Exhibit No.:	
Issue(s):	Refined Coal – Operational Considerations
Witness:	Mark C. Birk
Sponsoring Party:	Union Electric Company
Type of Exhibit:	Direct Testimony
Case No.:	EA-2012-_____
Date Testimony Prepared:	November 9, 2011

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. EA-2012-_____

DIRECT TESTIMONY

OF

MARK C. BIRK

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a AMEREN MISSOURI

****DENOTES HIGHLY CONFIDENTIAL INFORMATION****

St. Louis, Missouri
November, 2011

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DIRECT TESTIMONY

OF

MARK C. BIRK

CASE NO. EA-2012-_____

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Mark C. Birk. My business address is One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. By whom and in what capacity are you employed?

A. I am employed by Union Electric Company d/b/a Ameren Missouri ("Company" or "Ameren Missouri") as Vice President of Power Operations.

Q. Please describe your educational background and employment experience.

A. I received my Bachelor of Science degree in Electrical Engineering from the University of Missouri-Rolla in 1986 and my Master of Science in Electrical Engineering from the same institution in 1991. In 2009, I also received a Master of Business Administration from Washington University in St. Louis. I am a licensed professional engineer in the State of Missouri. I began my employment with Union Electric Company in 1986 as an assistant engineer in the nuclear function. In 1989, I transferred to Union Electric's Meramec Power Plant as an electrical engineer. In 1996, I transferred to the Energy Supply Operations Group and became a Power Supply Supervisor. I became Manager of Energy Supply Operations in the spring of 2000. I became General Manager of Energy Delivery Technical Services in the fall of 2001 and

Vice President of that department in 2002. I became Vice President of Ameren Energy, Inc., Ameren Corporation's short-term trading affiliate, in the fall of 2003 and assumed my current position with Ameren Missouri as Vice President of Power Operations in September of 2004.

Q. Please summarize your duties and responsibilities as Vice President of Power Operations for Ameren Missouri.

A. I am responsible for all of the generation assets of Ameren Missouri, except the Callaway Nuclear Plant. This includes responsibility for the Company's coal-fired base load fleet, responsibility for the Company's intermediate and peaking combustion turbine generating units, and responsibility for the Company's hydroelectric plants. In addition to being chief safety officer for Ameren Missouri's non-nuclear generation fleet, I am also responsible for the safe, reliable and efficient operation of the plants, environmental compliance at the plants, and the design, construction management and implementation of all plant-related projects.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your direct testimony in this proceeding?

A. The purpose of my testimony is to request approval of the Commission to sell a portion of the Company's coal supply and lease a portion of its Rush Island Plant site in connection with the purchase and use of refined coal at the Rush Island facility. The use of refined coal will provide environmental and financial benefits to the Company and its customers. In my testimony, I will provide an explanation of the refined coal process and its impact on operations at the Rush Island Plant.

Q. Please describe the Company's Rush Island Plant.

A. The Rush Island Plant is a 1204 megawatt base load coal-fired generating facility located in Jefferson County, Missouri.

III. OVERVIEW OF REFINED COAL PROCESS

Q. Please provide an overview of the refined coal process.

A. Refined coal is defined by the Internal Revenue Service ("IRS") Code as coal that has been treated such that when burned to produce steam, generates at least a 20% reduction in nitrogen oxide ("NOx") emissions and at least a 40% reduction in either sulfur dioxide ("SO_2") or mercury emissions. Refined coal provides significant tax benefits to the owners of the refined coal facilities for the first 10 years of operation.

Buffington Partners, LLC ("BP"), an affiliate of Coal Emissions Reduction Technologies, LLC ("CERT"), is a provider of refined coal with which the Company has contracted to provide refined coal at the Rush Island Plant. BP uses the Chem-Mod technology to produce refined coal, which consists of mixing additives with the coal to achieve emissions reductions. While the contractual arrangements for refined coal are complex and will be discussed in more detail by Ameren Missouri witness Robert Neff, the primary benefit to Ameren Missouri and its customers is reduced operating costs. Reduced operating costs will be realized through fees charged by Ameren Missouri to BP for the leasing of a small amount of land for the facility, a license to access the facility and other related handling services. Additional operating cost savings are expected through reduced additive costs when the United States Environmental Protection Agency's ("USEPA") Maximum Achievable Control Technology ("MACT") rule, which is expected to require mercury reductions, takes effect.

IV. REFINED COAL SELECTION & OPERATION

Q. **What vender was selected for supply of refined coal products?**

A. BP was selected as the supplier of refined coal at Rush Island. BP is one of several licensees of the Chem-Mod process in the U.S. Ameren Missouri reviewed proposals from both BP and another Chem-Mod licensee, and made the determination that BP was a better fit at Rush Island, primarily due to their system being less intrusive on the existing plant coal handing equipment and because there was not sufficient lead time available to install the more complex alternative system.

Q. Were other Ameren Missouri coal-fired generating units considered as candidates for using refined coal?

A. Yes. The Labadie and Meramec Plants were reviewed for the Chem-Mod process as they also use pulverized coal boilers. Both stations were ruled out due to the risk of increased particulate loading on the Electrostatic Precipitators ("ESPs") which could exceed the Prevention of Significant Deterioration ("PSD") limits of 25 tons annually on a site basis. Particulate emissions, based on recent stack testing for the draft USEPA MACT rule, are higher at Labadie and Meramec than at Rush Island.

Use of refined coal at the Sioux Plant is currently under negotiations with another refined coal provider, Clean Coal Solutions, LLC ("CCS"). CCS uses a proprietary process called CyClean which is only applicable to cyclone-fired generating units. Should Ameren Missouri reach agreement with CCS for the Sioux Plant, a separate filing will be made to seek the necessary approvals from the Commission.

Q. **What kind of equipment will be needed to process the refined coal?**

A. The equipment used to refine the coal includes (a) storage silos and dispensing equipment for the dry additive application, (b) liquid storage tanks and dispensing equipment for the liquid additive application, (c) mixing equipment for mixing the additives with the raw coal, and (d) a trailer containing all electrical and control equipment. This equipment will be located on the Rush Island Plant site.

All equipment and infrastructure will be funded, installed, owned and operated by BP. Ameren Missouri is responsible (and compensated) for providing leased space at the Rush Island Plant site, coal handling services of the coal feedstock and coal for BP to refine. Ameren Missouri's responsibilities also include providing incidental utility hook-ups for power and water as well as emergency services.

Q. **In the event the refined coal facility does not operate, will Ameren Missouri be able to continue electric operations?**

A. Yes. In the event that BP's facility is out of service we will continue operation as we do today. BP's structures will not interfere with delivery of coal to the energy centers for electric generation.

Q. **The tax code requires lower NOx and either mercury or SO_2 emission rates be demonstrated to qualify for tax credits. Please explain Ameren Missouri's expectations for emissions performance with refined coal.**

A. BP has successfully completed testing using Rush Island coal feedstock in a pilot scale combustion facility, demonstrating that the refined coal qualifies for tax credits (the tax code allows the fuel to be qualified in an approved pilot scale test).

Ameren Missouri expects to improve mercury capture at the Rush Island Plant with the use of the additive BP is providing. Although BP has met IRS testing requirements with respect to NOx emissions reductions, Ameren Missouri is uncertain at this time of the level of reductions in NOx emissions that will be achieved at the Rush Island Plant.

Q. **Is Ameren Missouri responsible for demonstrating the lower emissions rate?**

A. No, BP is responsible for demonstrating the required mercury and NOx emission reductions are being achieved. Testing of the refined coal is required every 6 months or whenever the fuel is changed. BP bears 100% of the cost of emissions reductions testing and 100% of the risk that the sorbents applied to the raw coal feedstock in the facility will generate the required emissions reductions. Ameren Missouri has no responsibilities or liabilities regarding the testing or the ultimate achievement of emissions reductions.

BP plans to conduct off-site testing in a pilot scale combustion facility to prove that the required mercury and NOx emission reductions could be achieved (pilot scale tests are a permitted methodology in the tax code). The pilot scale testing will be conducted at the pilot scale combustion facility at the University of North Dakota Energy & Environmental Research ("EERC"), which is a well-known and well-respected third party testing facility.

Q. **Are there operational benefits to burning refined coal? If so, please describe.**

A. Yes. In addition to the emission benefits, BP believes operational benefits associated with the Chem-Mod process include improved performance of fly ash as a cement replacement in concrete mixes, reduced scale formation on boiler tubes, and improved heat rate; however Ameren Missouri will not be able to quantify any such potential benefits until the refined coal project is in full operation.

Q. **Are there significant operational risks associated with burning refined coal?**

A. No, we do not believe there will be significant operational risks burning refined coal but there are always some risks when implementing any new technology at a power plant. Full scale testing of the Chem-Mod process is scheduled for late fall to ensure that there will be no detrimental operational impacts.

Q. **What if the Company determines there are detrimental impacts to using refined coal?**

A. The Company has the right to suspend refined coal usage if detrimental impacts are observed. As discussed by Mr. Neff in his direct testimony, under the terms of the Company's agreements with BP, the Company can suspend operation at any time if in Ameren Missouri's sole judgment the refined coal causes operational problems.

Q. **Will Ameren Missouri be able to operate Rush Island using refined coal under its current air operating permits?**

A. Ameren Missouri has received permission to conduct testing of the refined coal from the Missouri Department of Natural Resources ("MDNR") Air Pollution Control Program at the Rush Island Plant. BP has submitted an air permitting

applicability determination request to the MDNR asking confirmation that the project is exempt from construction permitting due to *de minimis* emissions from the equipment.

Ameren Missouri will need to seek permission from the MDNR Air Pollution Control Program to continue use of the refined coal after the test period has concluded. However, since all pollutants are expected to have emissions below de minimis levels, approval for continued use of refined coal is expected.

Q. **Are there any other units in Missouri or other states burning refined coal?**

A. Yes, another refined coal provider, Clean Coal Solutions, LLC has four operating units in Missouri using the Cyclean process, Thomas Hill 1 & 2 and New Madrid 1 & 2, owned by Associated Electric Company, Inc. CCS has test programs in place and is currently negotiating contracts with:

- **_____
- _____
- _____
- _____
- _____
- _____**

Ameren Missouri is not aware of any units in operation which use refined coal provided by CERT or its affiliates, but there are units in service using the Chem-Mod process. CERT facilities planned to be in service by the end of the year include:

- **_____
_____
- _____
- _____
_____
- _____
- _____
_____**

We do not have a comprehensive list of other Chem-Mod licensees but are aware of the following installations:

- Ameren Energy Resources: Duck Creek Plant
- DTE Energy: Monroe Power Plant, Belle River Power Plant, St. Clair Power Plant

Q. If refined coal is not used, what technologies would be required to reduce emissions and at what cost?

A. Currently, Ameren Missouri is assessing NOx reductions required to achieve the recently issued Cross-State Air Pollution Rule ("CSAPR") allocations. At this time, we are not able to quantify what NOx reductions will be achieved using refined coal. As a consequence, at this time we have not accounted for any savings in the use of refined coal for NOx emissions.

The proposed MACT rule requires reductions in mercury emissions from coal-fired units. Our expectation is that the refined coal provided by BP will provide a

significant contribution toward achieving MACT limits for mercury by providing fuel oxidizers.

Q. **Will refined coal impact economics of the sale of fly ash?**

A. Yes, due to the use of mercury capture additives, the fly ash will no longer be marketable to the cement kilns and the impacts of this are currently under review. It should be noted we expect that regardless of the use of refined coal, our fly ash is not expected to be marketable in 2015 or 2016 due to the proposed MACT mercury capture requirements.

Q. Can you provide any additional information regarding CERT's technologies?

A. Yes. Included as Schedule MCB-1 is a copy of a presentation provided by CERT to Ameren Missouri that provides additional information regarding their technologies.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Authority to Sell and Repurchase Coal and Lease Property.	))))	Case No. EA-2012-_____

AFFIDAVIT OF MARK C. BIRK

STATE OF MISSOURI)
) **ss**
CITY OF ST. LOUIS)

Mark C. Birk, being first duly sworn on his oath, states:

1. My name is Mark C. Birk. I work in the City of St. Louis, Missouri, and I am employed by Union Electric Company d/b/a Ameren Missouri as Vice President of Power Operations.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Union Electric Company d/b/a Ameren Missouri consisting of 10 pages and Schedule MCB-1, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Mark C. Birk

Subscribed and sworn to before me this 9th day of November, 2011.

Mary Hoyt
Notary Public

My commission expires: 4-11-2014

Mary Hoyt - Notary Public
Notary Seal, State of
Missouri - Jefferson County
Commission #10397820
My Commission Expires 4/11/2014

Schedule MCB-1 is

Highly Confidential

in its entirety