

# PERMIT BOOK

STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES

Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

www.dnr.mo.gov

SEP - 7 2011

CERTIFIED MAIL:7004135000314153816  
RETURN RECEIPT REQUESTED

Mr. Paul Ling  
Environmental Services Department Manager  
KCP & L Great Missouri Operations Company  
PO Box 418679  
Kansas City, MO 64141

RE: New Source Review Temporary Permit Request - Project Number: 2011-08-012  
Installation ID Number: 095-0031  
Temporary Permit Number: **092011-002**  
Expiration Date: December 31, 2011

Dear Mr. Ling:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to test a CyClean coal additive at Kansas City Power and Light Great Missouri Operations Company's (KCP & L GMO) Sibley Generating Station in Jackson County (S1, T50N, R30W). The Air Pollution Control Program is hereby granting your request to conduct this temporary operation at this location in accordance with Missouri State Rule 10 CSR 10-6.060(3).

Your facility is proposing to test a coal additive called CyClean in three (3) coal-fired boilers. The additive should improve combustion of the coal and assist in the removal of mercury. The combustion of coal yields elemental mercury vapors ( $Hg^0$ ), oxidized mercury vapors ( $Hg^{2+}$ ) and particulate-bound mercury ( $Hg_p$ ). While  $Hg_p$  and  $Hg^{2+}$ , which can be captured in the native carbon of the ash, can be easily removed by particulate air pollution control devices (e.g. fabric filters, scrubbers, electrostatic precipitators (ESP) and etc.),  $Hg^0$  cannot be removed because it stays in a vapor form. The CyClean additive assists in the removal of mercury by oxidizing  $Hg^0$  to  $Hg^{2+}$ , which can then be captured by the existing ESP. Besides the enhanced mercury removal, the addition of CyClean allows the boiler operators to better optimize the combustion process for further reduction of nitrogen oxides ( $NO_x$ ). Although the addition of CyClean by itself does not affect boiler emissions, it improves the bottom slag properties, allowing for more sustainable operation with deeper combustion staging. The operator can, therefore, redirect more or less air from the burner to the overfire air as needed while maintaining proper slag viscosities. Ultimately, this allows the operators to stage combustion to a lower stoichiometric ratio, which can lead to lower  $NO_x$  emissions. However, due to the inverse relationship between  $NO_x$  and

Mr. Paul Ling  
Page 2

carbon monoxide (CO), there may be a possibility for an increase in CO emissions due to changes made to reduce NO<sub>x</sub>. Furthermore, a properly tuned overfire system converts CO to carbon dioxide (CO<sub>2</sub>). Therefore, there may be increases in CO<sub>2</sub> emissions as well.

CyClean has two components: Additive A and Additive B. Additive A is a granular material while Additive B is a liquid. Additive A will be delivered by truck and transferred to a hopper. Then, Additive A will be transferred to the main coal conveyor by a secondary covered conveyor. Additive B is a liquid stored in a tote that is added to the coal just prior to entering the boilers. Additive B contains one of two halide salts in solution. Once in the boiler, the salts will thermally decompose. Approximately 25 tons of Additive A and 70 gallons of Additive B will be used during testing. However, this permit approves the use of 50 tons of Additive A and 140 gallons of Additive B in case the facility requires more material than originally planned.

Due to the limited amount being used and the nature of CyClean (i.e. Additive A is granular and should not have high silt content, Additive B is in liquid form and contains no volatile organic compounds (VOC) or hazardous air pollutants (HAPs)), emissions of all regulated pollutants and HAPs from this project are expected to be less than the limit required for temporary permits. The limits are 100 tons per year of all regulated pollutants (i.e. particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), particulate matter less than 10 microns in diameter (PM<sub>10</sub>), particulate matter (PM), sulfur oxides (SO<sub>x</sub>), NO<sub>x</sub>, CO and VOC), 10 tons per year of individual HAP and 25 tons per year of combined HAPs. KCP & L GMO shall record the amount of CyClean A and CyClean B used and the date that these additives were used and submit the records to the Air Pollution Control Program's Compliance/Enforcement Section within 30 days of the expiration of this permit.

If the facility decides to apply for a permanent permit to use the CyClean additives, it shall include, with its application, a report with the following information.

- A comparison of boiler operations before and after application of the CyClean additives, including the maximum output, boiler efficiency and any other key boiler parameters that are necessary to demonstrate boiler performance and the affects of the CyClean additives on its operation.
- A comparison of boiler emissions before and after application of the CyClean additives for green house gases (GHG), mercury, NO<sub>x</sub> and CO.
- A description of how the CyClean additives were added, the quantities added and the ratio of CyClean additives to coal.

Before performing any stack tests to characterize the GHG, mercury, NO<sub>x</sub> and CO emissions, your facility should contact the Enforcement/Compliance unit of the Air Pollution Control Program to work out an acceptable testing plan.

Mr. Paul Ling  
Page 3

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 10-6.220, *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.165 *Restriction of Emission of Odors* and 10 CSR 10-6.170 *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*.

No modification to your operating permit (OP2006-063) is required because this is a temporary project. A copy of this letter should be kept with the unit and be made available to Department of Natural Resources' personnel upon request.

If you have any questions regarding this determination, please do not hesitate to contact Chia-Wei Young at the Departments' 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: cwyl

c: PAMS File: 2011-08-012  
Kansas City Regional Office