

# PERMIT BOOK

STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

JUL 22 2011

CERTIFIED MAIL: 70051820000233104299  
RETURN RECEIPT REQUESTED

Mr. Greg Garrison  
EH & S Field Specialist  
Chesapeake Energy Corporation  
5880 Enterprise Drive, Suite 600  
Casper, WY 82609

RE: New Source Review Temporary Permit Request - Project Number: 2011-07-018  
Installation ID Number: PORT-0679  
Temporary Permit Number: **072011-010**  
Expiration Date: December 31, 2012

Dear Mr. Garrison:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to perform test runs on a Soil Tek Thermal Remediation System. The Air Pollution Control Program is hereby granting your request to conduct this temporary operation at World Recycling Equipment Sales LLC, 1414 Riley Industrial Drive, Moberly, MO 65270, in accordance with Missouri State Rule 10 CSR 10-6.060(3), *Temporary Installations and Pilot Plants Permits*.

Your facility proposes to test a thermal remediation system for the treatment of oil/water-based drill cuttings to ensure proper performance before purchase. The temperatures of the cuttings will be raised to approximately 650 degrees Fahrenheit (°F) by propane flame from a 2.5 million British Thermal Units per hour (MMBtu/hr) burner to vaporize the organics. The organics will gather in an afterburner chamber with a 2.5 MMBtu/hr burner where they will be oxidized. The inlet temperature of the afterburner is between 700 to 850 °F while the outlet temperature of the afterburner is 1600 °F. The processed solids will be expelled onto the ground or into a container. The processed material will be sent for disposal at either an area landfill or taken back to the location where the material originated from. Each run is expected to take approximately 12 hours and the facility is expected to perform a maximum of three runs.

Table 1 gives an emissions summary from this project. The emissions calculation is based on three (3) tests and therefore, your company is only permitted to perform a maximum of three (3) tests on the Soil Tek Thermal Remediation system.

**Table 1: Emissions Summary**

Pollutants	Emissions (tpy)	Temporary Permit Limit (tpy)
PM <sub>2.5</sub>	0.0027	100
PM <sub>10</sub>	0.0027	100
PM	0.0027	100
SO <sub>x</sub>	0.0015	100
NO <sub>x</sub>	0.0127	100
VOC	0.0004	100
CO	0.0074	100
HAPs	0.0037	<sup>1</sup> 0.01/10

Note 1: HAPs contain polycyclic organic matter (POM) which has individual limits ranging from 0.01 tpy to 10 tpy.

Particulate matter less than two-and-a-half microns in diameter (PM<sub>2.5</sub>), particulate matter less than ten microns in diameter (PM<sub>10</sub>), particulate matter (PM) and volatile organic compound (VOC) emissions from the entire unit were calculated using emission factors from performance tests conducted on the unit. The performance test only tested for PM, but it was assumed that all PM are PM<sub>2.5</sub> and PM<sub>10</sub>. Emissions from the combustion of propane, including sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO) were calculated using emission factors from the Environmental Protection Agency (EPA) document, AP-42, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition, Chapter 1.5, *Liquefied Petroleum Gas Combustion*, (July, 2008). VOC, PM<sub>2.5</sub>, PM<sub>10</sub> and PM emissions from combustion were not calculated using emission factors from AP-42, Chapter 1.5, because they are included in the results of the performance tests. Hazardous Air Pollutants (HAP) emissions from propane combustion were calculate using emission factors from AP-42, Chapter 1.4, *Natural Gas Combustion*, July (1998) because natural gas has similar combustion characteristics as propane.

The vaporization of the drill cuttings is expected to emit polycyclic organic matter, (POM) which are considered HAPs. POM, also called polycyclic aromatic hydrocarbons (PAH), from the vaporization of the drill cuttings were calculated from mass balances and assuming that a 98% control efficiency can be achieved. The POM content were taken from the research paper, *Mycoremediation of Polycyclic Aromatic Hydrocarbons (PAH)-Contaminated Oil-based Drill-Cutting*, published in the African Journal of Biotechnology, Volume 10(26), 2011.

Emissions from the remediation of drill cuttings have not been well characterized. The calculation method used for this temporary permit is based on the best data available. If the facility ever decides to apply for a permanent permit in Missouri for this thermal remediation system, it will have to submit data (i.e. stack testing data, sampling data, etc.) that will accurately characterize emissions from this unit.

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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 10-6.220, *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-5.160, *Control of Odors in the Ambient Air*, 10 CSR 10-6.170, and *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*. None of the New Source Performance Standards (NSPS) apply to the temporary unit. None of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) or the currently promulgated Maximum Achievable Control Technology (MACT) regulations apply to the proposed equipment. No operating permit is required because it is a temporary installation.

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



James L. Kavanaugh  
Director

JLK:cyl

c: Northeast Regional Office  
PAMS File: 2011-07-018