be confused with heavy water) is chemically identical to normal water and the tritium cannot be filtered out of the water.

Nuclear power plants routinely and safely release dilute concentrations of tritiated water. These authorized releases are closely monitored by the utility and are reported to the NRC. These releases are at fractions of the natural background production rates of tritium. To put the amount of tritium released from nuclear power plants in perspective, it is estimated that during 2009 at Ameren Missouri's Callaway plant, 4.6 drops of tritiated water was mixed with 204 million gallons of water at the plant for batch discharges to the Missouri River and mixed with 1,362 billion gallons of river water.

8.6.2 Current Radiation Protection Limits

The NRC is continuously evaluating the latest radiation protection recommendations from international and national scientific bodies to ensure the adequacy of the standards the agency uses. Among those standards, the NRC and the EPA have established three layers of radiation protection limits to protect the public against potential health risks from exposure to radioactive liquid discharges (effluents) from nuclear power plant operations. The NRC has determined that doses to the general public from the unintended release of tritium at nuclear power plants are significantly below even the

most stringent layer of these protective limits and, therefore, does not pose a risk to public health and safety.

Layer 1: 3 mrem per year ALARA objective — Appendix I to 10 CFR Part 50
The NRC requires that nuclear plant operators must keep radiation doses from gas and liquid effluents as low as reasonably achievable (ALARA) to people offsite. For liquid effluent releases, such as diluted tritium, the ALARA annual offsite dose objective is 3 mrem to the whole body and 10 mrem to any organ of a maximally exposed individual who lives in close proximity to the plant boundary. This ALARA objective is 3% of the annual public radiation dose limit of 100 mrem.

The NRC selected the 3 mrem and 10 mrem per year values because they are a fraction of the natural background radiation dose, a fraction of the annual public dose limit, and an attainable objective that nuclear power plants could realistically meet. Power plants that meet these objectives are considered to be ALARA in reducing exposures to the general public from nuclear power plant effluents (AEC 1971, NRC 1975).

Nuclear power plant operators must monitor the authorized releases (effluents) from their plants. If a given nuclear power plant exceeds half of these radiation dose levels in a calendar quarter, the plant operator is required to investigate the cause(s), initiate appropriate corrective action(s), and report the action(s) to the NRC within 30 days from the end of the quarter.

Layer 2: 25 mrem per year standard — 10 CFR 20.1301(e)
In 1979, the EPA developed a radiation dose standard of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of an individual member of the public. The NRC incorporated these EPA standards into its regulations in 1981, and all nuclear power plants must now meet these requirements. These standards are specific to facilities that are involved in generating nuclear power (commonly called the “uranium fuel cycle”), including where nuclear fuel is milled, manufactured, and used in nuclear power reactors. The EPA determined the basis of the standards by comparing the cost-effectiveness of various dose limits in reducing potential health risks from operation of these types of facilities. The EPA assumed the standards would be able to be met for up to four fuel cycle facilities (e.g., four reactors) at one location (EPA, 1976a). Notably, the NRC’s ALARA objectives are lower than these EPA standards (NRC, 1980).

Layer 3: 100 mrem per year limit – 10 CFR 20.1301(a)(1)
The NRC’s final layer of protection of public health and safety is a dose limit of 100 mrem per year to individual members of the public. This limit applies to everyone, including academic, university, industrial, and medical facilities that use radioactive material.

The NRC adopted the 100 mrem per year dose limit from the 1990 Recommendations of the International Commission on Radiological Protection (ICRP). The ICRP is an organization of international radiation scientists who provide recommendations regarding radiation protection related activities, including dose limits. These dose limits are often implemented by governments worldwide as legally enforceable regulations. The basis of the ICRP recommendation of 100 mrem per year is that a lifetime of exposure at this limit would result in a very small health risk and is roughly equivalent to background radiation from natural sources (excluding radon) (ICRP, 1991). Thus, the ICRP equated 100 mrem per year to the risk of riding public transportation – a risk the public generally accepts (ICRP, 1977). The U.S. National Commission on Radiological Protection and Measurements (NCRP) also recommends the dose limit of 100 mrem per year (NCRP, 1993).

For liquid effluents, including tritiated water, any licensee can demonstrate compliance with the 100 mrem per year dose standard by not exceeding the concentration values specified in Table 2 of Appendix B to 10 CFR Part 20. These concentration values, if inhaled or ingested over the course of a year, would produce a total effective dose of 50 mrem.

8.6.3 Possible Future Radiation Protection Limits

Ameren Missouri believes it is very unlikely that the Nuclear Regulatory Commission (NRC) will revise the regulations associated with effluent releases of tritium since there are no proposals from the EPA, NRC, or legislature to change the regulations associated with tritium or other noble gase releases. Furthermore, the NRC has stated that the NRC's statutory authority in the Atomic Energy Act of 1954, as amended, is limited to regulation based on "health and safety of the public" (see section 3 of the AEA). The NRC has also stated that promulgation of any rule that would result in a change to an existing system or structure, such as would be required to prevent tritium in effluents, would need to meet the standard of the backfit rule such that any backfitting would achieve a substantial increase in the overall protection of the public health and safety and that the costs of the backfitting, both direct and indirect, are justified in light of the overall increased protection. The NRC has evaluated possible regulatory changes which would result in lower quantities of tritium released to the environment and concluded that the NRC does not have the statutory authority to make such changes. The NRC also concluded that attempts to establish more restrictive regulatory limits on effluent releases, such as for tritium, would not meet the requirements of the backfit rule.

Ameren Missouri investigated two levels of mitigation more stringent than current requirements: 50% and 90% reductions in the maximum allowed doses due to liquid

effluents including tritium. These reductions would be applied to the NRC's most restrictive limits.

To assess the impact of the reduction in dose incurred to effluent tritium, the most restrictive ALARA limits were chosen. Shown in the Table 8.1 is the dose due to liquid effluents over the last 3 years of power operations at Callaway Unit 1, the ALARA limits, and more stringent effluent dose limits.

Table 8.1

ALARA Dose Location	Dose due to Liquid Effluents*	Dose due to tritium in Liquid Effluents*	Current Limits	50% Reduction	90% Reduction
Whole Body	0.0144	0.0019	3	1.5	0.3
Maximum Organ	0.0203	0.0019	10	5	1

*Average Actual 2007-2009

As shown in Table 8.1, even with reductions in the most restrictive NRC regulated allowable dose limits associated with effluent releases, the Callaway Plant Unit 1 would still only release a small fraction (less than 5%) of the most stringent limit (90% reduction). Therefore there is no additional cost to meet the analyzed reductions in tritium effluents.

A similar case can be made for gaseous effluents which includes the radioactive noble gases krypton and xenon that are released from Callaway Unit 1. Table 8.2 compares the dose due to gaseous effluents (includes krypton and xenon) with more stringent effluent dose limits.

Table 8.2

ALARA Dose Location	Dose due to Gaseous Effluents*	Current Limits	50% Reduction	90% Reduction
Gamma Air (1)	0.0016	10	5	1
Beta Air (1)	0.0041	20	10	2
Maximum Organ (2)	0.0089	15	7.5	1.5

*Average Actual 2007-2009

(1) – Gaseous effluent air doses are based on a hypothetical individual standing at the site boundary throughout the year. (mrad)

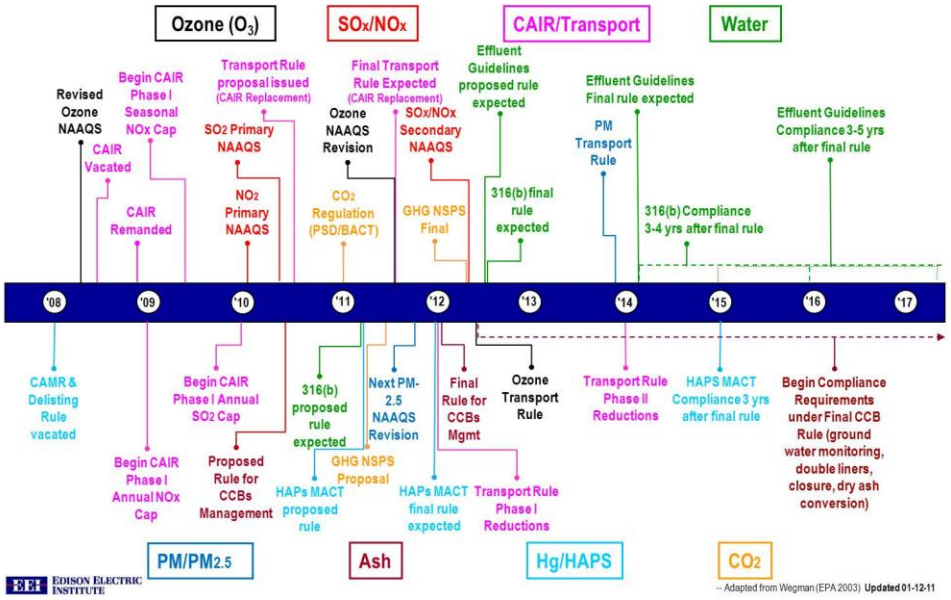
(2) – Gaseous effluent maximum organ doses are based on a hypothetical child residing at the nearest residence giving the highest dose and assumes all of the child's food and milk are produced at that location. (mrem)

As shown in Table 8.2, even with reductions in the NRC regulated allowable dose limits associated with effluent releases, the Callaway Plant Unit 1 would still only release a small fraction (less than 1%) of the most stringent limit (90% reduction). Therefore, there is no additional cost to meet the analyzed reductions in radiological gaseous effluents (including krypton and xenon).

8.7 Environmental Scenarios

An area that has received a great deal of focus and attention over the last several years has been environmental regulations. In particular, the U.S. Environmental Protection Agency (EPA) is expected to issue new environmental regulations in the next 12 to 24 months related to air emissions, ash waste and water. Figure 8.1 highlights some of the regulations under consideration.

Figure 8.1 Potential Environmental Regulations



In order to support analysis of environmental uncertainty, Ameren Missouri has developed two scenarios regarding future environmental laws. The two scenarios, moderate and aggressive, are characterized by the type of control technology required to meet increasingly stringent environmental laws. Table 8.3 summarizes the impacts to Ameren Missouri generating facilities. It should be noted that the planning scenarios described in Chapter 2 already contain multiple alternatives for carbon regulation.

Table 8.3 Environmental Scenario Impacts

Plant/Unit	Scenario	FGD (Scrubber)	ACI (Mercury)	Fine Mesh Screens	Ash & Landfill	Cooling Tower	Wastewater Plant
Labadie 1&2	Moderate	2020	2015	2017			
	Aggressive	2016	2015		2017	2017	2017
Labadie 3&4	Moderate	2024	2015	2017			
	Aggressive	2016	2015		2017	2017	2017
Meramec 1-4	Moderate		2015	2017			
	Aggressive	2016	2015	2017	2017		2017
Rush Island 1&2	Moderate	2016	2015	2017			
	Aggressive	2016	2015	2017	2017		2017
Sioux 1&2	Moderate	*2010*	2015	2017			
	Aggressive	*2010*	2015	2017	2017		2017

Therefore these environmental scenarios are designed to describe impacts of various other environmental regulations. The associated impacts of these environmental scenarios are incorporated into the IRP risk analysis (Chapter 9) and strategy selection (Chapter 10). Ameren Missouri also evaluated the financial impacts associated with the capital requirements needed to comply with these more stringent environmental scenarios (Chapter 10).

Table 8.4 summarizes the environmental policy changes for both scenarios and the following sections provide additional details.

Table 8.4 Summary of Environmental Scenarios

Moderate	Aggressive (Moderate plus…)
• EPA Transport Rule (CAIR Replacement) • MACT covers Mercury Only • EPA Regulations for Carbon Initially, but Future Projects Do Not Trigger GHG Controls • No Changes to Current State on Coal Ash (Use Existing Ash Ponds) • No Additional Wastewater Treatment Required	• Federal GHG Legislation in 2018-20 with Allowance Trading and Offsets • Future Projects Trigger BACT for GHG • MACT covers Acid Gases (HCl, HF) and metals –compliance by 1/1/2016 (FGD for most units) • Conversion to Dry Ash Handling; Closure of Existing Ash Ponds • Wastewater treatment plants needed for low volume wastewater when ash ponds closed – compliance by 1/1/2017 • Wastewater treatment for FGD discharge unless closed loop system • Limited Requirement for Cooling Towers – compliance by 1/1/2018

8.7.1 Moderate

The moderate environmental scenario assumes that the Clean Air Transport Rule as proposed by the EPA in the summer of 2010 is enacted as proposed and becomes effective by 2015. The proposed rule allows for some trading among utilities. This is the only regulation enacted to address SO_2 and NO_X emission issues. The scenario assumes the MACT HAPs (maximum achievable control technology for hazardous air pollutants) rules will only apply to mercury control. These rules become effective in 2018. It is assumed that a high level of mercury control will be achieved with investments in fuel additives or co-benefits from other control technology installations. The scenario assumes that EPA regulations on CO_2 do not require the installation of GHG controls. The scenario assumes that coal ash is not re-classified as a hazardous waste. As a result the existing ash ponds are assumed to be able to be used for disposal of ash. Also, current beneficial use of ash is allowed to continue. No

additional waste water treatment is required. Finally, to address water issues the scenario assumes that only fine mesh screens will be required on cooling water intake structures to address any entrainment and impingement issues associated with fish larvae mortality. No cooling towers are required to address thermal discharge issues.

8.7.2 Aggressive

The aggressive environmental scenario assumes that the Clean Air Transport Rule as proposed by the EPA in the summer of 2010 is enacted as proposed and becomes effective by 2012. The proposed rule allows for some trading among utilities. The scenario assumes the MACT HAPs (maximum achievable control technology for hazardous air pollutants) rules apply to acid gases and metals in addition to mercury. These rules become effective in 2016. It is assumed that to achieve compliance with these stringent regulations flue gas desulfurization equipment will be required on most units. The scenario assumes that EPA regulations on CO_2 trigger best available control technology (BACT) requirements for GHG for future projects. The scenario assumes federal GHG legislation becomes effective in the 2018-2020 time period. That legislation would allow allowance trading and use of offsets. The scenario assumes that coal ash is regulated under federal rules. As a result the existing ash ponds are required to be closed by 2017. Also, current beneficial use of ash is no longer possible due to liability issues and all units must be converted to dry ash handling for both fly ash and bottom ash. Waste water treatment plants are needed for low volume wastewater when ash ponds are closed. Also, wastewater treatment of scrubber discharge is required unless it is a closed loop system. All of the waste water treatment must begin by 2017. Finally, to address water issues the scenario assumes that fine mesh screens will be required on cooling water intake structures to address any entrainment and impingement issues associated with fish larvae mortality by 2017. Also, some cooling towers will be required to address thermal discharge issues by 2017.

8.8 Technology Characterization

Below is a description of the control options determined to be necessary to comply with the potentially more stringent environmental regulations described above.

Flue-Gas Desulfurization (FGD) is an emission control technology whose primary purpose is to remove sulfur dioxide (SO_2) from the exhaust gases of coal fueled power plants. There are different types of FGD's. For the purpose of this analysis, it is assumed to be a wet scrubber which uses limestone as the sorbent. A wet FGD is generally able to remove about 95-98% of the SO_2 emissions.

Activated Carbon Injection (ACI) is a system used to remove gas phase mercury (elemental or oxidized) from the exhaust gases of coal fueled power plants. Activated carbon is injected into the ductwork where it comes in contact with gas phase mercury.

The gas phase mercury attaches to the carbon and is removed in an electrostatic precipitator or fabric filter.

Fine Mesh Screens are screens installed on cooling water intake structures to minimize the number of fish larvae drawn into the cooling system. The screens are designed to address entrainment and impingement issues.

Ash & Landfill systems are designed to take the ash and other waste streams and isolate them from any groundwater systems or streams. The likely method of handling will change from wet handling to dry handling. That will result in more costs for the additional processing. In addition, if ash is classified as a hazardous waste the landfill would have to meet all the specifications of a hazardous landfill.

Cooling Towers are heat removal devices used to cool water used in the production of electricity so it can be reused in the generation of electricity. Cooling tower retrofits would eliminate thermal discharges from once-through systems currently being used by Ameren Missouri except at its Callaway plant. These plants currently discharge warm water into the Mississippi and Missouri rivers.

Wastewater Treatment Plants treat the waste water of power plants so that it can be reused in the plant to minimize total water discharge and so that the discharged water complies with effluent quality requirements.

Table 8.5 Characterization of Environmental Control Options

Plant	Control Technology	Nominal 2010 $MM	2010 $/kW	Heat Rate Reduction (%)	Capacity Reduction (MW)	Fixed O&M ($/kW-Year)	Variable O&M ($/MWh)	Construction Period
Labadie								
	FGD (Scrubber)	1,103	459	1.5	46	4.49	0.47	5
	ACI (Mercury)	11	5	--	--	0.01	0.32	2
	Fine Mesh Screens	16	7	--	--	0.07	--	2
	Ash & Landfill	120	50	--	--	0.64	0.31	3
	Cooling Tower	400	166	--	20	0.15	0.12	4
	Wastewater Plant	125	52	--	--	0.16	0.40	4
Meramec								
	FGD (Scrubber)	622	740	1.5	23	6.05	0.65	4
	ACI (Mercury)	10	12	--	--	0.01	0.32	2
	Fine Mesh Screens	13	15	--	--	0.15	--	2
	Ash & Landfill	76	91	--	--	0.96	0.69	3
	Cooling Tower	--	--	--	--	--	--	--
	Wastewater Plant	75	89	--	--	0.27	0.40	4
Rush Island								
	FGD (Scrubber)	620	525	1.5	23	6.95	0.33	5
	ACI (Mercury)	6	5	--	--	0.01	0.32	2
	Fine Mesh Screens	16	14	--	--	0.14	--	2
	Ash & Landfill	42	35	--	--	0.49	0.57	3
	Cooling Tower	--	--	--	--	--	--	--
	Wastewater Plant	100	85	--	--	0.25	0.40	4
Sioux								
	FGD (Scrubber)	--	--	--	--	--	--	--
	ACI (Mercury)	6	6	--	--	0.02	0.32	2
	Fine Mesh Screens	13	13	--	--	0.13	--	2
	Ash & Landfill	119	120	--	--	1.80	0.68	3
	Cooling Tower	--	--	--	--	--	--	--
	Wastewater Plant	100	101	--	--	0.30	0.40	4

8.9 Compliance References