Dear Mr. Whitworth:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to test two different technologies on Boiler Unit 3: a liquid coal additive, M-Prove, and an alternative liquid flue gas-conditioning agent, RESPond, at the Ameren Missouri Labadie Energy Center (Ameren - Labadie), located in Labadie, Missouri. The Air Pollution Control Program is hereby granting your requests to conduct these temporary testing operations at this location in accordance with Missouri State Rule 10 CSR 10-6.060(3).

According to the application, Ameren - Labadie is considering options to replace SO₃ as the conditioning agent on Boiler Unit 3. Ameren - Labadie is considering SO₃ replacement because SO₃ impedes capture of mercury by activated carbon sorbents which increases the costs associated with complying with 40 CFR Part 63, Subpart UUUU – *National Emission Standards for Hazardous Air Pollutants From Coal and Oil-Fired Electric Utility Steam Generating Units*. Ameren - Labadie employs flue gas conditioning on Boiler Unit 3 to ensure proper control of particulate matter (PM) by the electrostatic precipitator (ESP) on Boiler Unit 3. ESP control efficiency is partially dependent on fly ash resistivity. Western Powder River Basin (PRB) coals tend to result in high resistivity ash, impeding capture by the ESP.

ADA flue gas conditioning technology is based on the injection of a proprietary liquid flue gas-conditioning additive into the flue gas upstream of a unit’s ESP. The purpose of the technology is to optimize flue gas resistivity and enhance the collection efficiency of an ESP, thereby reducing PM emissions from the boiler. The primary mechanism for ESP performance improvement is through the reduction of fly ash resistivity. Optimizing the resistivity of the fly ash enables the ESP to operate at a greater collection efficiency.

Additionally, this flue gas conditioning technology has been shown to not inhibit the adsorptive capacity of the carbon sorbents used for mercury control. Ameren hopes this testing will show
improved PM control as well as improved mercury control when compared to SO₃ as a flue gas-
conditioning agent and as compared to no flue gas conditioning.

The ADA liquid flue gas conditioning technology, RESPond (formerly ADA-ES, inc. product
ATI-2001), was tested previously at Boiler Unit 3; however, flue gas duct stratification issues
during the testing were believed to have limited the observed fly ash resistivity benefits. Ameren
– Labadie is proposing additional testing of RESPond to see if optimal PM control can be
achieved after modifications to the injection lance array.

The liquid coal additive, M-Prove, is expected to increase mercury oxidation rates allowing for
greater mercury adsorption and capture in the ESP.

Ameren – Labadie will apply the coal additive, M-Prove, to the coal using a portable skid
containing a pump, flexible tubing, and rotameters dedicated to one of the coal feeders for Boiler
Unit 3. The flow to the selected feeder will be controlled by manually adjusting needle valves on
the rotameters. Totes containing M-Prove will be placed in a secondary containment area near
the skid. M-Prove will not be tested individually. M-Prove will be tested in conjunction with
RESPond.

RESPond will be delivered to the installation by tanker trucks. The RESPond equipment will
include a chemical injection skid provided by ADA, a receiving tank, a set of injection lances,
liquid and air distribution equipment, piping, and low-pressure blowers. The concentrated
RESPond chemical will be blended with water to create a low concentration aqueous solution at
the chemical injection skid. The solution will be delivered to a grid of fluid spray high
performance atomizers by a high-pressure pump. The atomizers are located on a set of
removable chemical injection lances that will be arranged in the ESP inlet ductwork to give
equal distribution of the solution throughout the flue gas stream. The high performance
atomizers will produce an ultrafine spray of droplets to provide quick evaporation, good
distribution, and optimum chemical utilization. RESPond will be testing individually and in
conjunction with M-Prove.

Ameren – Labadie is testing RESPond to potentially replace the use of the installation’s current
SO₃ flue gas conditioning system; therefore, the current SO₃ injection system required by
Construction Permit 0992-016B will not be operated during RESPond testing. This permit
temporarily relieves the installation of the requirement to operate the SO₃ flue gas conditioning
system on Boiler Unit 3 only for testing purposes.

Ameren – Labadie expects mercury and particulate matter (PM) emissions from Boiler Unit 3 to
be reduced by the testing operations; however, the receiving of M-Prove and RESPond will
result in increased haul road particulate emissions. Particulate emissions associated with the
receiving of 100 tons combined of M-Prove and RESPond were determined to be 0.02 tons of
PM, 0.004 tons of PM₁₀, and 0.001 tons of PM₂.₅. Boiler Unit 3 ESP will be in operation during
all testing. SDS provided by the installation for M-Prove and RESPond indicate the materials do
not contain any hazardous air pollutants (HAPs). As emissions of all pollutants are expected to
be below 100 tons per year, permission to temporarily use up to 100 tons combined of M-Prove
and RESPond is granted up to the expiration date stated above. In order to continue using M-Prove and RESPond past the expiration date, Ameren - Labadie will need to seek permission from the Air Pollution Control Program.

Ameren – Labadie shall submit an Excess Emissions Report for any emissions exceeding the emission limits within the installation’s Title V Operating Permit, OP2017-048. Ameren – Labadie should indicate the testing as the source of the excess emissions on the report.

No later than 90 days following the expiration of this permit, Ameren - Labadie shall submit a testing project report to the Air Pollution Control Program. At a minimum, the report shall include:

1. Identification of the emission unit (Boiler Unit 3) and control device (ESP) evaluated for this project
2. Location(s) of M-Prove application
3. Locations of the RESPond injection and sampling sites
4. M-Prove application rates and concentrations, RESPond injection rates and concentrations, and unit load for each trial
5. The date, time, and duration of each trial
6. Emission rates of particulates, mercury, NOx, and SO2 during the M-Prove and RESPond trial runs as observed by the CEMS already installed on Unit 3
7. Baseline emission rates of particulates, mercury, NOx, and SO2 while using SO3 as the flue gas conditioning agent as observed by the CEMS already installed on Unit 3
8. Higher heating value, sulfur, mercury, and ash content of the coal used during the M-Prove and RESPond trial runs and during the baseline SO3 flue gas conditioning agent runs
9. Conclusions reached concerning the emissions reduction effectiveness of the testing project
10. Comparison of the RESPond testing results from Temporary Permits 112012-011 and 122009-009 to the testing results of this project.

You are still obligated to meet all applicable air pollution control rules, Department of Natural Resources’ rules, or any other applicable federal, state, or local agency regulations. Specifically, you should avoid violating:

- 10 CSR 10-6.045 Open Burning Requirements
- 10 CSR 10-6.165 Restriction of Emission of Odors
- 10 CSR 10-6.170 Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin
- 10 CSR 10-6.220 Restriction of Emission of Visible Air Contaminants
- 10 CSR 10-6.260 Restriction of Emission of Sulfur Compounds
- 10 CSR 10-6.261 Control of Sulfur Dioxide Emissions
- 40 CFR Parts 72, 73, and 75 through 78 - Acid Rain Program
- 40 CFR Part 96 – Clean Air Interstate Rule
- 40 CFR Part 97, Subparts AAAAA, CCCCC, and EEEEEE - Cross-State Air Pollution Rules
Ameren - Labadie shall retain a copy of this letter with the unit and make this letter available to Department of Natural Resources' personnel upon verbal request. If you have any questions regarding this determination, please do not hesitate to contact Alana Hess at the Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or by telephone at (573) 751-4817. Thank you for your time and attention to this matter.

Sincerely,
AIR POLLUTION CONTROL PROGRAM

Kyra L. Moore
Director

KLM:ahj

c:  St. Louis Regional Office
    PAMS File: 2017-12-036
PERFORMANCE TEST PLAN

Submitted to: MO Dept. of Natural Resources,
Air Pollution Control Program, Enforcement Section
P.O. Box 176, Jefferson City, MO 65102

Date Submitted: _________________________

Attention: ______________________________

Proposed Test Date: _______________________

Test date must be agreed to by Air Pollution Control Program

1) FACILITY INFORMATION:

Name: ________________________________
Address: ______________________________
City: __________________ State: __________ Zip: __________
Name & title of Contact Person: __________
Phone # of Contact Person: ______________ Mobile #: __________

2) AIR POLLUTION SOURCE TO BE TESTED:

Type of Facility/Source: _________________
Permit #: __________ FIPS/Plant ID: __________
PORT #: __________
Address/Location: _______________________
Directions to Source (or map attached):

Initial Start-up Date: _________________
Reason for Test: _______________________
Condition of Permit __________ Consent Agreement __________
Administrative Order __________
Other (specify) __________

3) TESTING FIRM INFORMATION:

Name of Firm: _________________________
Address: ______________________________
City: __________________ State: __________ Zip: __________
Name & title of Contact Person: __________
Phone # of Contact Person: ______________ Mobile #: __________
Number of employees of firm: __________
No. of employees actually engaged in air pollution source testing: __________
Organizational chart with names & title of personnel: (please attach)
3. TESTING FIRM INFORMATION: (cont.)

Location & description of laboratory facilities:

Subcontractor(s) utilized by firm for source testing activities:

Number of air pollution sources previously tested by firm:

Sources tested by firm in Missouri in past 3 years (source, test, date):

4. PERFORMANCE TEST INFORMATION:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>No. of Sampling Points</th>
<th>Total Time per Test Run</th>
<th>No. of Test Runs</th>
<th>Test Method to be Used</th>
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### 5. Audit Information:

<table>
<thead>
<tr>
<th>Method</th>
<th>Specific Analyte</th>
<th>Expected Sample Concentration</th>
<th>Sample Matrix &amp; Audit Matrix (if different)</th>
<th>Audit Sample Concentration Requested</th>
<th>Audit Provider</th>
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### 6. Audit Provider Information:

**Provider #1:**
- **Address:**
- **City:**
- **State:**
- **Zip:**
- **Name & Title of Contact Person:**
- **Phone # of Contact Person:**
- **Fax #:**

**Provider #2:**
- **Address:**
- **City:**
- **State:**
- **Zip:**
- **Name & Title of Contact Person:**
- **Phone # of Contact Person:**
- **Fax #:**
Duct to be Sampled:

Duct Dimensions:
- From inside far wall to outside of port
- Nipple length
- Depth (or diameter) of duct
- Width (rectangular duct)

Rectangular stack Equivalent Diameter:
\[ D_e = 2 \times \text{Depth} \times \text{Width} = 2 \left( \frac{\text{Depth} + \text{Width}}{2} \right) \]

Distance from nearest flow disturbance to Ports

<table>
<thead>
<tr>
<th>Distance</th>
<th>Upstream (A)</th>
<th>Downstream (B)</th>
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</thead>
<tbody>
<tr>
<td>Diameters</td>
<td></td>
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</tbody>
</table>

Stack Area =

Calculated by:

Sketch of Stack or Duct with Port Locations & Distances Shown [NOTE: Cyclonic flow must be measured by instrument and shown to be within allowable limits prior to initiation of sampling.] If sampling location is downstream from an axial flow fan, installation of a flow straightening device will probably be necessary to meet cyclonic flow criterion.

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

<table>
<thead>
<tr>
<th>POINT</th>
<th>% of Stack I.D.</th>
<th>Stack I.D.</th>
<th>Distance from Outside Wall</th>
<th>Nipple Length</th>
<th>Distance from Outside of Port</th>
</tr>
</thead>
</table>

LOCATION OF TRAVERSE POINTS IN RECTANGULAR STACKS

<table>
<thead>
<tr>
<th>POINT</th>
<th>Stack I.D.</th>
<th>Distance from Outside Wall</th>
<th>Nipple Length</th>
<th>Distance from Outside of Port</th>
</tr>
</thead>
</table>

...
**A. Sampling Equipment Information:**
Manufacturer and model of the sampling equipment to be used by the tester for the performance tests, along with a description of any equipment which may differ from that required by the specified method(s).

**B. Test Procedures:**
Description of any test procedures to be used in the conduct of the performance tests which may differ from the specified method(s).

**NOTE:** Deviations from EPA test methods observed during test procedures will not necessarily be corrected by agency observer and could result in agency rejection of test results.

**C. Analytical Procedures:**
Description of any analytical procedures which differ from the specified method(s).

**D. Data Sheets:**
Sample of all field data sheets which do not provide the data shown on the example sheets in 40 CFR 60 for the specified method(s).

**E. Air Pollution Control Equipment:**
Types and manufacturers of all control equipment:
- Design or guarantee efficiency
- Design gas volume at full load (acfm)
- Design pressure drop
- Maintenance schedule and method of record keeping:
A description of the source operation including as a minimum the following:

A. Fuel type(s): Coal, Oil, or Gas Type of fuel(s) used and ultimate analysis of the fuel burned (%H, %C, %S, %N, %O, %H₂O & GCV) or F factors to be used in test:

   If fired in combination, list percentages of each fuel. For coal and oil, indicate classification, and for gas, indicate type:

B. Manufacturer(s) of boiler and other major components:

C. FIRING TYPE:
   For coal:
   - underfeed,
   - overfeed (moving grate, spreader or vibrating grate),
   - or suspension (pulverized or cyclone)

   For oil, gas, or pulverized coal suspension firing:
   - vertical
   - tangential
   - horizontal

   Number and Location(s) of burners:

D. Type of boiler: shell firetube watertube

E. Description of ash handling and disposal system:

F. Fuel composition (by analysis):

G. Design fuel firing rate and heat input:

H. Design steam production rate, pressure, and temperature:

I. Use of steam produced:

J. Design electricity generation rate, if applicable:

K. Fly ash re-circulation system description, if applicable:

L. Frequency and duration of soot blowing:

M. Normal maintenance schedule for facility, along with a description of the operating difficulties encountered thus far:

N. Normal operating schedule:
9. SPECIFIC: for Fossil Fuel-Fired Steam Generators

<table>
<thead>
<tr>
<th>O. Diagram of facility: (please attach)</th>
</tr>
</thead>
</table>
SOURCE TESTING REPORT FORMAT

COVER
- Plant name and location
- Source sampled
- Testing company or agency, name, and address

CERTIFICATION
- Certification by team leader
- Certification by reviewer (e.g.: Professional Engineer)

INTRODUCTION
- Test purpose
- Test location, type of process
- Test dates
- Pollutants tested
- Observers' names (industry and agency)
- Any other important background information

SUMMARY OF RESULTS
- Emission results
- Process data, as related to determination of compliance
- Allowable emissions
- Description of collected samples
- Visible emissions summary
- Discussion of errors, both real and apparent

SOURCE OPERATION
- Description of process and control device
- Process and control equipment flow diagram
- Process data and results, with example calculations
- Representatives of raw materials and products
- Any specially required operation demonstrated

SAMPLING and ANALYSIS PROCEDURES
- Sampling port location and dimensioned cross section
- Sampling port description, including labeling system
- Sampling train description
- Brief description of sampling procedures, with discussion of deviations from standard methods
- Brief description of analytical procedures, with discussion of deviations from standard methods

APPENDIX
- Complete results with example calculations
- Raw field data (original, not computer printouts)
- Laboratory report, with chain of custody
- Test log
- Calibration procedures and results
- Project participants and titles
- Related correspondence