

## 5. Environmental Compliance

### **Highlights**

- *The U.S. Environmental Protection Agency continues to aggressively pursue more stringent regulations of power plant air, water, and solid waste emissions.*
- *Existing and potential new environmental regulations could potentially affect the operations of Ameren Missouri's Energy Centers; in particular its coal fired units.*
- *Ameren Missouri has identified mitigation steps and costs for complying with current and probable future environmental regulations to be used in its evaluation of alternative resource plans.*

Ameren Missouri has made significant investments to comply with existing environmental regulations. However, in addition to existing laws and regulations, the EPA is developing environmental regulations that will likely have a significant (though undetermined at this time) impact on the electric utility industry. These regulations may prove to be particularly burdensome for certain companies, including Ameren Missouri, which operate coal-fired energy centers. Significant new rules proposed or promulgated since the beginning of 2010 include the regulation of greenhouse gas emissions; revised national ambient air quality standards for fine particulate, SO<sub>2</sub>, and NO<sub>2</sub> emissions; the Cross State Air Pollution Rule (CSAPR), which requires further reductions of SO<sub>2</sub> emissions and NO<sub>x</sub> emissions from energy centers; a regulation governing management of coal combustion residuals (CCR) and coal ash impoundments; the Mercury and Air Toxics Standards (MATS) rule, which requires reduction of emissions of mercury, toxic metals, and acid gases from energy centers; revised NSPS for particulate matter, SO<sub>2</sub>, and NO<sub>x</sub> emissions from new sources; the ELG rule, which may require the construction of waste water treatment facilities; and new regulations under the Clean Water Act that may require significant capital expenditures such as new water intake structures or cooling towers at our energy centers.

The EPA has proposed CO<sub>2</sub> limits for new, modified and existing coal-fired and natural gas-fired combined cycle units. These new, proposed regulations, if ultimately enacted, are likely to be litigated. As such, their ultimate implementation (including timing) is uncertain.

Environmental regulations are an important factor to consider in resource planning. In this IRP, it is assumed that construction of a new coal fired power plant would require carbon capture and sequestration (CCS) in addition to measures required for compliance with other existing, proposed, and potential environmental regulations.

Additionally, questions remain about the impacts of proposed and potential environmental regulations, including those limiting emission of greenhouse gases, on Ameren Missouri's existing generation fleet, especially its coal-fired generation assets.

This chapter presents the current major regulations affecting the power industry as well as proposed and potential new environmental regulations that are expected to be enacted during the planning horizon. The Environmental Protection Agency (EPA) has recently issued, and in the near future is expected to issue and finalize, new environmental regulations related to air emissions, coal ash waste, and water. Ameren Missouri has incorporated assumptions regarding such proposed and potential environmental regulations into its reference case and a corresponding compliance path characterized by environmental retrofits to its existing fleet. The costs and timing of those retrofits are reflected in the risk analysis presented in Chapter 9 and are instrumental in particular in the retirement analysis of the Meramec Energy Center. Furthermore, the planning scenarios act as a signpost for decision making and therefore are an important aspect of the strategy selection in Chapter 10.

## **5.1 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 are also charged with the enforcement of environmental laws and/or ordinances which are intended to implement various provisions of the federal statutes. In addition, a summary of possible future environmental initiatives that could affect the power industry is included.

Given the lack of certainty regarding the enactment of proposed regulations combined with the lack of specificity of regulations, which are under development but for which no proposed rule has been issued, Ameren Missouri has necessarily made certain good faith assumptions regarding potential future compliance measures.

## 5.2 Major Environmental Laws

### 5.2.1 Current Laws

#### *Clean Air Act (1970, 1977 & 1990)*

The Clean Air Act (CAA) established Ambient Air Quality Standards for SO<sub>2</sub>, NO<sub>x</sub>, particulate matter (PM), fine particulate matter (PM 2.5), ozone, carbon monoxide (CO) and lead. Ambient standards are required to be evaluated by the U.S. EPA on a 5 year cycle. The U.S. EPA continues to pursue more stringent ambient standards through this process. Ambient Standards are managed through emission limits, emission trading programs, ambient air monitoring, and air quality modeling conducted by each state as part of State Implementation Plans (SIP). The air quality in each state is analyzed and designated as Attainment or Nonattainment with the standard for 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;
- National Emission Standards for Hazardous Air Pollutants (NESHAPS) for control of asbestos and other hazardous air pollutants, defining a process to set Maximum Achievable Control Technology (MACT) Standards for these air pollutants;
- New Source Review (NSR) programs that mandate review to determine if projects trigger permitting and additional pollution control equipment requirements;
- Prevention of Significant Deterioration (PSD) program, which imposes control requirements on new and modified major sources to protect ambient air quality. The NSR and PSD programs do not apply to various actions at existing major sources, including routine repair & replacement of equipment, and changes which do not increase emissions; and
- The Acid Rain Program.

#### *Acid Rain Program*

The Acid Rain Program established a national cap-and-trade program for SO<sub>2</sub> emissions from generating units, established NO<sub>x</sub> 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<sub>2</sub>, NO<sub>x</sub>, oxygen (O<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>) on a continuous basis.

The Acid Rain Program required an SO<sub>2</sub> 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, existing generating units are issued thirty (30) years of SO<sub>2</sub> allowances (1 allowance = 1 ton of SO<sub>2</sub> emissions). The SO<sub>2</sub> allowances can be bought, sold, traded, or banked. Three percent of the SO<sub>2</sub> allowances were held back and available for purchase at an annual EPA SO<sub>2</sub> auction. These allowances have a perpetual shelf life, under current regulations.

### **Clean Air Interstate Rule (CAIR)**

Promulgated in March 2005, CAIR established a new cap-and-trade program with a reduction in emission allowances on annual SO<sub>2</sub> and seasonal NO<sub>x</sub> emissions from electric generating units, as well as a new cap and trade program for annual NO<sub>x</sub> emissions. CAIR is a regional program and applies to electric generating units in 28 eastern states and the District of Columbia. For SO<sub>2</sub> emissions, CAIR uses allowances from the Acid Rain Program and establishes 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<sub>x</sub> emissions; where NO<sub>x</sub> emissions are capped annually and seasonally in the 28 state CAIR region. Phase 1 began in 2009 and Phase 2 is scheduled to begin in 2015. Prior to CAIR, the NO<sub>x</sub> Budget Trading Program had created a seasonal NO<sub>x</sub> emission cap and trade program for twenty-two (22) eastern states including eastern Missouri. The NO<sub>x</sub> Budget Trading Program set a lower ozone season (May – September) cap on NO<sub>x</sub> emissions by state and created NO<sub>x</sub> allowances for the ozone season each year. CAIR is still in place pending a Court decision on the CSAPR that is described in the following section.

### **Cross State Air Pollution Rule (CSAPR)**

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. Initially a Clean Air Transport Rule (CATR) was developed in response to the court's concerns. The current rule, called the Cross State Air Pollution Rule (CSAPR), was finalized on July 6<sup>th</sup>, 2011. The CSAPR includes the same annual SO<sub>2</sub> and NO<sub>x</sub> programs, as well as seasonal NO<sub>x</sub> trading programs, as the CAIR. However, the CSAPR establishes new allowances for the annual NO<sub>x</sub> and SO<sub>2</sub> programs and the seasonal NO<sub>x</sub> program. Allowances for the CAIR trading programs cannot be used for the CSAPR trading programs. Several states including Missouri are designated as "Group 1" states in the rule, and SO<sub>2</sub> emission allowances are further reduced in Group 1 states beginning in 2014. The two programs, CAIR and CSAPR, are structured differently. CAIR uses the Acid Rain SO<sub>2</sub> allowances and thus allows Ameren Missouri to utilize its sizable SO<sub>2</sub> allowance bank. Also, it includes surrender ratios which are currently 2-for-1 and would become 2.86-for-

1 beginning in 2015 if it were to remain in effect at that time. CSAPR uses newly created allowances and thus there is no bank to rely on for any potential shortfall. Based on the surrender ratio, compliance with CAIR creates a lower limit relative to the CSAPR. However, Ameren Missouri's current bank and the national bank of allowances make compliance with CAIR less challenging as the current price is less than \$2 to offset a ton of SO<sub>2</sub> emissions. CSAPR was accompanied by much higher prices and included variability limits which control the amount of allowances that may be purchased and used for compliance.

CSAPR was slated to become effective January 1, 2012, but the rule was stayed by a federal court decision on December 30, 2011, in response to several legal challenges. On August 21, 2012, the D.C. Circuit Court of Appeals (D.C. Circuit) vacated CSAPR, directing EPA to continue to administer CAIR and to move "expeditiously" to finalize a replacement transport rule. The EPA appealed this ruling to the U.S. Supreme Court, which subsequently reversed the DC circuit opinion vacating CSPAR on April 29, 2014. On June 26, 2014, the EPA filed a motion with the U.S. Court of Appeals for the D.C. Circuit to (1) remove the stay of CSPAR and (2) delay for three years all of the compliance deadlines that had not already passed when the stay was enacted. In the interim, CAIR remains in place. If approved, the delays would result in phase 1 emission budgets applicable in 2015 and 2016 and phase 2 budgets applicable in 2017 and beyond.

### ***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. Class I areas are defined as national parks exceeding 6,000 acres, wilderness and national memorial parks exceeding 5,000 acres and all international parks in existence on August 7, 1977. There are currently 156 Class I areas, two of which are in the State of Missouri (Hercules Glade and Mingo). In addition, the Regional Haze Rule is the basis for Best Available Retrofit Technology (BART) rule setting SO<sub>2</sub> & NO<sub>x</sub> control requirements for certain large emission sources and Energy Centers in each state.

### ***Maximum Achievable Control Technology (MACT) Standards to Control Mercury and Other Hazardous Air Pollutants***

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. A MACT standard essentially requires the application of emission controls that are no less stringent than the emission control that

is achieved in practice by the best controlled similar source in commercial operation. 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 cement kilns.

In 2005, the EPA promulgated the Clean Air Mercury Rule (CAMR), which established a cap and trade program and defined the mercury monitoring and control requirements for coal-fired power plants over the following ten years. In 2008, the rule was vacated by the DC Circuit and remanded to the EPA. The EPA petitioned the U.S. Supreme Court to challenge this ruling. However in 2009, with the change in Administrations, this challenge was dropped.

With the vacatur of the CAMR, EPA began the development of a replacement rule –the Maximum Achievable Control Technology (MACT) standard for mercury and other hazardous air pollutants. EPA was subsequently required by a consent decree to propose regulations by March, 2011, and finalize regulations in November, 2011. The final rule was effective on April 16, 2012. This final rule is known as the Mercury and Air Toxics Standards (MATS). Compliance with the standards is required by April 16, 2015, although the permitting authority can grant a one-year extension on a case-by-case basis. The MATS includes standards for mercury, particulate matter as a surrogate for non-mercury metals, hydrogen chloride (HCl) as a surrogate for acid gases, work practices for organic emissions and monitoring requirements. The MATS standard also includes emission limits for new sources which are significantly tighter than for existing sources.

Ameren Missouri plans to utilize Activated Carbon Injection technologies and/or fuel additives and other sorbents to control mercury emissions. Other options are available depending on coal type including co-benefit control from Flue Gas Desulfurization (FGD) and other emerging multi-pollutant technologies.

The EPA has also included MACT standards for other hazardous air pollutants, such as non-mercury metals and acid gases, and work practice standards for organic compounds. Additional technology may be required to control such emissions. Depending on fuel type, EGUs could install additional pollution control equipment including Flue Gas Desulfurization (FGD) (commonly referred to as “scrubbers”) for acid gases (HCl), and particulate controls such as electrostatic precipitators (ESP) or fabric filters (“bag houses”) for non-mercury trace metals including arsenic, chromium, lead and nickel. The EPA has conducted an extensive information collection effort to obtain emission data from existing units and used that information to set the standard for each hazardous air pollutant.



***Revisions to the National Ambient Air Quality Standard (NAAQS) for Fine Particulate (PM<sub>2.5</sub>)***

On Feb. 24, 2009, the D.C. Circuit Court of Appeals remanded to EPA several aspects of its 2006 decisions on the PM<sub>2.5</sub> 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 µg/m<sup>3</sup>. As a result of the decision, the EPA folded its response to the remand into the next regular review of the NAAQS. The EPA announced a schedule that called for a proposal to revise the annual PM<sub>2.5</sub> standard in February, 2011 and for a final rule in October, 2011, to satisfy the 5-year review requirement of the CAA. On June 15, 2012 the EPA proposed to lower the ambient standard to a range of 12 – 13 µg/m<sup>3</sup>. The final rule was signed on December 14, 2012 and set the standard at 12 µg/m<sup>3</sup>. States were required to submit their recommendations on classifications by December 14, 2013. EPA will finalize these designations by December 12, 2014 with compliance by 2020. A state may request a 5 year extension with compliance in 2025 if approved by EPA.

***Revisions to the National Ambient Air Quality Standard (NAAQS) for NO<sub>2</sub>***

On January 22, 2010, the EPA revised the primary NAAQS for NO<sub>2</sub> by adding a one-hour 100 ppb standard. Because the EPA's main health concern was NO<sub>2</sub> concentrations attributable to mobile sources, the revisions included requirements for an expanded near-road NO<sub>2</sub> ambient monitoring network. However the standard also had an immediate impact on stationary sources seeking preconstruction permits. Attainment designations were made on January 20, 2012 and the entire US was designated as "unclassifiable/attainment", meaning that actual monitored data showed attainment or there was not sufficient data at this time to make an affirmative determination (unclassifiable). At this time the regulatory requirements for unclassifiable areas are the same as attainment areas. No areas within the U.S. were designated as nonattainment based on the 2008-2010 data. If an area within a state becomes nonattainment the state is required to submit attainment plans within 3 years of such designation. Compliance with the new NO<sub>2</sub> ambient standard would be required within 5 years of designation as nonattainment.

***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 EPA announced in July 2011 that the revisions to the standard would be delayed

until 2013 and that the current 75 ppb standard would be implemented. It should be noted that EPA Staff issued a recommendation on August 29, 2014, that these standards be further tightened between 7 and 20 percent.

Implementation of the existing standard starts a new round of nonattainment designations and subsequent state attainment plans for future controls. Attainment designations were made in 2012; attainment demonstrations are due in 2015 and attainment is required from 2015 to 2032 depending on the severity of the nonattainment classification. Six classifications range from marginal to extreme based on the current ambient air quality. In Missouri, Franklin, Jefferson, St. Charles, and St. Louis Counties and St. Louis City are designated as marginal nonattainment with attainment required in 2015. The rest of the state is designated as unclassifiable/attainment.

### ***Revisions to the National Ambient Air Quality Standard (NAAQS) for SO<sub>2</sub>***

The EPA adopted an SO<sub>2</sub> ambient standard of 75 ppb on June 2, 2010. The EPA also revoked the annual and 24-hour SO<sub>2</sub> NAAQS. The Missouri Department of Natural Resources (MoDNR) recommended three non-attainment areas, based on monitoring data: areas around Springfield, Kansas City and Herculaneum. Attainment designations were finalized on August 5, 2013, designating the areas around Kansas City (portions of Jackson County) and Herculaneum (portions of Jefferson County) as nonattainment. All states were required to submit “Infrastructure” State Implementation Plans by June 2013. States with non-attainment areas are required to submit attainment plans by April 6, 2015. Compliance with the new SO<sub>2</sub> standard is required no later than October 4, 2018. The EPA is evaluating the adoption of a new approach for determining compliance with the new SO<sub>2</sub> standard. The EPA has conducted focused stakeholder meetings to gather more input on modeling versus monitoring. As a result of these meetings EPA has proposed a Data Requirements rule that would allow states to address large sources of SO<sub>2</sub> with either modeling or monitoring. For areas where states choose modeling to determine attainment status, states must submit their designations (and supporting information) to EPA by January 13, 2017. US EPA will designate these areas either attainment or nonattainment by December 2017. Nonattaining areas must be in compliance by December 2022. For areas where states choose monitoring, states must submit monitoring plans to EPA by July 2016 and have monitors installed by January 1, 2017. After 3 years of monitoring data is collected (2017-19) the states must certify the data collected by May 2020. US EPA will designate these areas either attainment or nonattainment by August 2020. Nonattaining areas must be in compliance by August 2025. Because of the conservatism of the EPA’s models and modeling requirements, for states selecting



modeling for areas not yet designated it is likely that these areas will be determined to be in nonattainment and require additional controls for power plants.

### ***White House Climate Action Plan***

On June 25, 2013, President Obama presented his Climate Action Plan directly targeting carbon dioxide emissions from domestic power plants. The plan was described as, “an all-of-the-above approach to develop homegrown energy and steady, responsible steps to cut carbon pollution,” in order to, “leave a cleaner, more stable environment for future generations.”

The President directed the EPA to issue a new proposed rule regarding carbon emission standards for new generation resources by September 20, 2013. The proposed rule was published in the Federal Register on January 8, 2014. If subsequently enacted as a final rule, it would establish separate standards for coal-fired and natural gas-fired resources. The proposed standards require new coal-fired resources to control carbon dioxide emissions to a level about 50% less than that achieved by current advanced facilities and assume the use of carbon capture technology. There is significant debate regarding whether such technologies meet the requirements set forth in the Clean Air Act (that they be commercially demonstrated prior to adoption), and it is reasonable to assume that it will be challenged in the courts if adopted.

The President also directed the EPA to propose rules for modified, reconstructed, and existing power plants no later than June 1, 2014, with finalization of the rule no later than June 1, 2015. The EPA issued their proposed rules for both existing sources and modified or reconstructed units on June 2, 2014. This plan is discussed in the following section.

While we cannot predict the exact effect of these new standards and rules until such time that they are fully enacted, it is reasonable to assume that they will:

- (1) likely discourage investment in new coal fired generation resources, if not virtually eliminate coal fired generation as a viable new resource option until carbon capture and storage technology is demonstrated as a cost-effective technology.
- (2) increase the relative cost of existing fossil fuel-fired resources (and coal-fired resources in particular), and as a consequence impact the market price of energy, though we do not know to what extent either is impacted, individually or in relationship to each other or the cost of alternatives.

### *Regulation of Greenhouse Gases (GHG) under the CAA*

In April, 2007, the U.S. Supreme Court issued a decision that the EPA has the authority to regulate CO<sub>2</sub> 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, to 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 the need for smaller sources to control CO<sub>2</sub> emissions. The rule became effective on January 2, 2011. On June 26, 2012, the D.C. Circuit ruled to uphold several EPA GHG rules, including the endangerment findings and the Tailoring Rule. All challenges to the rules were either denied or dismissed by the D.C. Court. On October 15, 2013 the Supreme Court granted cert petitions from 6 petitioners on whether regulation of GHG from motor vehicles triggered GHG permitting requirements for stationary sources. On June 23, 2014, the U.S. Supreme Court ruled that the EPA exceeded its statutory authority under the Clean Air Act in determining that stationary source emissions of GHG’s would trigger permitting obligations. However, they upheld those portions of the rulemaking requiring a source to apply “best available control technology” (“BACT”) to GHG emissions when the source otherwise triggers permitting due to emissions of other pollutants (referred to as “anyway” sources). The Court’s decision was limited to the EPA’s regulation of GHG under the Prevention of Significant Deterioration program and Title V of the CAA.

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. Pursuant to this settlement, EPA planned to rely on a little used provision of the Clean Air Act, Section 111(d), which gives EPA the authority to establish performance standards to reduce emissions for which there is no ambient standard. The EPA has made it clear it wants the states to take the lead on establishing the GHG emission standards for existing power plants, and for the states to have considerable flexibility. It should be noted that EPA’s intent by this action is to have existing power plants reduce CO<sub>2</sub> emissions, presumably through energy efficiency or other Energy Center modifications or operating restrictions. EPA originally planned 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. A proposed new source performance standard for new units was issued in May 2012 and was open for public comment until June 25, 2012, but was withdrawn. A revised

standard for new units was issued on September 20, 2013 in pre-publication format and published in the Federal Register on January 8, 2014.

As noted above, the EPA issued their proposed “Clean Power Plan” on June 2, 2014, with comments due by October 16, 2014. This date was subsequently extended to December 1, 2014 for existing sources. These proposed rules apply to existing carbon emitting resources. The plan has two primary components: (1) state-specific, emission rate-based reduction targets; and (2) specific guidelines for states to utilize in developing and implementing compliance plans. Under the proposal, these rules would be due in June 2016, though there are provisions for up to a two year extension. The proposed rule provides flexibility to the states in the development of their compliance plans, including their ability to join with other states to develop a regional compliance approach.

## **5.3 Water Environmental Laws**

### **5.3.1 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.

Energy Center cooling water discharges are regulated by the EPA and Missouri Department of Natural Resources (MODNR) through the NPDES permit program. Currently the State of Missouri and the EPA are working on new NPDES permits for Ameren Missouri Energy Centers. Early indications suggest the resulting proposed revisions to thermal effluent permit limitations and/or state water quality temperature standards during periods of high ambient river temperatures or low flow conditions, may present a compliance challenge. If these potential revisions to the limitations cannot be

met in the current configuration, 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 Energy Centers could potentially 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. If ultimately installed, cooling tower installations would be anticipated to increase parasitic load requirements and decrease overall Energy Center efficiency.

### ***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 water intake structures. At energy centers, aquatic organisms can be impinged (e.g. trapped or pinned against the intake screens) and entrained (e.g. pass through the screens, enter the heat exchanger and then discharged) 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.

The EPA has revised 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. These new rules were proposed in the Federal Register as of April 20, 2011. The EPA secured additional time under a modified settlement agreement to finalize standards, with final action that was to occur on January 14, 2014. The EPA ultimately issued pre-public notice of the finalized standards on May 19, 2014 and it was published in the Federal Register August 15, 2014. While the rules do not require the installation of cooling towers at all facilities, they are expected to result in significant capital expenditures for advanced control technologies to achieve compliance. Facilities withdrawing in excess of 125 million gallons of water per day will be required to perform studies to determine what control technologies are required. Generation owners are provided the option of selecting one of seven different compliance options. These options include: (1) closed cycle cooling; (2) 0.5 ft/sec through-screen velocity (by design); (3) 0.5 ft/sec through-screen velocity (as measured); (4) existing off-shore

velocity cap; (5) modified traveling water screens (TWS); (6) a “suite of technologies” determined by the permit writer to represent the best available technology; or (7) any technology that results in an annual impingement mortality rate of less than 24%. The standards also include requirements for the reduction of intake flow similar to a closed cycle system for new units which increase an existing generation station’s capacity.

#### ***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 bulk oil storage containers/tanks 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. 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 and install containment measures where needed.

#### ***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 is the lead agency charged with establishing regulations and enforcing compliance.

### **5.3.2 Possible Future Water Environmental Initiatives**

#### ***Clean Water Act, Effluent Guideline Limitations Revisions***

Effluent guidelines are periodically updated by the EPA to ensure best available technology is utilized in the treatment of waste water from any steam electric power plants, including fossil, nuclear and combined cycle units. 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 plant water discharges. Ameren Missouri completed and submitted a response to the ICR in September 2010.

In response to challenges by environmental groups, the EPA agreed to a consent decree in November 2010. The consent decree required the EPA to propose revisions to the effluent guideline limitations by July 23, 2012, and finalize the revisions by January 31, 2014. In July 2012 these deadlines were extended to November 20, 2012 for the proposed rulemaking, with final rulemaking by April 28, 2014. The deadline was once again extended in December 2012, and a proposed rule was filed June 7, 2013, with the final rule making scheduled by May 22, 2014. On April 7, 2014, the EPA filed a stipulated extension, establishing September 30, 2015 as the date by which a final action must be signed.

The proposed rule would establish new or additional requirements for wastewater streams from the following processes and byproducts associated with steam electric power generation: flue gas desulfurization, fly ash, bottom ash, flue gas mercury control, and gasification of fuels such as coal and petroleum coke. The EPA has identified four “preferred alternatives” for regulating discharges from existing generators, differing in what waste streams are included, generator size and how stringent they are. Each results in a distinct projected level of reductions and associated cost.

States will be required to implement the revisions through regulations and permits. The proposed rule would strengthen the existing controls on discharges from these plants and establish federal limits on the levels of toxic metals in wastewater that can be discharged from power plants. The revised effluent guideline limitations are linked to the proposed coal combustion residual (CCR) rule discussed in Section 5.4.2. If ultimately enacted, there is a high possibility that additional wastewater treatment will be required to meet more stringent effluent limitations. The exact scope of the impacts cannot be determined until the final rule is approved.

## 5.4 Solid Waste Environmental Laws

### 5.4.1 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 byproducts (i.e. ash disposal).



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

CERCLA requires release reporting for chemicals that are released into the environment that exceed listed reportable quantities in any twenty-four (24) hour period and 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).

***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.

**5.4.2 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 power plants. On June 21, 2010, spurred in part by TVA's ash pond failure, the EPA proposed rules to regulate coal combustion residuals. 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, surface impoundments for the management of CCRs would be allowed to operate for five years and then be required to close within two years after the

effective date of the rules. A hazardous waste classification for ash, even temporary, 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 on December 19, 2014.

On February 2, 2014, a break in a storm water pipe beneath an ash basin at the retired Duke Energy Dan River Steam Station in Eden, N.C., caused a release of ash basin water and ash into the Dan River. It is estimated that 30,000 to 39,000 tons of ash was released into the Dan River and coated 70 miles of the river. Duke Energy announced on July 16, 2014, that they had completed cleanup efforts.

### **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.

Ameren Missouri has begun building landfills to replace ash ponds that are at or near capacity. However, some are only in the early planning stages. As there are no specific regulations regarding the requirements for ash pond closures, costs for closures remain uncertain, though permanent closures could potentially cost tens of millions of dollars at each Energy Center, impose ongoing O&M costs in the hundreds of thousands of dollars per site annually, and result in substantial capital and O&M costs for new wastewater treatment at Energy Centers to treat low volume wastewater that had previously flowed to the ash ponds. If existing ash ponds would be required to be closed prior to reaching capacity, the timing of these costs would be accelerated accordingly.

## **5.5 Compliance Assumptions<sup>1</sup>**

Ameren Missouri has used its assessment of current and future environmental regulations to develop compliance assumptions for use in the analysis of alternative resource plans described in Chapter 9. We have established a “reference case” to

---

<sup>1</sup> 4 CSR 240-22.040(1); EO-2014-0062 h

Timing and capital costs for environmental compliance options are provided in Appendix B; related O&M costs are provided in the workpapers.

represent the regulatory requirements and compliance measures needed for continued operation of our existing energy centers throughout the 20-year planning horizon. While Ameren Missouri's compliance assumptions are intended to comply with all environmental regulations, there are only a few of these regulations that are driving changes from our current operations that require significant investment. These regulations are outlined in the next section.

### **5.5.1 Air Environmental Laws**

The need for capital investment is anticipated to be driven by MATS, NAAQS and the potential replacement for CSAPR.

#### ***Cross State Air Pollution Rule – CSAPR Replacement***

Many compliance options are being considered by Ameren Missouri in anticipation of replacement regulations substantially similar to CSAPR that include the following.

- SO<sub>2</sub> emissions
  - Flue Gas Desulfurization
  - Dry Sorbent Injection
  - Burn Ultra-Low Sulfur Coal
  - Purchase SO<sub>2</sub> allowances
  - Unit de-rates or reductions in generation

In general, our current assumption is to meet the SO<sub>2</sub> compliance requirements with the continued burning of Ultra-Low Sulfur Coal at all of our unscrubbed coal Energy Centers in conjunction with the operation of the wet scrubbers at our Sioux Energy Center. Ameren Missouri's existing contracts for Ultra-Low Sulfur Coal will meet our needs through 2017.

While the Company anticipates that this will meet our compliance needs through the near term planning window, Ameren Missouri has identified the risk that this solution may not fully meet our SO<sub>2</sub> compliance needs when the planning window is extended out to the 20 year IRP timeframe. As such, we have assumed the installation of additional FGD to ensure compliance over this timeframe for planning purposes. In establishing our reference case, Ameren Missouri has assumed the installation of such scrubbers at the Labadie and Meramec Energy Centers given the co-benefit available for 1 hour SO<sub>2</sub> compliance at those particular stations. As information, regarding the potential replacement regulations becomes clearer, further analysis will identify the most economical path to meet this requirement including the need for any additional capital investment to meet the regulation.

- NO<sub>x</sub> emissions

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Low-NO<sub>x</sub> burners/OFA
- Purchase NO<sub>x</sub> allowances
- Unit de-rates or reductions in generation

The actions assumed by Ameren Missouri to comply with the potential NO<sub>x</sub> emissions standards include the installation of additional separated over-fire air ports at Labadie and continued use of low NO<sub>x</sub> burners and a staged air combustion process at our other coal fired Energy Centers. Ameren Missouri installed this technology on Labadie Units 2 & 4 in 2012.. In addition to these operational techniques Ameren Missouri has installed SNCR capability at our Sioux Energy Center that can be utilized to further reduce our NO<sub>x</sub> as necessary. For our reference case, Ameren Missouri has assumed the addition of Selective Catalytic Reduction (SCR) equipment at our Sioux Energy Center.

As information and interpretations of the replacement regulations become more certain, further analysis will be performed to identify the appropriate compliance, including the identification of additional capital investment required to meet the regulation.

#### ***Mercury and Air Toxics Standard - MATS***

The compliance options that have been considered to meet MATS include the following.

- Hg emissions
  - Activated Carbon Injection (ACI)
  - Fuel Additives

In order to comply with the Hg emissions standards set by the MATS rule, Ameren Missouri anticipates making investments in ACI systems at the Labadie and Rush Island Energy Centers as well as units 3&4 at Meramec, along with Hg monitoring systems. Plans for mercury control at Sioux include chemical additives combined with the existing wet scrubbers.

- Particulate Matter (PM) emissions;
  - ESP upgrades or replacements
  - Flue Gas Conditioning

Ameren Missouri is making ESP upgrades at Labadie and anticipates (to a much lesser extent) ESP upgrades at the Meramec Energy Center as well to achieve compliance

with the PM emission limits associated with the MATS rule. These investments will be in conjunction with PM CEMS equipment at all of our coal-fired Energy Centers.

- Hydrogen Chloride HCl emissions
  - FGD (Dry or Wet Scrubbers)
  - Dry Sorbent Injection (DSI)

Testing of prototype HCl CEMs at Rush Island in late 2013, in partnership with EPRI, has provided additional data substantiating that actual emissions are under the MATS standard when burning the ultra-low sulfur fuels.

### **5.5.2 Water Environmental Laws**

The need for capital investment is anticipated to be driven by the requirements of sections 316(a) and 316(b) of the Clean Water Act in addition to the Steam Electric Effluent Limitations Guidelines Revisions.

#### **Clean Water Act 316(a)**

The compliance options that have been considered to meet the CWA 316(a) include the following.

To meet the thermal standard

- Demonstration of non-impact
- Installation of Closed loop Cooling Towers
- Installation of “helper” Cooling Towers

While Ameren Missouri assumes that current Energy Center operations will meet our compliance needs in the near term, Ameren Missouri has identified the risk that this solution may not fully meet our compliance needs when the planning window is extended out to the 20-year IRP planning window. As such, Ameren Missouri has assumed the installation of “helper” Cooling Towers at its Labadie Energy Center to meet probable regulations.

#### **Clean Water Act 316(b)**

The compliance options that have been considered to meet the CWA 316(b) include the following.

To meet the impingement and entrainment standards

- Installation of Fine Mesh Screens
- Installation of Cooling Towers

Ameren Missouri anticipates the installation of fine mesh screens, at all coal fired energy centers and the Callaway Energy Center, to achieve compliance with potential 316(b) limits.

As information and interpretations of 316(a) & 316(b) regulations become more certain, further analysis will be performed to identify the appropriate compliance path including the identification of additional capital investment required to meet the regulations.

### ***Effluent Limitations Guidelines Revisions***

The current proposed rule would strengthen the existing controls on discharges from Ameren Missouri's Energy Centers and establish federal limits on the levels of toxic metals in wastewater that can be discharged from power plants including mercury, arsenic, selenium, and potentially copper and iron. Ultimate enactment of these guidelines may require the use of sophisticated physical, chemical and/or biological treatment systems. Ameren Missouri has assumed that ash and scrubber solid wastes would likely require dry systems with the use of landfills for disposal. Additionally, the Company has assumed that scrubber wastewater discharges would likely be the most highly regulated discharges and that co-mingling of low volume waste streams (as currently allowed) may be precluded. Compliance will likely be mandated through the NPDES permit process with anticipated compliance over a 5 to 8 year period.

The compliance options that have been considered to meet the Steam Electric Effluent Guidelines include the following.

To meet the proposed standards

- Installation of Waste Water Treatment Systems

The development of the Steam Electric Effluent Limitations Guidelines has driven a long term IRP assumption that Waste Water Treatment Systems would be required at each of our coal-fired Energy Centers. This assumption will be closely monitored and as these regulations become clear, further analysis will identify the most economical path to meet this requirement including the need for any additional capital investment.

### **5.5.3 Solid Waste Environmental Laws**

The need for capital investment is anticipated to be driven by the Coal Combustion Residuals regulation.

#### ***Coal Combustion Residuals - CCR***

The compliance options that have been considered to meet the CCR include the following.

- To meet the proposed standards



- Possible shut down of existing ash ponds
- Construct new landfills
- New Monitoring
- Less Recycling of coal ash
- Installation of Waste Water Treatment Plants

Our current plans to meet the Coal Combustion Residuals regulation include the development and construction of new landfills at our Labadie, Rush Island and Meramec Energy Centers in addition to the one already constructed at the Sioux Energy Center. The timing of these investments will be based on the final interpretations of the Coal Combustion Residuals regulations. As these regulations become clear, further analysis will identify the most economical path to meet this requirement including the need for any additional capital investment.

### **5.5.4 Other Environmental Laws**

#### ***Other Environmental Projects***

Other environmental projects include Spill Prevention, Control, and Countermeasure (SPCC) Rule projects and avian protection projects from 2014-2018.

### **5.5.5 Summary**

Ameren Missouri's probable compliance timing and cost assumptions, as illustrated in Appendix B, are based on current, proposed and potential environmental regulations. Given the length of the IRP Planning window, the likelihood of changes in environmental laws and regulations, and the uncertainty surrounding labor and materials costs in the future, these assumptions could change substantially but represent Ameren Missouri's best estimate of these costs at this time. The diamonds in the chart represents the Company's reference case, while the arrows represent potential timing changes under a more aggressive (accelerated) or a more moderate (delayed) implementation of each regulation.

## 5.6 Compliance References

4 CSR 240-22.040(1) .....	16
EO-2014-0062 h.....	16