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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3391
Plant ID No.:	051-00251
Applicant:	ECC Windsor Inc.
Facility Name:	Bailey 18H-1
Location:	Marshall County
SIC/NAICS Code:	1241/213113
Application Type:	Construction
Received Date:	November 22, 2017
Engineer Assigned:	Joe Kessler
Fee Amount:	$1,000
Date Received:	November 27, 2017
Complete Date:	January 18, 2017
Due Date:	March 20, 2017
Applicant Ad Date:	November 24, 2017
Newspaper:	*Wheeling News Register*
UTM's:	539.4106 km Easting • 4,413.4237 km Northing • Zone 17
Latitude/Longitude:	39.869941/-80.539174
Description:	Construction of a non-assisted John Zink ZTOF 1,000 ft^3/minute (scfm) coal mine-methane utility enclosed flare at Consol Energy's Bailey Mine.

DESCRIPTION OF PROCESS

ECC Windsor Inc. (ECCW) has submitted a permit application for the construction of a non-assisted John Zink ZTOF 1,000 scfm coal mine-methane utility enclosed flare to be located approximately 3.34 miles north-northeast of Cameron, Marshall County, WV just south of WV State Route 891. Methane gas will be provided to the enclosed flare from Consol Energy's active Bailey Mine. The enclosed flare will utilize a 0.057 mmBtu/hr pilot light and will be designed to operate 8,760 hours per year. ECCW plans to sell carbon credits (gained by destroying methane, designated as a greenhouse gas) generated at the site into the California carbon trading market (as managed by the California Air Resources Board).

As noted above, the flare will be enclosed to promote complete combustion of the methane (the enclosed flare will also mitigate any light pollution from the unit). ECCW conservatively estimates a minimum 98% methane destruction and removal efficiency (DRE). However, it is expected that the unit will achieve a higher DRE in practice. The unit will utilize an automatic re-ignition sequence upon loss of flame (as detected using an ultra-violet or infrared monitor) while vapors are being vented to it. Upon loss of flame, the main valve will close, isolating the flow of waste mine gas to the main burner. The pilot valve will also close to completely isolate the flow of gas to the combustion chamber. If the appropriate "start" conditions are detected, the start sequence will re-initiate by first opening the pilot valve and re-lighting the pilot burner, then slowly opening the main valve to re-establish the main burner flame.

The life-span of the flaring operation at this site will depend on the methane concentrations provided to the flare from a sealed off portion of an area behind on-going longwall mining operations. ECCW expects other, similar, projects to be applied for in the area in the future based on the nature and speed of the mining operations. It is possible that ECCW will wish to relocate this unit in the future.

ECCW has proposed to construct three (3) coal mine-methane utility enclosed flares at the Bailey Mine. The first was granted a permit (Bailey 1, R13-3353) on March 9, 2017 and lies approximately 0.40 miles south of the proposed flare evaluated herein. The second was applied for simultaneously (R13-3392) with the Bailey 18H-1 application and lies approximately one (1) mile to the southeast. These proposed flares are considered separate sources as they are not considered adjacent; i.e., located on property contiguously owned or leased by ECCW.

SITE INSPECTION

Due to workload constraints and the nature of the proposed facility, the writer did not perform a site inspection for the permitting action evaluated herein. However, on January 31, 2017, the writer conducted an inspection of the proposed location of the Bailey-1 flare. From that inspection and the use of mapping software, the following observations can made:

- The proposed facility will be in a very rural area approximately 3.34 miles north-northeast of Cameron, Marshall County, WV just south of WV State Route 891. The area is hilly and rural in nature with scattered homes and farms within the vicinity of the proposed location. Cameron High School is located approximately 1.72 miles southwest of the proposed site; and

- The occupied dwelling located nearest to the proposed site is approximately 250 yards north of the proposed flare. This home, however, is the landowner who is leasing the land to ECCW for installation of the flare. Another house is located approximately 350 yards west of the proposed site of the flare. In this instance, it appears as if the topography and existing tree line will mitigate the visibility of the flare from the west.

The following satellite view is taken from Google Earth and shows the proposed site of the flare:

Directions: [Latitude: 39.869941, Longitude: -80.539174] From the junction of WV State Route (SR) 2 and US 250, take US 250 South (Waynesburg Pike) for approximately 16.3 miles and turn left onto WV SR 891 East for approximately 0.9 miles. The access road will then be on your right (may appear as a gravel residential driveway.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

ECCW included in Attachment N of the permit application an emission estimate for CO and NO_x from the proposed flaring of coal mine-methane gas. Emissions of CO and NO_x were based on a maximum expected gas flow rate of 18,000 ft^3/hour and 157.68 $mmft^3$/year (at 8,760 hours/year) with an average gas heat content of 1,012 Btu/ft^3 (for a maximum design heat input of 18.22 mmBtu/hr). CO and NO_x emission factors were based on vendor data. ECCW did not provide an

emission estimate for particulate matter, SO_2, or VOCs. As there are no significant sulfur compounds expected in the mine gas (and the emissions of SO_2 only occur as a result of sulfur compounds in the combusted gas), and the flare is designed to be smokeless, emissions of particulate matter and SO_2 are expected to be negligible. However, as there may be some trace amounts of VOCs in the vented coal mine gas, emissions of VOCs were included and based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4. (AP-42 is a database of emission factors maintained by USEPA). Pilot light emissions were considered negligible. The following table details the calculated emissions from the proposed enclosed flare:

Table 1: John Zink ZTOF Enclosed Flare PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	0.20 lb/mmBtu	Vendor Data	3.64	15.96
NO_X	0.15 lb/mmBtu	Vendor Data	2.73	11.97
VOCs	5.5 lb/mmft^3	AP-41, Table 1.4-2	0.10	0.43

REGULATORY APPLICABILITY

This section will address the potential regulatory applicability/non-applicability of substantive state and federal air quality rules relevant to the Bailey 18H-1 Mine Gas Flaring Project.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

ECCW has proposed use of a enclosed flare for combusting coal mine methane to generate carbon credits. This enclosed flare will meet the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the unit is discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

Incinerator Capacity	Factor F
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

Based on the maximum capacity of the proposed enclosed flare of 1,000 scfm (60,000 ft^3/hour), and using the density of methane (0.0422 lb/scf), the capacity of the enclosed flare in lbs/hr would

be approximately 2,532 lbs/hour (1.27 tons/hr). Using this value in the above equation produces a PM emission limit of 6.87 lb/hr. When operating correctly, there is expected to be only trace amounts of particulate matter from the enclosed flare and, therefore, the enclosed flare shall easily meet this limit.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the enclosed flare has a 20% limit on opacity during operation. As a primary constituent in the vapors combusted in the unit shall be clean burning methane, particulate matter emissions from the unit is expected to be nominal. Therefore, the unit should easily meet this requirement.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The proposed construction of the Bailey 18H-1 Mine Gas Flaring Project does not have the potential to increase the emissions of a regulated pollutant in excess of the thresholds that would, pursuant to §45-13-2.24, define the facility as a "stationary source" under 45CSR13 (see Table 1 above). However, under Section 2.24 of 45CSR13, included in the definition of a "stationary source" is any facility that "is subject to any substantive requirement of an emission control rule promulgated by the Secretary." In the case of the proposed Bailey 18H-1 Mine Gas Flaring Project , it does trigger a substantive requirement of 45CSR6 and, therefore, is defined as a stationary source. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, ECCW is required to obtain a permit under 45CSR13 for the construction of the proposed Bailey 18H-1 Mine Gas Flaring Project.

As required under §45-13-8.3 ("Notice Level A"), ECCW placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on November 24, 2017 in the *Wheeling News Register* and verification that is legal advertisement ran was provided on with the permit application.

45CSR14 (NON APPLICABILITY)

The facility-wide PTE of the Bailey 18H-1 Mine Gas Flaring Project (see Table 1 above) is far below the levels that would define the source as "major" under 45CSR14 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

45CSR30: Requirements for Operating Permits - (NON APPLICABILITY)

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The facility does not meet the definition of a "major source under § 112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. Therefore, the Bailey Mine Gas Flaring Project is not subject to 45CSR30.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Bailey 18H-1 Mine Gas Flaring Project and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM_{10} and $PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The Bailey 18H-1 Mine Gas Flaring Project will not produce any substantive amount of non-criteria regulated pollutants.

AIR QUALITY IMPACT ANALYSIS

The proposed construction does not meet the definition of a "major stationary source" pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required. Additionally, based on the nature of the construction , modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

The following substantive monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR) shall be required:

- To demonstrate compliance with flow and heat input limits given under 4.1.2(a) of the draft permit, the permittee shall be required to install instrumentation to monitor and record, at a minimum of fifteen (15) minute intervals, the flow of vapors sent to the flare;

- Pilot flame compliance demonstration, monitoring and record-keeping is extensive and shall be required as given under 4.2.1(b) through (e) of the draft permit and may be reviewed there; and

- Recording and reporting for visible emissions testing shall be required as given under 4.4.4. and 4.5.1 of the draft permit and may be reviewed there.

PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- Visible emissions testing to show compliance with 45CSR6 shall be required initially within 180 days of start-up and thereafter at a minimum of at least once per each period of 12 months. Additionally, a visible emission check shall be conducted each time the enclosed flare is manually started. Specific visible emissions testing requirements shall be as given under 4.3.1. of the draft permit and may be reviewed there.

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-3391 indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-3391 to ECC Windsor Inc. for the construction and operation of the Bailey 18H-1 Mine Gas Flaring Project located near Cameron, Marshall County, WV.

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Joe Kessler, PE
Engineer

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Date