UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

DEC 07 2009

OFFICE OF
AIR, WASTE AND TOXICS

Rosanne F. Paris
Environmental Lead
ConocoPhillips Company
Ferndale Refinery
P.O. Box 8
Ferndale, Washington 98248

Dear Ms. Paris:

Re: Opacity Alternative Monitoring Plan Proposal for the Fluid Catalytic Cracking Unit (FCCU) Wet Gas Scrubber (WGS) for the Ferndale Refinery

This is in response to your letter of August 17, 2009, requesting approval of a revision to the previously approved alternative monitoring plan (AMP) dated March 31, 2006. After review of the information ConocoPhillips submitted, EPA approves your request.

ConocoPhillips requested that the approved AMP be modified as follows:

- Update the AMP to reflect the most recent physical modifications. As required by the March 31, 2006 AMP, the additional Belco filtration modules have been installed.
- Allow alternative flow calculation methodologies (Equation 2) per 40 CFR 63 Subpart UUU (40 CFR § 63.1573 (a) (2)).

EPA approves the following AMP modification for opacity:

This alternative monitoring plan (AMP) is to be implemented in place of the requirement to install and operate a continuous opacity monitoring system (COMS) required by NSPS Subpart J [40 CFR § 60.105(a)(1)] and by reference from MACT Subpart UUU (Table 2).

The ConocoPhillips Fluid Catalytic Cracking Unit (FCCU) Wet Gas Scrubber (WGS) is not a venturi scrubber, so the requirements of Tables 2 and 3 of MACT Subpart UUU apply. Because a WGS is being used and as the result of the presence of condensed water in the stack, a COMS will not accurately measure opacity. An appropriate continuous parameter operating system (CPMS) for the ConocoPhillips FCCU WGS includes monitoring the WGS liquid-to-gas (L/G) ratio and the weight percent solids in the scrubber recirculation liquid. The value for L will be determined by measuring the amperage to each WGS recirculation pump motor that is operating, calculating the power generated by the pump motor at the measured amperage using a standard equation from the Chemical Engineers Handbook, determining the liquid flow rate at the calculated power input from the pump manufacturer's Centrifugal Pump Characteristics

Curve and summing the liquid flow rate from each operating pump. The value for G will be measured by a gas flow meter or calculated in accordance with 40 CFR § 63.1573(a)(2)(iii) using control room instrumentation for air flow into the regenerator, and continuous gas analyzers on the exhaust from the regenerator. As described in the guideline of 40 CFR § 63.1564(b)(2) and (3), the L/G ratio will be calculated and recorded at least once every operating hour. ConocoPhillips has established a minimum L/G ratio of 1.25 calculated on a three-hour block average based on performance testing.

The weight percent solids in the WGS liquid must be sampled and analyzed weekly. ConocoPhillips has established a maximum weight percent value of 1.0 based on data taken during performance testing.

ConocoPhillips has developed and must maintain a written monitoring plan which describes the specific CPMS for this AMP including the measurement equipment, equations, centrifugal pump characteristics curves or algorithms, sampling methods, analytical methods and operation and maintenance requirements. This monitoring plan must be reviewed annually and revised, if necessary, and made available to EPA and NWCAA upon request. This CPMS will meet the requirements of 40 CFR §63.1572(c) and (d).

If you have any questions about this approval, please contact Madonna Narvaez at 206-553-2117, or electronically at narvaez.madonna@epa.gov.

Sincerely,

Nancy Helm, Manager
Federal and Delegated Air Programs Unit

cc: Tim Hall, ConocoPhillips
Annie Naismith, NWCAA

Rosanne F. Paris
Environmental Air Lead

ConocoPhillips Company
Ferndale Refinery
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ConocoPhillips

May 17, 2011
HSE 480.001.002; File No. 6.2.6.9

Annie Naismith
Air Quality Engineer
Northwest Clean Air Agency
1600 South Second Street
Mount Vernon, WA 98273-5202

Re: Submission of Final Plan for FCC Enhanced Selective Non-Catalytic Reduction (E-SNCR) Ammonia Predictive Emissions Monitoring

Dear Annie,

Pursuant to Condition 4b in NWCAA OAC #1047, ConocoPhillips is required to submit a final plan to establish a predictive relationship between the FCC Unit and ESNCR operating parameters and emissions of ammonia. The plan must be submitted within 180 days after conducting the initial ammonia compliance test. Ferndale completed the initial compliance test for ammonia at the FCC/CO Boiler wet gas scrubber outlet on January 13, 2011.

If you have questions regarding this issue, please don't hesitate to contact the undersigned at (360) 384-8375.

Sincerely,

Rosanne F. Paris

Enclosure: Ammonia Emissions Monitoring Plan

Cc: Christian Schoepe
William Henning

Ammonia Emissions Monitoring Plan
ESNCR System
ConocoPhillips Ferndale Refinery
Revision B
May 13, 2011

Introduction

The ConocoPhillips Ferndale Refinery has installed an ESNCR system on the CO Boiler in the FCC Unit to reduce NOx emissions. This system vaporizes aqueous ammonia and injects the stream into the CO Boiler where the ammonia reacts with NOx to form molecular nitrogen. A hydrogen stream may also be injected in order to improve the conversion of NOx.

Any of the ammonia that does not react with the NOx will either react to form ammonia salts or will exit the boiler as ammonia vapor. The ammonia that exits the boiler as vapor is known as 'slip'.

This document describes how ConocoPhillips plans to estimate the amount of ammonia that passes through the Wet Gas Scrubber and is released to the atmosphere through the stack.

Basis

The ammonia flow to the ESNCR system will be automatically controlled either by an algorithm that estimates the amount of NOx in the CO Boiler, or by feedback control from an ammonia slip analyzer that is located between the CO Boiler and the Wet Gas Scrubber. In either case, the amount of ammonia slip will be measured and used to limit the amount of un-reacted ammonia that exits the boiler.

A portion of the ammonia vapor that exits the CO Boiler is captured by the Wet Gas Scrubber. It is assumed that this portion will be a function of the degree of contact in the scrubber and will remain relatively constant. The portion of the ammonia captured by the scrubber was calculated using data from a January 2011 stack test, and was found to be about 35%.

Estimate of Ammonia Emissions

The amount of ammonia slip from the CO Boiler is to be continuously measured by AE-7340, which is a tunable diode laser analyzer located on the duct between the boiler and the scrubber. If we assume that the correction factor to correct to 0% O2 remains fairly constant, then the expected ammonia emissions from the wet gas scrubber stack can be calculated from the slip value and the capture efficiency in the scrubber. A maximum ammonia slip of approximately 13.6 ppmv (wet) corresponds to ammonia emissions from the wet gas scrubber of 8.8 ppmvd. When this is corrected to 0% O2, it corresponds to 10 ppmvd out the stack and to the atmosphere.

Corrective Actions

Process control alarms will be set to alert the operator that the maximum ammonia slip value is being approached or exceeded. The operator will act to reduce the flow of ammonia to the ESNCR system in order to lower the ammonia slip value to an acceptable level.