



west virginia department of environmental protection

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**ENGINEERING EVALUATION / FACT SHEET**

BACKGROUND INFORMATION

Application No.: R13-2334W  
Plant ID No.: 029-00008  
Applicant: Ergon - West Virginia, Inc.  
Facility Name: Newell Facility  
Location: Newell, Hancock County  
NAICS Code: 324110  
Application Type: Modification  
Received Date: June 30, 2014  
Engineer Assigned: Laura Jennings  
Fee Amount: \$1,000.00  
Date Received: July 15, 2014  
Complete Date: September 22, 2014  
Due Date: December 21, 2014  
Applicant Ad Date: July 2, 2014  
Newspaper: *The Weirton Daily Times*  
UTM's: Easting: 531.0 km      Northing: 4,495.1 km      Zone: 17  
Description: EWVI plans to install an Ammonia Destruction Unit (ADU). This project includes two (2) small columns, seven (7) pumps, one (1) thermal oxidizer (TO), one (1) air cooler, and one (1) electric heater. Application also addresses correction to the CO, NO<sub>x</sub>, PM/PM<sub>10</sub>/PM<sub>2.5</sub>, and SO<sub>2</sub> emissions from OXIDIZER and MLDOX.

DESCRIPTION OF PROCESS

Summary:

The project will require the addition of two (2) small columns, seven (7) pumps, one (1) thermal oxidizer, one (1) air cooler, and one (1) electric heater. The first of the two columns, the Caustic Scrubber, will receive the Sour Water Stripper (SWS) gas stream containing hydrogen sulfide and ammonia. The Caustic Scrubber will remove the hydrogen sulfide from the stream. The overhead from this column is sent to the combustor, and the partially reacted caustic slip stream is sent to the second column, the Ammonia Stripper. The Ammonia Stripper will remove the ammonia from the stream and

send it to the strong section of the H<sub>2</sub>S Scrubber. The light ends of the stream are also routed to the thermal oxidizer (TO). The TO is manufactured by Process Combustion Corporation (PCC) and is designed to destroy ammonia while keeping NO<sub>x</sub> emissions low. The spent caustic stream from the Ammonia Stripper, are routed to the existing tanks TK-820 and TK-821.

The previously submitted calculations for the criteria pollutants CO, NO<sub>x</sub>, PM/PM<sub>10</sub>/PM<sub>2.5</sub>, and SO<sub>2</sub> of OXIDIZER and MLDOX contained an error in the calculation of the loading factor. The destruction efficiency that is claimed for VOCs was inadvertently including in the loading factor for the other criteria pollutants. Revised calculations are provided in the application.

**Description:**

The construction of the Ammonia Destruction Unit project will require the installation of two (2) small columns, seven (7) pumps, one (1) thermal oxidizer, one (1) air cooler, and one (1) electric heater.

The Sour Water Stripper (SWS) gas will be fed to the first of the newly constructed columns, the Caustic Scrubber. The Caustic Scrubber will remove most of the Hydrogen Sulfide (H<sub>2</sub>S) from the stream. The liquid bottoms from the Caustic Scrubber are pumped to the top of the weak caustic section and re-circulated, while a small slip stream is routed to the second of the newly constructed columns, the Ammonia Stripper.

The Ammonia Stripper combines the caustic slip stream with a stream of stripping stream, which will remove the ammonia from the caustic stream. The gas overhead stream that exits the Ammonia Stripper is sent to the strong section of the H<sub>2</sub>S Scrubber. The liquid bottoms from the Ammonia Stripper are sent to tank-820 or TK-821. The gas stream exiting the top of the H<sub>2</sub>S Scrubber is routed to the thermal oxidizer NH<sub>3</sub>OX.

The stream combusted by NH<sub>3</sub>OX is defined below:

Design	
Total flow rate, ft <sup>3</sup> /hr	2,622
Temp °F	211
Pressure, psig	4.5
Waste Composition %V	
Water	42.03%
Hydrogen	7.18%
Ammonia	22.10%
Methane	3.07%

Ethane	2.21%
Propane	6.89%
Butane	9.27%
Pentane	5.32%
Hexane	1.93%

The emission units and control devices that are part of this permit application review are included in the emission units table below.

**Table 1 - Emission Units Table:**

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type and Date of Change	Control Device
ADU	NH3OX	Ammonia Destruction Unit	Install 2014	N/A	Install 2014	00A-05
00A-05	NH3OX	Ammonia Destruction Thermal Oxidizer	Install 2014	6.6 MMBtu/hr	Install 2014	N/A
ADUFUG	ADUFUG	Ammonia Destruction Unit Fugitives	Install 2014	N/A	Install 2014	N/A

## SITE INSPECTION

WVDAQ is familiar with the Ergon, WV, Newell facility located in Hancock County, WV. The last full on-site inspection was conducted by Michael Wade of DAQ's Compliance and Enforcement Section on July 25, 2014. There is an open violation associated with the inspection however it is not related to this modification permit application.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

### NH3OX:

The waste composition is based on vendor models. The heating values are the HHV taken from the Hydrogen Analysis Resource Center: Lower and Higher Heating Values of Hydrogen and Fuels. PM<sub>2.5</sub> and PM<sub>10</sub> are 100% of Total PM emissions, from CEIDARS PM<sub>2.5</sub> Emission Factor Table.

Emission Factors for NO<sub>x</sub> and VOC are manufacturer's guarantees. The CO emission factor is from TCEQ RG-109 Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers and PM and SO<sub>2</sub> are from EPA AP-42, Chapter 1.4 Natural Gas Combustion. CO<sub>2</sub>e emission factors are from 40 CFR98, Subpart C Tables C-1 and C-2 for natural gas, converted to lb/MMBtu from kg/MMBtu. The Global Warming Potentials

are from 40 CFR 98, Subpart A, Table A-1.

Consistent with the other permit emission limits in this section, the monthly emission limit is 10% of the annual emission limit.

**ADUFUG:**

The EPA correlation approach was used to calculate the fugitive emissions of the Ammonia Destruction Unit (ADU) VOC Components, using a 3% leak rate and the component count provided in the fugitive emissions table, Table 3.

**MLDOX and OXIDIZER:**

An error was found in the MLDOX and OXIDIZER emissions that were submitted with an earlier permit revision and the corrected emissions were provided with this application. No physical changes were made to the emission points and there were no changes to the established throughput for either of the units.

The loading factor used to calculate the total product combustion of the waste gas stream, was based upon the controlled factor used to calculate the VOC emissions for MLDOX and OXIDIZER. The revised, uncontrolled loading factor is used in the revised calculation and is used to calculate the total MMBtu's combusted in MLDOX per year. The total MMBtu's per year combusted are used to calculate NOX, CO, PM, PM<sub>10</sub>, and PM<sub>2.5</sub> emissions. The revised potential to emit emissions for MLDOX and OXIDIZER are provided in Tables 4 and 5. There will be no change to the VOC emission limits in the permit because the emission limits are based on all loading activity at the Marine Terminal and the Tank Truck Loading Area and not just the emissions routed through OXIDIZER and MLDOX.

**Table 2 - Emissions Summary Table:**

Emission Point ID	Emission Unit ID	Source	Regulated Pollutant	Maximum Potential Uncontrolled Emissions		Maximum Potential Controlled Emissions	
				lb/hr	tpy	lb/hr	tpy
NH3OX	OOA-05	Ammonia Recovery System	CO	n/a	n/a	1.82	7.96
			NOX			0.11	0.50
			PM/ PM10/ PM2.5			0.05	0.22
			SO2			0.01	0.02
			VOC			0.23	1.00
			CO2e			778.16	3,408.33
ADUFUG	ADUFUG	Component Leaks	VOC	0.07	0.29	n/a	n/a

**Table 3 - Fugitive Emissions Component Count Table:**

	Valves		Pumps		Connectors		Other	
	Total	Leaks	Total	Leaks	Total	Leaks	Total	Leaks
3% Leak Rate	31	1	1	0	93	3	0	0

**Table 4 - MLDOX REVISED EMISSIONS:**

Regulated Pollutant	Revised Emissions	Emission Limits Permit R13-2334V	Change in Emissions
	tpy	tpy	tpy
CO	2.63	1.38	1.25
NOX	0.48	0.25	0.23
PM/ PM10/ PM2.5	0.05	0.03	0.02
SO2	1.64	0.72	0.92
VOC	6.18	n/a*	n/a
CO2e	838.47	n/a	440.14

\* includes controlled and uncontrolled VOC emissions

**Table 5 - OXIDIZER REVISED EMISSIONS:**

Regulated Pollutant	Revised Emissions	Emission Limits Permit R13-2334V	Change in Emissions
	tpy	tpy	tpy
CO	1.98	0.48	1.50
NOX	0.36	0.09	0.27
PM/ PM10/ PM2.5	0.04	0.01	0.03
SO2	1.16	0.05	1.11
VOC	11.59	n/a*	n/a
CO2e	630.79	n/a	39.57

\* includes controlled and uncontrolled VOC emissions

## REGULATORY APPLICABILITY

The state and federal regulations listed below were reviewed in association with this permit application.

### STATE REGULATIONS:

#### 45CSR6 CONTROL OF AIR POLLUTION FROM COMBUSTION OF REFUSE

The NH3OX Thermal Oxidizer is subject to this rule. Compliance with the requirements will be demonstrated with compliance to permit requirements. NH3OX will be added to permit condition 5.1.6 that includes the PM emissions of 6.4.1, the opacity requirements of 6.4.3 and the design and operation requirements of 6.4.6.

The PM limit required by 45CSR6-4.1 is 1.13 lb/hr. The PM potential emissions provided with this application is 0.05 lb/hr which is well below this limit, indicating compliance.

#### 45CSR10 TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES

The NH3OX Thermal Oxidizer is subject to section 4.1 of this rule. Compliance with the requirements will be demonstrated with compliance to permit requirement 5.1.7. Fuel burning units having a design heat input under 10 MMBtu/hr are exempt from section 3 and sections 6 - 8 of this rule. NH3OX has a design heat input of 6.6 MMBtu/hr.

#### 45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

The applicant has demonstrated compliance by submitting a complete permit application, placing a Class I legal notice in *The Weirton Daily Times* on July 2, 2014, and paid the \$1,000 modification permit fee.

#### 45CSR14 PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES OF AIR POLLUTION FOR THE PREVENTION OF SIGNIFICANT DETERIORATION

The EWVI Refinery is located in an area that is designated as an attainment area for all criteria pollutants. Hancock County was redesignated to attainment status for PM<sub>2.5</sub> in April 2014.

EWVI is a major source of criteria pollutants for the purposes of New Source Review (NSR). The proposed construction of the Ammonia Destruction Unit does not meet the definition of a major modification and therefore is not subject to 45CSR14.

Step 1 Significance Determination

The ammonia unit destruction unit [NH3OX and ADUFUG] are new sources. The MLDOX and OXIDIZER are existing units.

**Project Increases (Emission Point ID's):**

Criteria Pollutant	Potential Emissions (tpy)					Significant Threshold
	NH3OX	ADUFUG	MLDOX	OXIDIZER	Total	
NO <sub>x</sub>	0.50	n/a	0.23	0.27	1.00	40
CO	7.96	n/a	1.25	1.50	10.71	100
SO <sub>2</sub>	0.02	n/a	0.92	1.11	2.25	40
VOC	1.00	0.34	0	0	1.34	40
PM	0.22	n/a	0.02	0.03	0.27	25
PM <sub>10</sub>	0.22	n/a	0.02	0.03	0.27	15
PM <sub>2.5</sub>	0.22	n/a	0.02	0.03	0.27	10

\* On June 23, 2014, the United States Supreme Court issued a decision addressing the application of stationary source permitting requirements to greenhouse gases. In very brief summary, the Supreme Court said that EPA may not treat GHG as an air pollutant for the purposes of determining whether a source is a major source required to obtain a PSD or Title V permit.

The revised emission calculations for MLDOX and OXIDIZER that EWVI provided in the application to correct an error that was found in previously submitted calculations was reviewed against the previous PSD determination associated with those emission units. The correction of the emissions do not change the result of the last PSD applicability analysis that was conducted during permit revision R13-2334T.

**45CSR30 REQUIREMENTS FOR OPERATING PERMITS**

EWVI is currently subject to Title V permitting. The application that was submitted to modify the R13-2334W permit was a joint application to also update their current Title V permit 029-00008-2010.

**FEDERAL REGULATIONS:**

NSPS,  
Subpart Ja      STANDARDS OF PERFORMANCE FOR PETROLEUM REFINERIES FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR MODIFICATION COMMENCED AFTER MAY 14, 2007

NH3OX is a thermal oxidizer and is not subject to this rule.

On August 27, 2013, EPA provided a letter of clarification guidance to the American Petroleum Institute (API) regarding NSPS, Subpart Ja in response to a letter dated 11/30/2012 from API to the EPA on a number of issues.

One of the questions identified as API Question F1 asks “are thermal oxidizers and other enclosed flame combustion devices now considered flares?”

EPA’s response to F1 states that changes to the definition of a “flare” were not intended to include thermal oxidizers, process heaters, or other truly enclosed combustion devices within the definition of a “flare”, but were instead intended to include “enclosed” or shrouded flares within the definition.....the revised definition clearly distinguishes the types of combustion devices that are considered to be “flares” and clearly excludes thermal incinerators, process heater, or other devices that have completely enclosed combustion chambers.

NSPS,  
Subpart VVa

STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOC IN THE SYNTHETIC ORGANIC CHEMICALS MANUFACTURING INDUSTRY FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR MODIFICATION COMMENCED AFTER NOVEMBER 7, 2006

It has previously been determined that EWVI is subject to NSPS, Subpart VVa. The Ammonia Destruction Unit [ADU] will adhere to the applicable provisions of NSPS, Subpart VVa regarding leak detection and repair (LDAR) of VOC fugitive emissions and will demonstrate compliance by demonstrating compliance with the permit requirements that have previously been established for the facility.

#### TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There are no new non-criteria regulated pollutants associated with this permit application.

#### AIR QUALITY IMPACT ANALYSIS

The proposed project does not meet the definition of a major modification according to the definitions in 45CSR14 and 45CSR19; therefore, modeling is not required for this permit application.

## MONITORING OF OPERATIONS

- Visible emissions of PM emissions from NH3OX will be monitored per Method 9.
- As proposed in the application, Ergon will use a CPMS capable of measuring temperature in the firebox or immediately downstream of the firebox of NH3OX.
- Consistent with the other thermal oxidizers at the facility and information provided in the permit application, NH3OX will meet the monitoring, performance testing, recordkeeping, and reporting requirements of NSPS, Subpart A.
- Fuel gas usage/flow (scf/hr) and hours of operation for pilot and non-pilot conditions of the NH3OX shall be monitored monthly.
- The Ammonia Destruction Unit [ADU] will be subject to the LDAR monitoring, testing, recordkeeping, and reporting requirements of NSPS, Subpart VVa.

## CHANGES TO PERMIT R13-2334V

- Miscellaneous changes to address current permit version
- Updated Table of Contents
- 1.0 - Updated the Emission Units table as shown in the Emission Unit Table of this evaluation
- 5.0 - Updated the title to add NH3OX
- 5.1 - Added emission limits for NH3OX and updated the CO, NO<sub>x</sub>, PM/ PM<sub>10</sub>/ PM<sub>2.5</sub>, and SO<sub>2</sub> emission limits for MLDOX and OXIDIZER as described in the emissions section of this evaluation
- Combined the requirements of 5.1.4 and 5.1.5 into 5.1.4 Marine Loading.
- 5.1.5 (new) - Added requirements for the Ammonia Destruction Unit to route the emissions to NH3OX at all times when operational and to operate NH3OX within the operating parameters established during testing and to maintain to achieve the minimum control efficiency of 99.9% for VOCs.
- 5.1.6 - Added NH3OX as discussed in the regulatory section of this evaluation
- 5.2.2 and 5.2.4 - updated to include NH3OX
- 5.3.2 - updated to include NH3OX
- 5.4.4 - updated to include NH3OX
- 5.5.3 - updated to include NH3OX
- 6.0 - Updated the title to add the Ammonia Destruction Unit [ ADU]
- 6.1.4 - updated to include ADUFUG

RECOMMENDATION TO DIRECTOR

Based on the information provided in the application including all supplemental information provided, Ergon - West Virginia, Inc. will be in compliance with all applicable state and federal air quality regulations if they demonstrate compliance with the permit requirements. It is therefore the recommendation of the writer that permit modification R13-2334W be granted to Ergon, Newell Facility located in Hancock County, WV.

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Laura M. Jennings  
Permit Engineer

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Date