Notice of Construction (NOC) Worksheet

pscleanair.org
Puget Sound Clean Air Agency

Applicant: Cadman Materials	**NOC Number**: 11665
Project Location: 17 E Marine View Dr, Everett, WA	**Registration Number**: 30196
Applicant Name and Phone: Christy McDonough, (425) 961-7325	**NAICS:** 562910
Engineer: Courtney O'Gorman	**Inspector**: Tom Hudson

A. DESCRIPTION

For the Order of Approval:
One thermal desorption unit (60 TPH) consisting of a rotary dryer (60 TPH) heated by a Honeywell (Hauck) KD-LE 10 burner (22 MMBtu/hr), controlled by a baghouse rated at 42,000 cfm and a Honeywell (Hauck) KD-LE 10 afterburner (22 MMBtu/hr).

Additional Information:

Proposed Equipment/Activities:

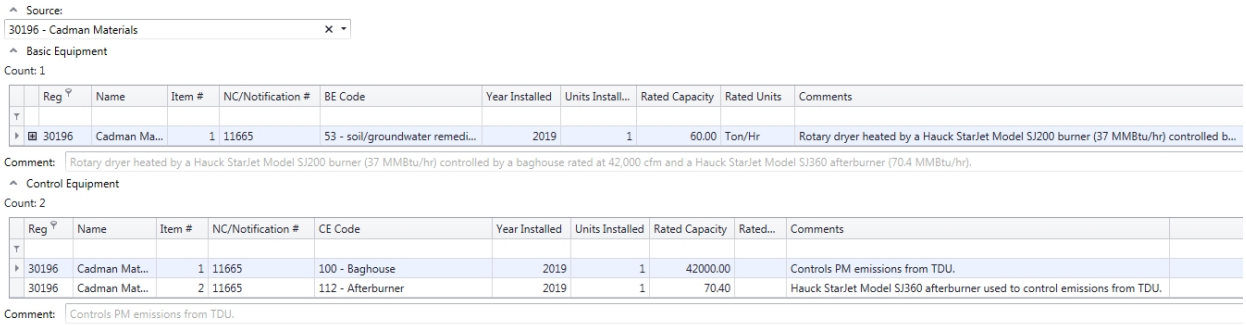
Cadman Materials is proposing to relocate a thermal desorption unit (TDU) and associated baghouse and afterburner from its existing location at 6300 Glenwood Avenue, Everett, WA (Glenwood Facility) to a new site located at 17 E Marine View Drive, Everett, WA (project site). Cadman is not proposing to relocate any other operations or equipment from the Glenwood Facility to the project site.

The TDU currently consists of a 60 ton per hour rotary drum dryer heated by a 37 MMBtu/hr Hauck StarJet Model SJ200 burner. Cadman is proposing to replace the Starjet Model SJ200 burner with a Hauck KD-LE 10 low NO_x burner (22 MMBtu/hr). This modification will not change the soil processing capacity of the TDU. The TDU will process contaminated soil from a variety of locations that contains a mixture of gasoline, diesel, and heavy oil. Trucks will deliver the contaminated soil to the project site and unload it onto a flat, paved surface covered by a roof. The contaminated soil will be sifted using a screener to prevent large pieces of soil from entering the rotary drum and will then be transferred to the rotary drum dryer feeder via loaders. Remediated soil will exit the rotary drum dryer onto a conveyor, which will load the soil into trucks that will transport the soil to onsite piles.

Permit History:

The TDU was originally permitted at the Glenwood Facility under Order No. 8408. There are no existing Orders for the proposed project site.

B. DATABASE INFORMATION



Source:
30196 - Cadman Materials
Basic Equipment
Count: 1

Reg	Name	Item #	NC/Notification #	BE Code	Year Installed	Units Install...	Rated Capacity	Rated Units	Comments
30196	Cadman Ma...	1	11665	53 - soil/groundwater remedi...	2019	1	60.00	Ton/Hr	Rotary dryer heated by a Hauck StarJet Model SJ200 burner (37 MMBtu/hr) controlled b...

Comment: Rotary dryer heated by a Hauck StarJet Model SJ200 burner (37 MMBtu/hr) controlled by a baghouse rated at 42,000 cfm and a Hauck StarJet Model SJ360 afterburner (70.4 MMBtu/hr).

Control Equipment
Count: 2

Reg	Name	Item #	NC/Notification #	CE Code	Year Installed	Units Installed	Rated Capacity	Rated...	Comments
30196	Cadman Mat...	1	11665	100 - Baghouse	2019	1	42000.00		Controls PM emissions from TDU.
30196	Cadman Mat...	2	11665	112 - Afterburner	2019	1	70.40		Hauck StarJet Model SJ360 afterburner used to control emissions from TDU.

Comment: Controls PM emissions from TDU.

New NSPS due to this NOCOA?	**No**	**Applicable NSPS: None**	**Delegated? N/A**
New NESHAP due to this NOCOA?	**No**	**Applicable NESHAP: None**	**Delegated? N/A**
New Synthetic Minor due to this NOCOA?	**No**		

C. NOC FEES AND ANNUAL REGISTRATION FEES

NOC Fees:

Fees have been assessed in accordance with the fee schedule in Regulation I, Section 6.04. All fees must be paid prior to issuance of the final Order of Approval.

Fee Description	Cost	Amount Received (Date)
Filing Fee	$ 1,150	
Thermal Desorption Unit	$ 5,000	
Refined Dispersion Modeling Analysis Review	$ 1,000	
Public Notice	$ 700 (plus publication costs to be invoiced later)	
Filing received		$ 1,150 (9/4/2018)
Additional fee received		$ 6,700 (1/11/2019)
Total Remaining	**$ 0***	

*Publications costs still need to be invoiced

Registration Fees:
Registration fees are assessed to the facility on an annual basis. Fees are assessed in accordance with Regulation I, Section 5.07.

Applicability		
Regulation I	**Description**	**Note**
5.03(a)(5)(B)	Facilities with gas or odor control equipment (≥200 cfm)	
5.03(a)(6)(A)	Facilities with particulate control equipment (≥2,000 cfm)	
Annual Registration Fee		
Regulation I	Description	Fee
5.07(c)	Base Fee for Registered Sources	$ 1,150
	Total =	$ 1,150

D. STATE ENVIRONMENTAL POLICY ACT (SEPA) REVIEW

State Environmental Policy Act (SEPA) review was conducted in accordance with Regulation I, Article 2. The SEPA review is undertaken to identify and help government decision-makers, applicants, and the public to understand how a project will affect the environment. A review under SEPA is required for projects that are not categorically exempt in WAC 197-11-800 through WAC 197-11-890. A new source review action which requires a NOC application submittal to the Agency is not categorically exempt.

The City of Everett is the SEPA lead agency for this project. The City of Everett published a proposed DNS for the project and held a public comment period from January 7 to January 22, 2019. No comments were received related to air impacts. A copy of the final DNS (issued on February 5, 2019) is included in the NOC file and is provided below.

Final DNS Cadman Delta SEPA18-017.pdf

E. BEST AVAILABLE CONTROL TECHNOLOGY (BACT) REVIEW

Best Available Control Technology (BACT)

New stationary sources of air pollution are required to use BACT to control all pollutants not previously emitted, or those for which emissions would increase as a result of the new source or modification. BACT is defined in WAC 173-400-030 as, "an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under Chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each pollutant."

An emissions standard or emissions limitation means "a requirement established under the Federal Clean Air Act or Chapter 70.94 RCW which limits the quantity, rate, or concentration of emissions of air contaminants on a continuous basis, including any requirement relating to the operation or

maintenance of a source to assure continuous emission reduction and any design, equipment, work practice, or operational standard adopted under the Federal Clean Air Act or Chapter 70.94 RCW."

Best Available Control Technology for Toxics (tBACT)

New or modified sources are required to use tBACT for emissions control for TAP. Best available control technology for toxics (tBACT) is defined in WAC 173-460-020 as, "the term defined in WAC 173-400-030, as applied to TAP."

Thermal Desorption Unit

Similar Permits and Other Regulatory Agencies BACT for Soil Thermal Desorption Units (PM, Visible Emissions, NO_X, CO, VOC, Organic HAP/TAP):

Origin	Emissions Limitation	Operational and Design Limitation
SJVPACD BACT Guideline 2.1.7 (8/24/98)	▪ None	**$PM_{2.5}$, PM_{10}, TSP, Visible Emissions:** ▪ Fabric filter serving desorber exhaust with a control efficiency of 99% **NO_x, PM, Visible Emissions:** ▪ Low NO_x burner and natural gas/LPG firing **VOC, Organic HAP/TAP, Visible Emissions:** ▪ Thermal or catalytic oxidation (95% control efficiency)
SJVAPCD Authority to Construct S-1134795 (6/9/14)	**$PM_{2.5}$, PM_{10}, TSP:** ▪ PM_{10} emissions shall not exceed 0.004 grains per dry standard cubic foot **Visible Emissions:** ▪ Opacity from the exhaust stack shall not exceed 5% for more than 3 minutes in any hour. **NO_x:** ▪ NO_x concentration shall not exceed 4.3 ppmv corrected to 19% O_2 dry basis **CO:** ▪ CO concentration shall not exceed 42 ppmv corrected to 19% O_2 dry basis **VOC, Organic HAP/TAP:** ▪ Either the VOC control efficiency shall not be less than 95% or total VOC shall not exceed 2 pounds in any one day. ▪ VOC emissions shall not exceed 0.60 lb/ton soil processed.	**$PM_{2.5}$, PM_{10}, TSP, Visible Emissions:** ▪ Baghouse serving TDU exhaust with a control efficiency of 99% **NO_x, PM, Visible Emissions:** ▪ Low NO_x burner and natural gas/LPG firing **VOC, Organic HAP/TAP, Visible Emissions:** ▪ Afterburner with a minimum operating temperature of 1,400 degrees Fahrenheit when soil is present in TDU

Origin	Emissions Limitation	Operational and Design Limitation
CT Department of Energy and Environmental Protection – Permit No. 146-0042	**$PM_{2.5}$, PM_{10}, TSP:** ▪ PM emissions shall not exceed 0.04 gr/dscf (corrected to 7% O_2) **Visible Emissions:** ▪ Opacity shall not exceed 10% during any six minute block average **CO:** ▪ CO concentration shall not exceed 100 ppmvd (corrected to 7% O_2) when O_2 concentration is ≤ 14% (1-hour average). ▪ CO concentration shall not exceed 50 ppmvd (uncorrected for O_2) when O_2 concentration is greater than 14% (1-hour average).	**VOC, Organic HAP/TAP, Visible Emissions:** ▪ Secondary treatment unit with a minimum operating temperature of 1,500 degrees Fahrenheit **$PM_{2.5}$, PM_{10}, TSP, Visible Emissions:** ▪ Baghouse with a control efficiency of 99% **SO_x:** ▪ Wet scrubber with mist eliminator
PSCAA (No. 10707)	**$PM_{2.5}$, PM_{10}, TSP:** ▪ PM emissions shall not exceed 0.02 grains per dry standard cubic foot **Visible Emissions:** ▪ Opacity from the exhaust stack shall not exceed 10% for more than 3 minutes in any hour. **NO_x:** ▪ NO_x concentration shall not exceed 43.0 ppmv corrected to 14% O_2 dry basis **CO:** ▪ CO concentration shall not exceed 18 ppmv corrected to 14% O_2 dry basis **VOC, Organic HAP/TAP:** ▪ VOC emissions shall not exceed 0.020 lb/ton soil processed	**VOC, Organic HAP/TAP, Visible Emissions:** ▪ Afterburner with a minimum operating temperature of 1,400 degrees Fahrenheit when soil is present in TDU **$PM_{2.5}$, PM_{10}, TSP, Visible Emissions:** ▪ Baghouse serving TDU exhaust

Analysis:

Within the Agency's jurisdiction, there have been no Orders of Approval for plants treating contaminated soil using thermal desorption issued in the last four years. The Agency has issued one Order of Approval for this type of process since 2001 (Order No. 10707 for Iron Mountain Quarry LLC, issued in February 2015). Prior to 2001, the Agency issued 48 Orders for thermal desorption processing of contaminated soil. The first of these Orders was issued 1989. With the exception of the first (issued May 4, 1989), every thermal desorption unit the Agency reviewed was required to use an afterburner (i.e., thermal oxidizer) or a catalytic oxidizer to reduces emissions of VOC and toxic air pollutants. With the exception of two facilities equipped with wet scrubbers, every thermal desorption unit was required

to have a baghouse to control particulate matter. The vast majority of these Orders also included visible emission limits, particulate matter emission limits, afterburner temperature limits, and limits of concentration of petroleum hydrocarbons in the soil. In Order No. 10707, additional limits were set, including chloride, PCB, and chromium content limits in the soil, and NO_x, VOC, and CO emission limits.

Visible Emissions

SJVAPCD Authority to Construct S-1134795 has a 5% (for no more than 3 minutes in any hour) opacity limit for a TDU. This is more stringent that the opacity limit in Order No. 10707 (10% for no more than 3 minutes in any hour). The opacity limit set in Order No. 10707 was based on the limit historically set by the Agency for TDUs (2001 and earlier), since no permits for TDUs issued by other agencies had been identified at that time. BACT for visible emissions is emissions no greater than 5% opacity for three minutes in an hour per a Washington Department of Ecology (WDOE) Method 9A test.

Particulate Matter

The PM emission limit from Order No. 10707 (the most recent Agency permit issued for a TDU) is 0.02 gr/dscf and does not include an oxygen correction. For asphalt plants, the Agency also historically established a total particulate BACT limit of 0.02 gr/dscf with no oxygen correction. Many asphalt plants use the same type of rotary drum dryer that is used for TDUs. According to EPA 510-B-17-003, "Typically, asphalt plant aggregate dryers are identical to countercurrent rotary desorbers described above and are effective on the same types of contaminants. The primary difference is that an afterburner is not required for incorporation of clean aggregate into the asphalt mix." Iron Mountain Quarry LLC actually uses the same Barber-Greene BE100X209 rotary drum dryer for both thermal desorption and for asphalt production. Order No. 10707 establishes a limit of 0.02 gr/dscf PM for both asphalt production and thermal desorption.

There is some concern that adding dilution air during an emission test could be used to demonstrate compliance with a limit; therefore, the Agency is setting future particulate limits using an oxygen correction factor, as first established in Order No. 11328 (issued January 23, 2018) for a rotary drum dryer at an asphalt plant. For consistency with Agency Regulation I, Section 9.09, the standard for correction chosen is 7% O_2.

The same approach that was used for Order No. 11328 is being used for this analysis. The Agency reviewed thirty-two asphalt plant particulate test results to determine what current BACT for particulate should be. This data was available from the Agency, SWCAA, and Northwest Clean Air Agency (NWCAA). This review is fully documented in the NOC worksheet for Order No. 11328.

Based on this review, the Agency determined that the BACT limit for total particulate is 0.027 gr/dscf corrected to 7% oxygen. The BACT limit for filterable particulate is 0.014 gr/dscf corrected to 7% oxygen.

Carbon Monoxide

Of the CO emission limits listed in the table above, Order No. 10707 is the most stringent: 18 ppmvd corrected to 14% O_2, which is equivalent to 36.3 ppmvd corrected to 7% O_2. This concentration was calculated using the AP-42 Chapter 1.3 emission factor for fuel oil combustion. Due to the uncertainty of AP-42 emission factors, this CO limit is not relied on for this BACT analysis.

SJVAPCD Authority to Construct S-1134795 for a TDU sets a CO limit of 42 ppmv corrected to 19% O_2 (equivalent to 307 ppmv corrected to 7% O_2). CT Department of Energy and Environmental Protection (Permit No. 146-0042) sets two CO limits: 100 ppmvd (corrected to 7% O_2) when flue gas oxygen concentration is less than or equal to 14% and 50 ppmvd (uncorrected for oxygen) when flue gas oxygen concentration is greater than 14%. The 100 ppmvd limit (corrected to 7% O_2) is the most stringent limit established in recent permits issued by other agencies. In the Agency's jurisdiction, there has been one CO source test conducted for a TDU. Iron Mountain Quarry LLC (Reg. 10455) conducted one source test for CO on February 10, 2017. The test resulted in a CO concentration of 11.16 ppmvd, corrected to 14% O_2. This is the equivalent of 22.5 ppmvd corrected to 7% O_2. Based on the source test data from Iron Mountain, it is expected that the TDU proposed by Cadman will be able to comply with a limit of 100 ppmvd limit (corrected to 7% O_2). Therefore, the BACT limit for CO is 100 ppmvd (corrected to 7% O_2).

Nitrogen Oxides

The NO_X limit established for a TDU in SJVAPCD Authority to Construct S-1134795 is 4.3 ppmvd corrected to 19% O_2, which is based on SJVAPCD District Rule 4309, Table 1, for asphalt/concrete plants. This is equivalent to 31.5 ppmvd corrected to 7% O_2, and is very similar to the NO_x limit established in a recent Agency permit for an asphalt dryer (Order No. 11328 – 32.0 ppmvd at 7% O_2). This is more stringent than the limit from Order No. 10707 (43.0 ppmvd at 14% O_2 or 86.6 ppmvd at 7% O_2). CT Department of Energy and Environmental Protection, Permit No. 146-0042, did not establish a NO_x limit.

BACT is defined in WAC 173-400-030 as, "an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under Chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each pollutant." Cadman included a BACT analysis for NO_x in the NOC application. The analysis identified good combustion practices and low-NO_x burners (LNBs) as options for reducing NO_x emissions from the TDU.

In SJVAPCD Authority to Construct S-1134795, BACT for NO_x emissions was determined to be the use of a low NO_x burner fired on natural gas. In addition, the minimum operating temperature for the combustion chamber of the thermal oxidizer is 1,400°F, consistent with the minimum

temperature requirement historically set by PSCAA for TDUs. Since a low-NO_x burner has been used in practice for a TDU, it is technically feasible for Cadman to install low-NO_x burners to reduce NO_x emissions. Cadman is proposing to install low NO_x burners for both the rotary drum dryer and thermal oxidizer that are capable of meeting a NO_x emission limit of 32 ppmvd corrected to 7% O_2, which is consistent with the limit established in SJVAPCD Authority to Construct S-1134795. However, there is concern that the limit established in S-1134795 does not take into consideration the additional NO_x that may be generated from the combustion of VOCs evaporated from the contaminated soil, since the rule that the limit was based on is specifically applicable to asphalt/concrete plants. Therefore, there are two NO_xBACT limits established by this Order of Approval: one that applies during processing of contaminated soil and one that only applies to natural gas combustion in the dryer and thermal oxidizer burners. The NO_xBACT limit during processing of contaminated soil is 86.6 ppmvd (corrected to 7% O_2), consistent with Order of Approval No. 10707. The NO_x BACT limit for natural gas combustion only is 32.0 ppmvd corrected to 7% O_2, consistent with SJVAPCD Authority to Construct S-1134795.

Sulfur Dioxide

The applicant will be limited to firing natural gas to fuel the rotary dryer burner and the afterburner. This satisfies BACT for SO_2.

Volatile Organic Compounds

With the exception of the first Agency Order of Approval issued for a TDU, every TDU the Agency reviewed was required to use an afterburner (i.e., thermal oxidizer) or a catalytic oxidizer to reduce emissions of VOC and volatile toxic air pollutants. The applicant proposed a VOC BACT limit of 0.02 lb/ton of contaminated soil achieved using an afterburner, consistent with Order No. 10707. This is more stringent than the VOC limit from SJVAPCD Authority to Construct S-1134795 (0.6 lb/ton soil) and is consistent with Order No. 10707; therefore, BACT for VOC is a limit of 0.02 lb/ton contaminated soil processed.

Summary of Recommendations:

Pollutant	Emissions Limitation	Operational and Design Limitation
VOCs including volatile HAP/TAP	▪ VOC emissions shall not exceed 0.020 lb/ton soil processed	▪ Combustion of natural gas in burners ▪ Afterburner with a minimum operating temperature of 1,400 degrees ▪ Baghouse serving TDU exhaust
PM including non-volatile HAP/TAP	▪ Total PM emissions shall not exceed 0.027 gr/dscf (corrected to 7% O_2) ▪ Filterable PM emissions shall not exceed 0.014 gr/dscf (corrected to 7% O_2) ▪ Opacity from the exhaust stack shall not exceed 5% for more than 3 minutes in any hour.	
NO_x	▪ NO_x concentration shall not exceed 32.0 ppmvd corrected to 7% O_2	
CO	▪ CO concentration shall not exceed 100 ppmvd corrected to 7% O_2	
SO_2	None	

Soil Storage/Handling

Similar Permits and Other Regulatory Agencies BACT (Visible Emissions):

Origin	Visible Emissions Limitation	Operational and Design Limitation
SJVAPCD BACT Guideline 2.1.7 (8/24/98)	▪ Visible emissions must be less than 5% opacity	▪ Soil covered or adequate moisture
SJVAPCD Authority to Construct S-1134795 (6/9/14)	▪ Opacity from stockpiled soil shall not exceed 5% for more than 3 minutes in any hour.	▪ Impervious cover for soil stockpiles except when soils are being added or removed. ▪ Adequate moisture content.
CT Department of Energy and Environmental Protection – Permit No. 146-0042	▪ Opacity from fugitive dust sources shall not exceed 10% during any six minute block average	▪ Sufficient wetting, grading, covering, and maintenance of material storage piles
PSCAA (No. 10707)	▪ Opacity from each screening operation, material hopper, storage bin, transfer point, or any other stationary equipment used to process, load, blend, transfer, or stack material treated by the TDU shall not exceed 7% for more than 3 minutes in an hour.	▪ Monitor the plant operations for evidence of odor and fugitive dust emissions at least once per week

Analysis:

SJVAPCD Authority to Construct S-1134795 established an opacity limit of 5% (for no more than 3 minutes in any hour) for stockpiled soil storage piles. PSCAA Order No. 10707 established an opacity limit of 7% (for no more than 3 minutes in any hour) for other fugitive dust sources, such as screening operations, hoppers, storage bins, and material transfer points. Since BACT is defined as "an emission limitation based on the maximum degree of reduction for each air pollutant…", BACT for visible emissions from fugitive dust sources is being set to the most stringent limit listed in the table above, which is emissions no greater than 5% opacity for three minutes in an hour per a WDOE Method 9A test.

F. EMISSION ESTIMATES

Proposed Project Emissions

Contaminated Soil Emissions

The TDU will be used to process contaminated soil that contains a mixture of gasoline, diesel, and heavy oil. Emission factors for distillate-oil fired boilers (<100 MMBtu/hr) from AP-42 Chapter 1.3 were used to calculate emissions of SO_2. Emissions of VOC, PM, NO_x, and CO were calculated using the BACT emission limits described in the previous section.

Emission factors for residual oil-fired boilers were used to estimate TAP emissions (except benzene), since residual oil generally contains more impurities than gasoline or diesel. Benzene emissions were calculated using the maximum hydrocarbon content of the soil (assuming 100% is gasoline), maximum benzene content of gasoline, and the destruction efficiency of the afterburner.

There is also an expectation that some of the contaminated soils may contain sodium chloride salt due to saltwater intrusion into soils. The chlorine in the salt potentially could be emitted as hydrogen chloride; however, this is speculative as it is expected that most chloride would remain in the soil as salt precipitate and would remain solid at the temperatures present in the rotary dryer (melting point of sodium chloride is 1,474°F). According to the application, the rotary dryer will be operated at 550°F, and the melting point of sodium chloride is 1,474°F. Therefore, emissions of hydrogen chloride are not expected from the TDU.

If there is chlorine present, it is theoretically possible that dioxin and furans may form. However, one of the primary forms of dioxin and furan formation, fly ash catalysis, is not expected to occur in the dryer given the requisite temperature ranges.[1] Emission factors of dioxin and furan are not available for this process. If any dioxins or furans are formed, it is expected that they will be combusted by the thermal oxidizer. Any secondary formation of dioxin is expected to be

[1] Mukherjee, A., Debnath, B., Ghosh, S.K. A Review of Technologies of Removal of Dioxins and Furans from Incinerator Flue Gas. Procedia Environmental Sciences 35 (2016) 528-540.
According to this paper, fly ash catalysis occurs in the post-combustion zone at temperatures between 473-673 K (392°F-752°F). The TDU dryer will have a maximum operating temperature of 350°F.

minimal due rapid cooling of exhaust gases in ambient air and relative lack of catalytic metals present in exhaust gases.

The table below shows the facility operating assumptions.

Annual Operating Hours	7,509
Soil Processing Rate (tons per hour)	60
Soil Contamination (%)	2
Contamination types	Gasoline, diesel, heavy oil

Burner Emissions

The TDU dryer burner and the thermal oxidizer burner both combust natural gas only. Natural gas combustion emissions were calculated using AP-42 Chapter 1.4 emission factors rated C or higher. Ventura County APCD natural gas combustion emission factors were used when the emission factor was greater than the AP-42 emission factor (more conservative) or AP-42 did not have an emission factor.

PM, NO_x, CO, and VOC emissions from the dryer burner are included in the total emissions from the TDU exhaust stack (described above).

Fugitive Emissions

Fugitive emissions are calculated for the contaminated soil screener, rotary drum feeder loading, the transfer of material to a conveyor belt, storage pile loading and unloading, and storage pile wind erosion. For the screener, controlled emission factors from AP-42 Section 11.19.2 were used to calculate PM_{10} emissions. Controlled emission factors were used due to the moisture content of the contaminated soil (>5% moisture).[2] Emissions from drop points (including storage pile loading/unloading, drum feeder loading, and transfer of material to a conveyor belt) were calculated using Equation 1 of AP-42 Section 13.2.4. Emissions from storage pile wind erosion were calculated using Equation 4-9 from *Control of Open Fugitive Dust Sources* (EPA-450/3-88-008).

Emission Summary

The permitted potential to emit calculations are based on the limit of 7,509 hours of operation per year proposed by the applicant and established by this Order. The TDU is expected to actually operate near this limit, so actual emissions are assumed to be equal to potential emissions. The table below shows the estimated criteria pollutant emissions for the entire project. Emissions at 7,509 hours per year remain below all regulatory triggers (including the Title V criteria pollutant and HAP major source thresholds) except the requirement to put the draft Order out for public comment.

[2] Among the sources reviewed for AP-42 Chapter 11.19.1, the moisture content of uncontrolled sources ranged from 0.21 to 1.3 percent, and the moisture content of controlled sources ranged from 0.55 to 2.88 percent

Pollutant	Project Emissions (lb/hr)	(tpy)
PM_{10}	4.12	15.47
$PM_{2.5}$	4.05	15.20
VOC	1.20	4.51
SO_2	2.74	10.29
NO_x	10.65	39.97
CO	7.48	28.10

The workbook attached below shows the detailed emission calculations.

CADMAN_Emissions_CSO.xlsx

Facility-wide Emissions

The facility will consist only of the relocated TDU, so facility-wide emissions are equal to the project emissions.

Actual Emissions

Reporting Source? The facility will be identified as a reporting source in our database, because facility-wide CO emissions may exceed reporting thresholds.

Ambient Impact Analysis

Due to the level of emissions from the proposed equipment, the applicant provided criteria pollutant modeling to demonstrate compliance with the Washington Ambient Air Quality Standards (WAAQS) and the National Ambient Air Quality Standards (NAAQS).

The entire facility was modeled, including fugitive sources, using AERMOD and meteorological data from Paine Field in Everett. Background concentrations were obtained from the Washington State University NW AIRQUEST database. There are no other reporting sources of emissions near the project facility that need to be included in the analysis.

The results of the analysis are provided below.

Pollutant	Avg. Period	Concentration (µg/m^3)			
		Model	Background	Total	WAAQS/NAAQS
NO_2 [2]	1-Hour	7.30	86.48	93.78	188
	Annual	0.26	24.44	24.70	100
$PM_{2.5}$ [1]	24-Hour	1.65	30	31.65	35
	Annual	0.40	7.9	8.30	12.0
PM_{10} [1]	24-Hour	16.04	48	64.04	150

[1] Design concentrations are the highest 6th-high 24-hour average PM_{10} concentration over five modeled years, the highest 5-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentrations at each receptor, and the highest 5-year average of the annual average $PM_{2.5}$ concentrations at each receptor. (based on guidance in the "Modeling Procedures for Demonstrating Compliance with the $PM_{2.5}$ NAAQS" memorandum issued on March 23, 2010 by Stephen Page, Director of OAQPS).

[2] Design concentrations are the highest annual average NO_2 concentration over five modeled years, the 8th-highest daily maximum concentration averaged over 5 years at each receptor.

G. OPERATING PERMIT or PSD

The Title V Air Operating Permit (AOP) program applicability for the entire source has been reviewed. The facility is not a Title V air operating permit source because post project PTE remains below Title V applicability thresholds and criteria. The source is considered a "**natural minor**".

Emission increases associated with this project were reviewed for Prevention of Significant Deterioration (PSD) Program applicability. The facility is not an existing PSD major source and the increase in emissions from this permitting action is below PSD thresholds.

H. AMBIENT TOXICS IMPACT ANALYSIS

Potential annual toxic air pollutant (TAP) emissions were calculated using the limit of 7,509 hours per year of operation established by this Order. Potential daily emissions were calculated assuming 24 hours of operation per day, and potential hourly emissions were calculated using the maximum hourly throughput of the TDU. The table below includes estimated potential emissions of all TAP and compares those to the Small Quantity Emission Rates (SQER) in WAC 173-460-150.

CAS	Pollutants	Avg. Period	Emissions (lb/avg. period)					Above SQER?	Emission Rate (g/s)	ASIL	Scaled Modeled Conc. (ug/m^3)	% of ASIL
			Fuel Oil	Rotary Dryer	After Burner	Total Emissions	SQER					
630-08-0	CO	1-hr	--	--	--	7.48E+00	5.04E+01	N	9.4307E-01	--	--	--
10102-44-0	NO2	1-hr	--	--	--	1.06E+01	1.03E+00	Y	1.3414E+00	470	1.47E+01	3%
7446-09-05	SO2	1-hr	2.71E+00	1.29E-02	1.29E-02	2.74E+00	1.45E+00	Y	3.4190E-01	660	3.74E+00	1%
71-55-6	1,1,1-Trichloroethane	24-hr	1.96E-03	--	--	1.96E-03	1.31E+02	N	1.0279E-05	--	--	--
1309-64-4	Antimony Trioxide	24-hr	4.36E-02	--	--	4.36E-02	2.63E-02	Y	2.2866E-04	0.2	1.04E-03	1%
7440-38-2	Arsenic	year	3.43E+00	--	--	3.43E+00	5.81E-02	Y	4.9275E-05	3.03E-04	1.13E-05	4%
56-55-3	Benz(a)anthracene	year	1.04E-02	--	--	1.04E-02	1.74E+00	N	1.4969E-07	--	--	--
71-43-2	Benzene	year	3.24E+03	3.40E-01	3.40E-01	3.24E+03	6.62E+00	Y	4.6662E-02	3.45E-02	1.07E-02	31%
205-99-2	Benzo(b,k)fluoranthene	year	3.84E-03	--	--	3.84E-03	1.74E+00	N	5.5247E-08	--	--	--
7440-41-7	Beryllium	year	7.22E-02	--	--	7.22E-02	8.00E-02	N	1.0378E-06	--	--	--
7440-43-9	Cadmium	year	1.03E+00	--	--	1.03E+00	4.57E-02	Y	1.4857E-05	2.38E-04	3.40E-06	1%
7782-50-5	Chlorine	24-hr	2.88E+00	--	--	2.88E+00	2.60E-02	Y	1.5113E-02	0.2	6.90E-02	34%
18540-29-9	Chromium VI	year	6.44E-01	--	--	6.44E-01	1.28E-03	Y	9.2577E-06	6.67E-06	2.12E-06	32%
218-01-9	Chrysene	year	6.18E-03	--	--	6.18E-03	1.74E+01	N	8.8844E-08	--	--	--
7440-48-4	Cobalt	24-hr	4.99E-02	--	--	4.99E-02	1.30E-02	Y	2.6219E-04	0.1	1.20E-03	1%
7440-50-8	Copper	1-hr	6.08E-04	1.83E-05	1.83E-05	6.45E-04	2.19E-01	N	7.6655E-05	--	--	--
53-70-3	Dibenzo(a,h) anthracene	year	4.33E-03	--	--	4.33E-03	1.60E-01	N	6.2340E-08	--	--	--
100-41-4	Ethylbenzene	year	1.65E-01	1.12E+00	1.12E+00	2.40E+00	7.68E+01	N	3.4517E-05	--	--	--
50-00-0	Formaldehyde	year	8.57E+01	1.21E+01	1.21E+01	1.10E+02	3.20E+01	Y	1.5812E-03	0.167	3.62E-04	0%
110-54-3	Hexane	24-hr	--	9.32E-01	9.32E-01	1.86E+00	9.20E+01	N	2.6800E-05	--	--	--
193-39-5	Indo(1,2,3-cd)pyrene	year	5.55E-03	--	--	5.55E-03	1.74E+00	N	7.9885E-08	--	--	--
7439-92-1	Lead	year	3.92E+00	8.10E-02	8.10E-02	4.08E+00	1.60E+01	N	5.8696E-05	--	--	--
7439-96-5	Manganese	24-hr	2.49E-02	--	--	2.49E-02	5.26E-03	Y	1.3066E-04	0.04	5.96E-04	1%
7439-97-6	Mercury	24-hr	9.37E-04	--	--	9.37E-04	1.18E-02	N	4.9216E-06	--	--	--
91-20-3	Naphthalene	year	2.93E+00	4.86E-02	4.86E-02	3.03E+00	5.64E+00	N	4.3580E-05	--	--	--
7723-14-0	Phosphorus	24-hr	7.85E-02	--	--	7.85E-02	2.63E+00	N	4.1202E-04	--	--	--
7782-49-2	Selenium	24-hr	5.67E-03	--	--	5.67E-03	2.63E+00	N	2.9747E-05	--	--	--
108-88-3	Toluene	24-hr	5.14E-02	1.37E-02	1.37E-02	7.89E-02	6.57E+02	N	2.7043E-04	--	--	--
7440-62-2	Vanadium	24-hr	2.64E-01	--	--	2.64E-01	2.63E-02	Y	1.3850E-03	0.2	6.32E-03	3%
1330-20-7	o-Xylene	24-hr	9.04E-04	--	--	9.04E-04	2.90E+01	N	4.7474E-06	--	--	--

For some TAP, the potential emissions exceed the SQER. An air dispersion modeling analysis was conducted using AERMOD and meteorological data from Paine Field in Everett. The model was setup using a nominal emission rate of 1 g/s from the stack, so concentrations of each TAP could be calculated by scaling up the maximum modeled impact. A summary of the maximum modeled impacts and the model output files are provided below.

	Maximum Modeled Concentrations (µg/m3)		
Year	**1-hr**	**24-hr**	**Annual**
2013	8.0828	3.5031	0.15629
2014	10.93708	4.56232	0.1701
2015	10.76412	3.38947	0.22867
2016	9.85984	2.45915	0.18437
2017	9.90478	2.7784	0.16778
Max	10.93708	4.56232	0.22867


NomStack2013_052019.aml


NomStack2014_052019.aml


NomStack2015_052019.aml


NomStack2016_052019.aml


NomStack2017_052019.aml

Based on these results, impacts of all TAPs are below the ASIL.

I. APPLICABLE RULES & REGULATIONS

1. PUGET SOUND CLEAN AIR AGENCY REGULATIONS

SECTION 5.05 (c): The owner or operator of a registered source shall develop and implement an operation and maintenance plan to ensure continuous compliance with Regulations I, II, and III. A copy of the plan shall be filed with the Control Officer upon request. The plan shall reflect good industrial practice and shall include, but not be limited to, the following:
(1) Periodic inspection of all equipment and control equipment;
(2) Monitoring and recording of equipment and control equipment performance;
(3) Prompt repair of any defective equipment or control equipment;
(4) Procedures for startup, shut down, and normal operation;
(5) The control measures to be employed to ensure compliance with Section 9.15 of this regulation; and
(6) A record of all actions required by the plan.
The plan shall be reviewed by the source owner or operator at least annually and updated to reflect any changes in good industrial practice.

SECTION 6.09: Within 30 days of completion of the installation or modification of a stationary source subject to the provisions of Article 6 of this regulation, the owner or operator or applicant shall file a Notice of Completion with the Agency. Each Notice of Completion shall be submitted on a form provided by the Agency, and shall specify the date upon which operation of the stationary source has commenced or will commence.

SECTION 9.03: (a) It shall be unlawful for any person to cause or allow the emission of any air contaminant for a period or periods aggregating more than 3 minutes in any 1 hour, which is:
(1) Darker in shade than that designated as No. 1 (20% density) on the Ringelmann Chart, as published by the United States Bureau of Mines; or
(2) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in Section 9.03(a)(1).
(b) The density or opacity of an air contaminant shall be measured at the point of its emission, except when the point of emission cannot be readily observed, it may be measured at an observable point of the plume nearest the point of emission.
(c) This section shall not apply when the presence of uncombined water is the only reason for the failure of the emission to meet the requirements of this section.

SECTION 9.09: General Particulate Matter (PM) Standard. It shall be unlawful for any person to cause or allow the emission of particulate matter in excess of the following concentrations:
Burning fuel other than wood: 0.05 gr/dscf @ 7% O_2

SECTION 9.11: It shall be unlawful for any person to cause or allow the emission of any air contaminant in sufficient quantities and of such characteristics and duration as is, or is likely to be, injurious to human health, plant or animal life, or property, or which unreasonably interferes with enjoyment of life and property.

SECTION 9.13: It shall be unlawful for any person to cause or allow the installation or use of any device or use of any means designed to mask the emission of an air contaminant which causes detriment to health, safety or welfare of any person.

SECTION 9.15: It shall be unlawful for any person to cause or allow visible emissions of fugitive dust unless reasonable precautions are employed to minimize the emissions. Reasonable precautions include, but are not limited to, the following:
(1) The use of control equipment, enclosures, and wet (or chemical) suppression techniques, as practical, and curtailment during high winds;
(2) Surfacing roadways and parking areas with asphalt, concrete, or gravel;
(3) Treating temporary, low-traffic areas (e.g., construction sites) with water or chemical stabilizers, reducing vehicle speeds, constructing pavement or rip rap exit aprons, and cleaning vehicle undercarriages before they exit to prevent the track-out of mud or dirt onto paved public roadways; or
(4) Covering or wetting truck loads or allowing adequate freeboard to prevent the escape of dust-bearing materials.

REGULATION I, SECTION 9.20(a): It shall be unlawful for any person to cause or allow the operation of any features, machines or devices constituting parts of or called for by plans, specifications, or other information submitted pursuant to Article 6 of Regulation I unless such features, machines or devices are maintained in good working order.

2. WASHINGTON STATE ADMINISTRATIVE CODE

WAC 173-400-040(3): Fallout. No person shall cause or allow the emission of particulate matter from any source to be deposited beyond the property under direct control of the owner or operator of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited.

WAC 173-400-040(4): Fugitive emissions. The owner or operator of any emissions unit engaging in materials handling, construction, demolition or other operation which is a source of fugitive emission:

(a) If located in an attainment area and not impacting any nonattainment area, shall take reasonable precautions to prevent the release of air contaminants from the operation.

WAC173-400-111(7): Construction limitations.
(a) Approval to construct or modify a stationary source becomes invalid if construction is not commenced within eighteen months after receipt of the approval, if construction is discontinued for a period of eighteen months or more, or if construction is not completed within a reasonable time. The permitting authority may extend the eighteen-month period upon a satisfactory showing by the permittee that an extension is justified.

3. FEDERAL

N/A

J. PUBLIC NOTICE

A notice of application was posted on the Agency's website for 15 days. No requests or responses were received. A copy of the website posting is below:

Cadman Materials	17 E Marine View Drive, Everett, WA 98201	Application for the relocation of a thermal desorption unit and associated equipment used to remediate contaminated soil.	9/10/18	Courtney O'Gorman

This project meets the criteria for mandatory public notice under WAC 173-400-171(3)(b) for a project with an increase in emissions of any air pollutant at a rate above the emission threshold rate as defined in WAC 173-400-030. The emission increase of $PM_{2.5}$ is greater than the 10 ton per year emission threshold established in WAC 173-400-030, and the emission increase of PM_{10} is greater than the 15 ton per year emission threshold established in WAC 173-400-030. In addition, the Agency has determined that there would be significant public interest in this project; therefore, the project also meets the criteria for mandatory public notice under WAC 173-400-171(3)(n).

A 30-day public comment period was held from June 1, 2019 through July 1, 2019. Notices that the draft materials were open to comment were published in the Everett Herald, the Marysville Globe, and the Daily Journal of Commerce on June 1, 2019. The Agency posted the application and the draft worksheet on the Agency's website during the comment period. [insert discussion of comments received].

[insert screenshot website posting]

K. RECOMMENDED APPROVAL CONDITIONS

Standard Conditions:

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Clean Air Agency to the applicant to install or establish the equipment, device or process described hereon at the installation address in accordance with the plans and specifications on file in the Engineering Division of the Puget Sound Clean Air Agency.

2. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.

Specific Conditions:

EMISSION LIMITATIONS

3. Opacity from the thermal oxidizer exhaust stack shall not exceed 5% opacity for a period or periods aggregating more than 3 minutes during any one hour as measured by WDOE Method 9A.

4. Total particulate matter emissions from the thermal oxidizer exhaust stack shall not exceed 0.027 gr/dscf (corrected to 7% O_2) as measured by U.S. EPA Method 5 as modified by Puget Sound Clean Air Agency Board Resolution 540 dated August 11, 1983.

5. Filterable particulate matter emissions from the thermal oxidizer exhaust stack shall not exceed 0.014 gr/dscf (corrected to 7% O_2) as measured by U.S. EPA Method 5 as modified by Puget Sound Clean Air Agency Board Resolution 540 dated August 11, 1983.

6. The non-methane volatile organic compound emissions from the thermal oxidizer exhaust stack shall not exceed of 0.020 lb VOC (expressed as propane) per ton of soil processed as determined in accordance with Section 3.07 of PSCAA Regulation I using USEPA reference methods 1, 3A, 4, and 25A from Appendix A of 40 CFR Part 60 by the average of three 60-minute test runs.

7. Carbon monoxide emissions from the thermal oxidizer exhaust stack shall not exceed 100 ppmvd (corrected to 7% O_2) as determined in accordance with Section 3.07 of PSCAA Regulation I using USEPA reference methods 1, 3A, 4, and 10 from Appendix A of 40 CFR Part 60 by the average of three 60-minute test runs.

8. Nitrogen oxides emissions from the thermal oxidizer exhaust stack shall not exceed 86.6 ppmvd (corrected to 7% O_2) as determined in accordance with Section 3.07 of PSCAA Regulation I using USEPA reference methods 1, 3A, 4, and 7E from Appendix A of 40 CFR Part 60 by the average of three 60-minute test runs.

9. Nitrogen oxides emissions from the combustion of natural gas in the dryer and thermal oxidizer shall not exceed 32.0 ppmvd (corrected to 7% O_2) as determined in accordance with Section 3.07 of PSCAA Regulation I using USEPA reference methods 1, 3A, 4, and 7E from Appendix A of 40 CFR Part 60 by the average of three 60-minute test runs.

10. For any period or periods aggregating no more than 3 minutes in any one hour, each storage pile, screening operation, material hopper, storage bin, transfer point on belt conveyors, or any other stationary equipment used to process, load, blend, transfer, or stack material treated by the TDU shall exhibit opacity no greater than 5 percent as measured by Department of Ecology Method 9A.

COMPLIANCE DEMONSTRATION

11. The owner or operator shall notify the Puget Sound Clean Air Agency in writing, within 15 days of initial startup of the thermal desorption unit.

12. The owner or operator shall have emissions tested for compliance with Conditions 3 through 8 of this Order within 90 days after achieving the maximum production rate, but no later than 180 days after initial startup of the thermal desorption unit. Source testing must occur while processing petroleum contaminated soils at the maximum hourly rate. The emission tests listed in this requirement shall be repeated at an interval no less than once every five calendar years. The owner or operator shall submit a compliance test plan with the test notification submitted under Regulation I, Section 3.07(b) at least 60 days prior to the compliance test. The test plan shall detail the test methods used for each pollutant, the operational data that will be collected during the test, the level of contamination in the soil that will be processed during the test, and any other relevant information about the test. The test plan must be approved before conducting the source test, and the owner or operator must follow the approved test plan. Changes to the approved test plan are acceptable as long as the Agency has approved the proposed changes.

13. Compliance with Condition 3 must at a minimum be demonstrated by inspecting the thermal oxidizer exhaust stack for visible emissions once every operating day when the thermal desorption unit is in use. If during the scheduled inspection or at any other time, visible emissions other than uncombined water are observed, the owner or operate must immediately take one of the following actions:

    a. Corrective action or mitigation measure to eliminate the visible emissions;

    b. Compliance verification by completing a certified opacity reading per Ecology Method 9A. Certified opacity readings must be performed by certified persons with current certification for plume evaluation in accordance with EPA Method 9; or

    c. Cease operation of the thermal desorption unit until the problem is corrected.

    Any operation with visible emission above the limit in Condition 3 is a violation of this Order.

14. The owner or operator shall keep a record showing the date, time, and results of each inspection, a description of all corrective actions or mitigation measures taken, and the date, time and results of all Ecology Method 9A tests performed as required by Condition 13.

OPERATING LIMITATIONS

15. The thermal desorption unit shall not operate for more than 7,509 hours per consecutive 12-month period. Within 30 days of the end of each month, a record of operating hours shall be kept showing the total operating hours for the month and the total operating hours for the previous 12 consecutive months.

16. The thermal desorption unit shall not process contaminated soil at a rate greater than 60 tons per hour.

17. The thermal desorption unit burner and the thermal oxidizer burner shall be fired only on natural gas.

18. The soil processed in the thermal desorption unit shall not exceed the following contamination limits:
    a. 2.0% total petroleum hydrocarbons by weight.
    b. 1.0 ppm polychlorinated biphenyls (PCBs) by weight.
    c. 48 ppm total chromium by weight.

19. Prior to initial processing of contaminated soil in the thermal desorption unit, the owner or operator shall submit for Agency approval a Process Rate Monitoring Plan providing the details of how the facility will measure, monitor, and document, the thermal desorption unit soil process rate. The Agency-approved Process Rate Monitoring Plan shall be incorporated into the facility Operations and Maintenance Plan required by Regulation I, Section 5.05. Contaminated soils shall not be introduced into the thermal desorption unit without an Agency approved Process Rate Monitoring Plan in place. The Process Rate Monitoring Plan may be revised with Agency approval at any time and also may be revised by the Agency at any time.

20. No contaminated soil shall enter the thermal desorption unit unless the thermal oxidizer is operating and its monitored temperature is greater than 1,400 degrees Fahrenheit. The thermal oxidizer temperature shall be maintained at greater than 1,400 degrees Fahrenheit whenever soil is present in the thermal desorption unit.

MONITORING

21. To demonstrate compliance with the limits in Condition 18, incoming soil must be tested at the following minimum frequency: at least 3 soil samples must be tested for less than 100 cubic yards of soil; at least 5 soil samples must be tested for 101- 500 cubic yards of soil; at least 7 soil samples must be tested for 501 – 1000 cubic yards of soil; at least 10 soil samples must be tested for 1001 - 2000 cubic yards of soil; at least 10 soil samples must be tested for greater than 2,000 cubic yards of soil, plus 1 additional sample for every 500 cubic yards over 2000. The owner or operator must receive soil analysis results from the required testing prior to accepting the tested material onsite. The owner or operator shall maintain records of the soil analysis results.

22. To demonstrate compliance with Condition 20, the thermal oxidizer shall be equipped with a thermocouple near the entry to its stack to measure temperature to +/- 14 degrees Fahrenheit.

Temperature data must be measured and recorded continuously (or sampled at intervals no greater than 10 seconds and recorded as 1 minute averages).

23. The owner or operator shall annually test or replace the thermal oxidizer thermocouple. If performed, the test shall consist of either a physical or electronically simulated comparison and shall follow manufacturer specifications. The results of the test readings must be within +/- 14 degrees Fahrenheit. If the results of the test readings exceed +/- 14 degrees Fahrenheit of the reference value, the thermocouple must be replaced or adjusted to read within +/- 14 degrees Fahrenheit of the reference value. The owner or operator shall keep records of thermocouple calibration test reports, including the date and results of each test, the test method used, and a record of who performed the test. If the thermocouple is replaced, the owner or operator shall keep a record of the date it was replaced and who replaced it.

24. In the event of a thermal oxidizer thermocouple failure or in the event of any other failure such that the owner or operator cannot demonstrate that it meets Condition 20, the thermal desorption unit shall be shut down until the problem is fixed. The date of the failure, a description of the failure, and actions taken to resolve it shall be logged contemporaneously with their occurrence.

25. The baghouse shall be equipped with a gauge measuring the pressure drop across the baghouse. The pressure gauge shall be in operation whenever the baghouse is in operation. The pressure gauge shall be marked with the acceptable pressure drop range. The maximum acceptable pressure drop shall be determined from manufacturer specifications for the bags used in the baghouse. The minimum acceptable pressure drop shall be determined from manufacturer specifications for the bags used in the baghouse. The pressure drop observed during the most recent compliance source test shall fall within the defined acceptable range of pressure drop. The acceptable range and the basis for the range shall be included in the facility Operations and Maintenance plan required by Agency Regulation I, Section 5.05(c).

26. The owner or operator shall monitor and record the following information:
    a) One daily pressure drop across the baghouse during each day of operation.
    b) Hourly, monthly, and annual (12 consecutive month rolling total) soil throughput.
    c) The date and time of each thermal oxidizer startup and shutdown.
    d) The date and time of each time contaminated soil is introduced into the TDU and each time the TDU is emptied of soil.

COMPLAINTS

27. The owner or operator shall establish a complaint response program as part of the O&M Plan. The program shall include a complaint phone line, criteria and methods for establishing whether the owner or operator may be the source of emissions related to the complaint, and a format for communicating results of investigation and advising complainants of corrective actions.

    a) The owner or operator shall record and investigate complaints received regarding air quality as soon as possible, but no later than one working day after receipt.

b) The owner or operator shall correct any problems identified by these complaint investigations within 24 hours of identification or cease operation of the equipment until the problem is resolved;

c) Records of all complaints received regarding air quality issues shall include information regarding date and time of complaint; name and address of complainant (if known); nature of the complaint; investigation efforts completed and basis for conclusion reached; and date, time, and nature of any corrective action taken.

RECORDKEEPING

28. The owner or operator shall maintain records required by this Order of Approval, as well as the records identified in the Operation and Maintenance Plan required by Regulation I, Section 5.05, for two years and make them available to Puget Sound Clean Air Agency personnel upon request.

L. CORRESPONDENCE AND SUPPORTING DOCUMENTS

From: Courtney O'Gorman
To: 'christy.mcdonough@lehighhanson.com'
Cc:
Subject: NOC #11665 Incomplete - Cadman Materials
Sent: Thu 10/4/2018 2:40 PM

Message | Fenceline.PNG (2 MB)

Hi Christy,

I have reviewed the NOC application you submitted for Cadman Materials' proposed TDU relocation and have determined that the application is incomplete. Please provide the following information:

General

1. Please provide documentation to support the 99.8% destruction efficiency for the afterburner. In the worksheet for NOC #8408, a conservative 90% destruction efficiency was used for the emission calculations.
2. Please provide the manufacturer's operating manual for the TDU.
3. Condition 11 of Order No. 8408 required a source test for PM and opacity within 90 days of the date that Order No. 8408 went into effect. I could not find this source test report in our records. Could you please provide this?
4. Is the dryer parallel or counter-flow?
5. The proposed project location is in an area that we have received numerous odor complaints for, and the Agency previously conducted an odor monitoring study in this area (North Everett). To ensure that there will not be a negative odor impact on the community upon completion of the project, please provide a BACT analysis for odor emissions.

Emission Calculations

6. Based on the summary values in Table 2-1 and the supporting calculations in Appendix B, it appears that the total $PM_{10}/PM_{2.5}$ emissions are calculated as the sum of uncontrolled fuel oil combustion emission from the TDU, uncontrolled natural gas combustion emissions from the two burners, and controlled emissions from the baghouse based on the maximum grain loading rate and flow rate. The report states, "Although the baghouse is located downstream of the rotary drum dryer, PM emissions from combusting natural gas in the rotary drum dryer burner , and from the destruction by the rotary drum dryer of contaminants volatilized from the soil, were assumed to pass through the baghouse unabated." Why did you assume this?
7. I agree with the approach of using emission factors for fuel oil combustion by residual oil-fired boilers for estimating TAP emissions. However, I would expect gasoline to result in higher emissions of benzene. Please update the TAP analysis for the TDU to calculate benzene emissions from gasoline and provide a modeling analysis for benzene if necessary.
8. Footnote 2 of Table 2-4 says, "Uncontrolled VOC TAP emission rates from TDU are presented above." Can you clarify what is meant by "uncontrolled" in this statement? My understanding is that these emissions represent oil-fired combustion emissions, which are the result of combustion in the afterburner as control.
    - Similarly, Tables 2-6 and 2-7 each have a footnote that says, "In conservative approach, uncontrolled VOC TAP emission rates from TDU are used in modeling," and the footnote is specifically referenced for 7,12-Dimethylbenz(a)anthracene and formaldehyde. Are emissions of these two TAP calculated differently than other TAP?
9. In the application, potential emissions are calculated assuming 7,509 hours per year (144 hours per week). The estimated hours of operation listed in the "Thermal Desorption (Soil Remediation)" NOC form are also listed as 7,509 hours per year. Does the facility expect to actually operate at its permitted limit? If not, please provide the estimated actual operating hours per year.
10. Please provide PM and VOC emission calculations for the contaminated soil storage pile and provide PM emission calculations for the remediated soil storage pile. These sources should also be included in the models.
11. Please provide an Excel version of the emission calculation workbook. I may have more questions/comments that arise once I've had a chance to review the calculations in depth.

Modeling

12. In Section 5.1.1 of the report, you indicate that fugitive PM emissions were not modeled, because the fugitive emissions are much lower than the stack emissions. Since fugitive emissions associated with screens and material handling drop points would be modeled as volume sources low to the ground rather than point sources, it is possible that these sources may have a non-negligible impact on the model concentrations. Please include the fugitive emission sources in the $PM_{10}/PM_{2.5}$ NAAQS modeling.
13. The fenceline appears to be off directly east of the stack. Please see the attached image, where I have drawn in red where I expect the fenceline to be. Please adjust the fenceline accordingly or explain.
14. The 1-hour NO_2 NAAQS models show increasing concentrations at the edge of the receptor grid in the NE and SW directions. For example, for the 2013 8th high NO_2 NAAQS model, the maximum impact is at the very edge of the receptor grid. Please expand the receptor grid and verify that the concentrations are decreasing at the edge of the grid.
15. Can you confirm that you aren't using NO_x to NO_2 conversion method in the modeling analysis?

Please let me know if you have any questions.

Thank you!

Courtney O'Gorman
Engineer II
CourtneyO@pscleanair.org

From: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com> Sent: Thu 10/18/2018 8:35 AM
To: Courtney O'Gorman
Cc:
Subject: RE: NOC #11665 Incomplete - Cadman Materials
Message | CADMAN_Emissions_2018-10-17.xlsx (494 KB) | CADMAN_NOC_Application_ModifiedFiguresAndTables_2018-10-17.docx (5 MB) | Responses to PSCAA comments - 20181017.pdf (170 KB)

Hi Courtney,

Thank you for the feedback on the NOC application for the relocation of the TDU plant.

The following information is attached in response to the queries from your email:

- Document providing detailed responses to each of the questions in the email below
- Emissions spreadsheet
- Modified tables and figures (only those which have been updated due to the new modeling are included)
- Updated air modeling files (available in a One Drive directory, click here)

Please let me know if you have any questions or need additional information. Please confirm receipt of this information.

Sincerely,

Christy

From: Maria Zatko <MZatko@ramboll.com> Sent: Thu 11/1/2018 3:18 PM
To: Courtney O'Gorman
Cc:
Subject: Cadman Soil TDU NOC follow-up

Hi Courtney,

Thank you for calling to chat about the soil TDU NOC application. I've reached out to Cadman to make sure it's okay to distribute the photos from the site visit. I have also asked them to confirm dimensions for the volume sources and will keep you posted.

According to a preliminary site plan that Cadman shared with us, the height of the remediated storage pile will be 25 feet and located underneath a 40-foot tall roof. I apologize for my uncertainty on the phone – we have been dealing with a variety of piles and pile heights recently. The storage piles are currently modeled as surface-based sources while the screener and feeder are modeled as elevated sources.

Please feel free to reach out at any time with more questions and I will be in touch again about the site visit photos.

Thank you!
Maria

Maria Zatko, Ph.D.

Air Quality Scientist - Senior Consultant

D +1 (425) 412-1819
M +1 (413) 335-2471

Ramboll
19020 33rd Avenue West
Suite 310
Lynnwood, WA 98036
USA
https://ramboll.com

From: Courtney O'Gorman Sent: Mon 11/5/2018 7:25 AM
To: 'Maria Zatko'
Cc:
Subject: RE: Cadman Soil TDU NOC follow-up

Hi Maria,

Thank you very much for sending these photos – they are very helpful.

After looking at the photos, the 10' release height for the screener and feeder seems appropriate. However, since the material isn't being dropped from 10' in the air to the ground, I think the vertical dimension for the screener and feeder volume sources needs to be revisited. I would expect the vertical dimension to be the vertical distance that the material will fall.

Also, the length and width for the rotary feeder (8') look appropriate based on the picture, but the screener doesn't look that wide. I would expect sigma y to be calculated using the width of the screener. Please let me know if you disagree.

There's no need to rerun any of the models at this point; I'm still working on responses to some of the other items from my original list of questions.

Thank you!
Courtney

From: Courtney O'Gorman
To: 'McDonough, Christy M (Redmond) USA'
Cc: 'Maria Zatko'
Subject: RE: NOC #11665 Incomplete - Cadman Materials
Sent: Tue 11/6/2018 7:29 AM

Message | RE: Cadman Soil TDU NOC follow-up (63 KB)

Hi Christy,

Thank you very much for your detailed response to my email. I have a few follow-up comments (related to the question number in **bold** from my original email) and a few other additional questions.

- **#4** - Since the dryer is counter-flow design, I do not think it is appropriate to assume a 75% control efficiency in the dryer. The dryer for Iron Mountain Quarry is parallel flow, so the stream is introduced at the end with the burner, which is more likely to result in some VOC destruction. I found a TDU permit issued by the SJVAPCD that states that the primary purpose of the rotary drum dryer is to volatilize contaminants trapped in the soil, and they assumed no control of VOC in the dryer. https://www.valleyair.org/notices/Docs/2014/04-29-14_(S-1134795)/Prelim-S-1134795.PDF. Unless you can provide justification for assuming 75% control, please update your calculations to assume 0% control from the dryer. My understanding is that this will only affect total VOC emissions in your calculations, since TAP emissions are calculated using AP-42 emission factors.

- **#6** – Since the permit limit (0.02 gr/dscf) in Condition 6 of Order No. 8408 represents total PM from the exhaust stack and accounts for condensable particulate, you do not need to add in PM emissions calculated using the AP-42 emission factors. Also, the exhaust stack PM emissions should be calculated using dscfm (instead of acfm) of the exhaust stack.

- **#7** – I think it would be appropriate to calculate benzene emissions from gasoline combustion in a manner similar to how the VOC emissions are calculated. You can use the maximum benzene concentration in gasoline and assume that all of the hydrocarbon contamination in the soil is from gasoline to estimate the amount of benzene that is evaporated from the soil. Then, you can apply the VOC destruction efficiency. Please let me know if you disagree with this approach.

- **#10** – What is the moisture content of the contaminated soil and remediated soil? I would at least expect the remediated soil to be fairly dry, which could result in windblown fugitive emissions from the storage pile.

- **#12** – I spoke with Maria Zatko and got some clarification on the volume source parameters for the fugitive sources. However, I had some additional comments on the parameters. Please see the attached email for details.

- Maria sent me some pictures of the facility to help me better understand the equipment, which were very helpful. It looks like the afterburner exhaust stack is rectangular rather than circular. Can you confirm that the stack diameter used for AERMOD is the equivalent circular diameter?

- Also, based on the pictures of the afterburner exhaust stack, it looks like the stack might have some kind of cap on it. Can you confirm that there is no raincap and that the afterburner exhaust stack has vertical, unobstructed flow?

- What is the actual moisture content and oxygen content of the exhaust from the afterburner?

- What is the status of the SEPA review with the City of Everett?

You do not need to rerun any of your models at this time. I am still in the process of determining the BACT limits for the TDU, which I will use to update the PTE calculations and criteria pollutant modeling.

Please feel free to reach out if you have any questions or if you would like to discuss any of my comments.

Thank you!
Courtney

From: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com> Sent: Thu 11/8/2018 10:37 AM
To: Courtney O'Gorman
Cc: Maria Zatko; Carrico, Brian (Brian.Carrico@abam.com)
Subject: RE: NOC #11665 Incomplete - Cadman Materials

Hi Courtney,

Please find responses to your follow-up comments below in the green italicized text. Let me know if you need any additional information.

Sincerely,
Christy

Christy McDonough
Environment Manager – Washington
Lehigh Hanson

From: Courtney O'Gorman [mailto:CourtneyO@pscleanair.org]
Sent: November 6, 2018 7:29 AM
To: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com>
Cc: Maria Zatko <MZatko@ramboll.com>
Subject: RE: NOC #11665 Incomplete - Cadman Materials

Hi Christy,

Thank you very much for your detailed response to my email. I have a few follow-up comments (related to the question number in **bold** from my original email) and a few other additional questions.

- **#4** - Since the dryer is counter-flow design, I do not think it is appropriate to assume a 75% control efficiency in the dryer. The dryer for Iron Mountain Quarry is parallel flow, so the stream is introduced at the end with the burner, which is more likely to result in some VOC destruction. I found a TDU permit issued by the SJVAPCD that states that the primary purpose of the rotary drum dryer is to volatilize contaminants trapped in the soil, and they assumed no control of VOC in the dryer. https://secure-web.cisco.com/1ak9dieOfOsC3IXVwpWaFtw4UjogVpeguLayeQVWc9Cmh1UZy-As2u5sSKvUaCd1HwU3INDpMmas-klTOx_yd9KHNqWG-bQFqheXQdlzwJefICdd93iDqr0r8j5mPwaVEND3LQm2BfdwhKa8TXjqPBC3PznH41tm859Xjd82QRG4BD51--IyB1SUPAXI0riYmPEohPRSqeM6_svdm2q0smcquxQsm_mvai2mG9EPtB7slcqnCp1dax2sGZWyzi3LJs6FKAxaoAVRrrDnzs7L2GHLW2wIiK-y8uhvzZx0Eo8xA04olhGELOB36DfVvAhAsq7etBTqb0MVyKQ2mIig09A/https%3A%2F%2Fwww.valleyair.org%2Fnotices%2FDocs%2F2014%2F04-29-14_%28S-1134795%29Prelim-S-1134795.PDF. Unless you can provide justification for assuming 75% control, please update your calculations to assume 0% control from the dryer. My understanding is that this will only affect total VOC emissions in your calculations, since TAP emissions are calculated using AP-42 emission factors.

  Ramboll has updated their calculations to assume 0% control from the rotary dryer. Updated VOC emissions are 2.52 lb/hour and 19.4 TPY, which equates to 0.086 lb NMVOC per ton of soil assuming a 60 ton/hour soil throughput.

- **#6** – Since the permit limit (0.02 gr/dscf) in Condition 6 of Order No. 8408 represents total PM from the exhaust stack and accounts for condensable particulate, you do not need to add in PM emissions calculated using the AP-42 emission factors. Also, the exhaust stack PM emissions should be calculated using dscfm (instead of acfm) of the exhaust stack.
  Ramboll has updated the PM emission calculations. They are now using the PM permit limit (0.02 gr/dscf) in Condition 6 or Order No. 8408 along with the exhaust stack flow rate (5,400 scfm corrected to dscfm assuming 1% moisture content). The moisture content of the exhaust stack is unknown and we assume 1% to be conservative.

- **#7** – I think it would be appropriate to calculate benzene emissions from gasoline combustion in a manner similar to how the VOC emissions are calculated. You can use the maximum benzene concentration in gasoline and assume that all of the hydrocarbon contamination in the soil is from gasoline to estimate the amount of benzene that is evaporated from the soil. Then, you can apply the VOC destruction efficiency. Please let me know if you disagree with this approach.
  Ramboll has updated the benzene emission calculations to reflect this methodology. The updated benzene emission rate exceeds the SQER. Model results show that the modeled concentration is less than the ASIL.

- **#10** – What is the moisture content of the contaminated soil and remediated soil? I would at least expect the remediated soil to be fairly dry, which could result in windblown fugitive emissions from the storage pile.

  The moisture content of the contaminated soil pile is between 5 and 10%. The moisture content of the remediated soil pile is between 4-7%. The remediated pile will be rehydrated specifically to control dust emissions.

- **#12** – I spoke with Maria Zatko and got some clarification on the volume source parameters for the fugitive sources. However, I had some additional comments on the parameters. Please see the attached email for details.

  Volume source parameters have been updated in the model based upon comments from PSCAA and additional information from CADMAN. Please let us know if you would like to see the updated emission workbook.

- Maria sent me some pictures of the facility to help me better understand the equipment, which were very helpful. It looks like the afterburner exhaust stack is rectangular rather than circular. Can you confirm that the stack diameter used for AERMOD is the equivalent circular diameter?

  Yes, the rectangular stack dimensions were converted into an equivalent circular diameter.

- Also, based on the pictures of the afterburner exhaust stack, it looks like the stack might have some kind of cap on it. Can you confirm that there is no raincap and that the afterburner exhaust stack has vertical, unobstructed flow?

  The afterburner stack cover is fully-opened during operation. The afterburner exhaust stack flow will be vertical and unobstructed.

- What is the actual moisture content and oxygen content of the exhaust from the afterburner?

  The actual moisture and oxygen content of the exhaust from the afterburner is unknown.

- What is the status of the SEPA review with the City of Everett?

  The SEPA has been submitted and is undergoing initial review with the City of Everett.

From: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com> Sent: Wed 2/20/2019 7:33 AM
To: Courtney O'Gorman
Cc:
Subject: RE: Draft NOC Worksheet 11665 - Cadman

Hi Courtney,

We have some comments on the draft NOC.

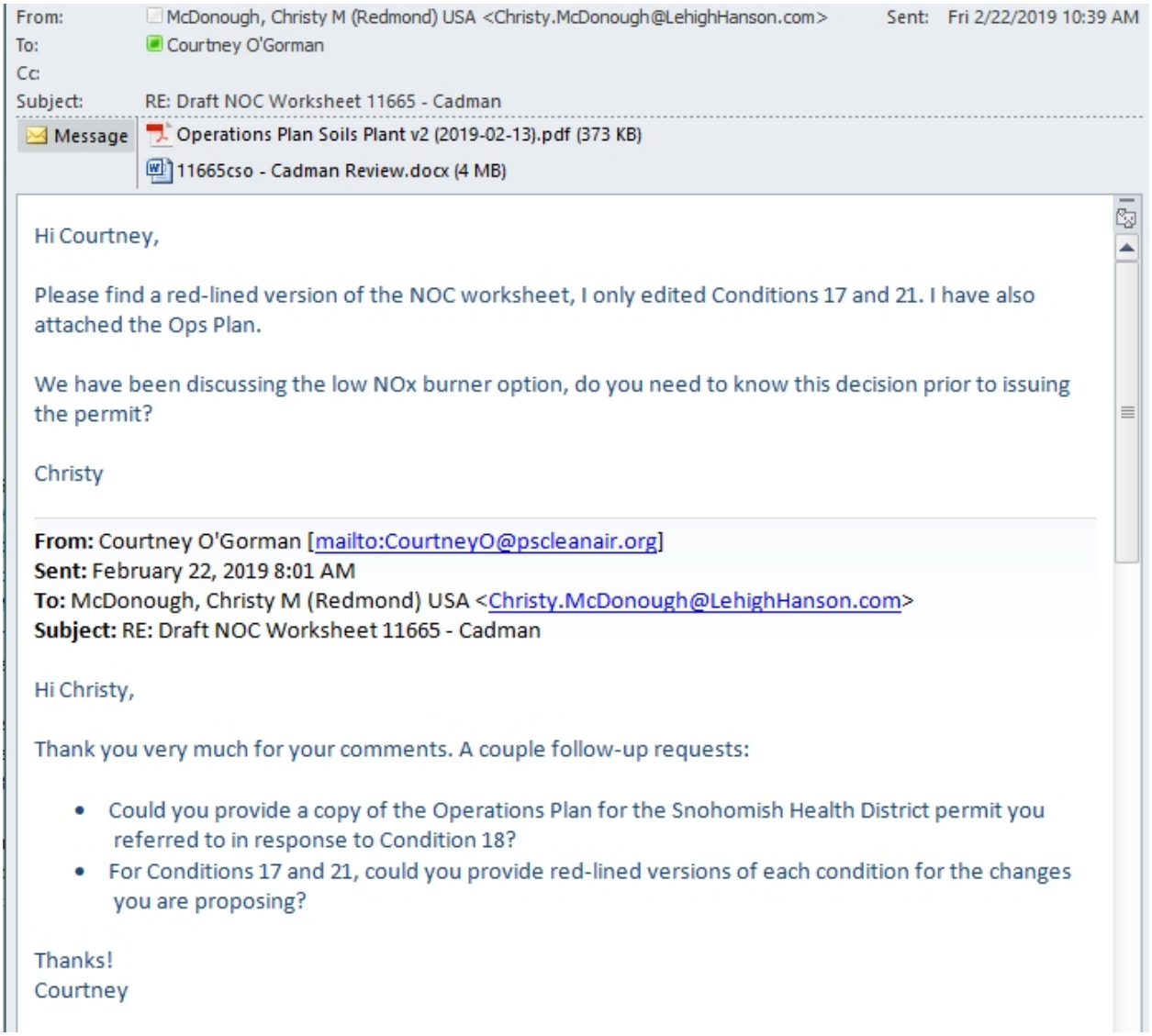
Proposed Condition #17 – Chloride is not a standard test to conduct on soil. Various local labs we contacted said it is a rare request for soil analysis. In reading the NOC, it appears as though the requirement stems from the potential for salt water intrusion into soils. Would it be possible to limit this test requirement to those soil source sites where this could potentially be a concern?

Proposed Condition #18 – We require the customer to provide all required soil sampling and analysis prior to bringing any material to site. Any material which does not meet the screening criteria is not accepted. This is all detailed in the Operations Plan prepared for the Snohomish Health District permit. In addition, the only blending which occurs on site is the use of treated soil to address any moisture content in contaminated soils prior to treatment. As any sampling, analysis, or blending occurs by the customer prior to the material being accepted at our site, we would suggest this condition is not applicable.

Proposed Condition #21 – We propose this condition is clarified to be consistent with other permit requirements. The sampling frequency identified is consistent with current Ecology guidance, however it is on a per project basis, not per load as stated in the draft condition. Also, as mentioned above, no blending occurs at site with the exception of using treated soil to address moisture content in contaminated soil prior to treatment.

Sincerely,

Christy



From: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com> Sent: Fri 2/22/2019 10:39 AM
To: Courtney O'Gorman
Cc:
Subject: RE: Draft NOC Worksheet 11665 - Cadman
Message
Operations Plan Soils Plant v2 (2019-02-13).pdf (373 KB)
11665cso - Cadman Review.docx (4 MB)

Hi Courtney,

Please find a red-lined version of the NOC worksheet, I only edited Conditions 17 and 21. I have also attached the Ops Plan.

We have been discussing the low NOx burner option, do you need to know this decision prior to issuing the permit?

Christy

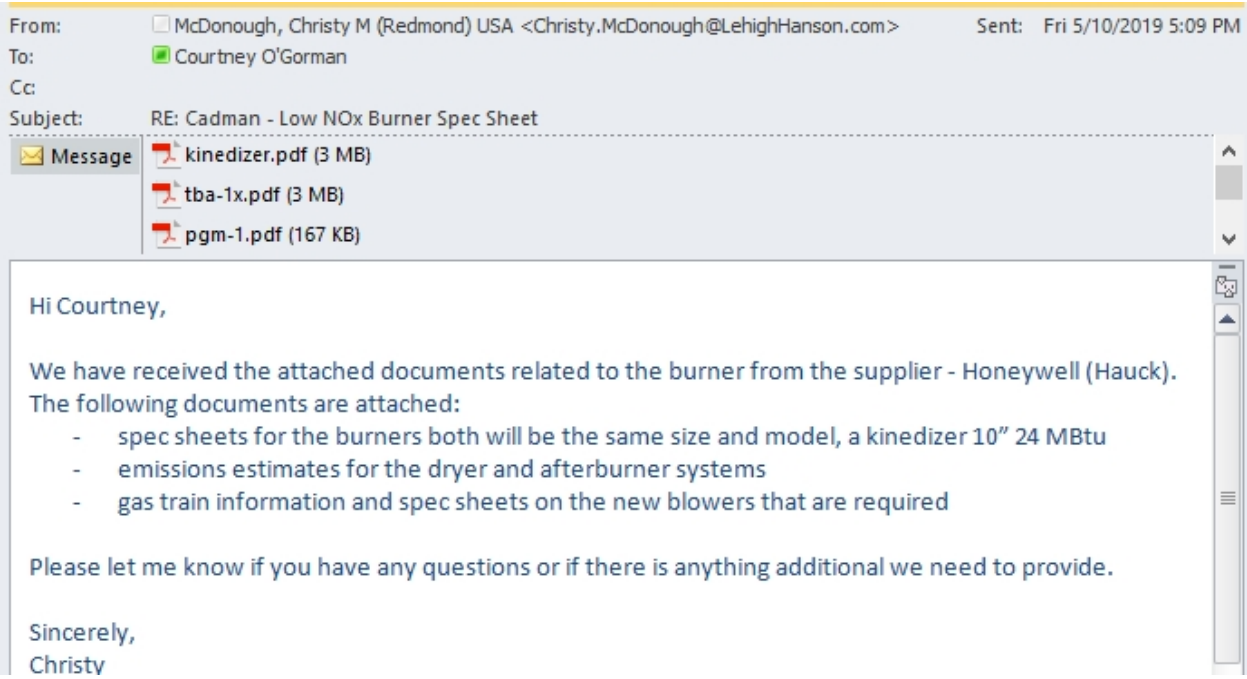
From: Courtney O'Gorman [mailto:CourtneyO@pscleanair.org]
Sent: February 22, 2019 8:01 AM
To: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com>
Subject: RE: Draft NOC Worksheet 11665 - Cadman

Hi Christy,

Thank you very much for your comments. A couple follow-up requests:

- Could you provide a copy of the Operations Plan for the Snohomish Health District permit you referred to in response to Condition 18?
- For Conditions 17 and 21, could you provide red-lined versions of each condition for the changes you are proposing?

Thanks!
Courtney



From: McDonough, Christy M (Redmond) USA <Christy.McDonough@LehighHanson.com> Sent: Fri 5/10/2019 5:09 PM
To: Courtney O'Gorman
Cc:
Subject: RE: Cadman - Low NOx Burner Spec Sheet
Message
kinedizer.pdf (3 MB)
tba-1x.pdf (3 MB)
pgm-1.pdf (167 KB)

Hi Courtney,

We have received the attached documents related to the burner from the supplier - Honeywell (Hauck). The following documents are attached:

- spec sheets for the burners both will be the same size and model, a kinedizer 10" 24 MBtu
- emissions estimates for the dryer and afterburner systems
- gas train information and spec sheets on the new blowers that are required

Please let me know if you have any questions or if there is anything additional we need to provide.

Sincerely,
Christy

M. REVIEWS

Reviews	Name	Date
Engineer:	Courtney O'Gorman	1/9/2019; 5/20/2019
Inspector:	Tom Hudson	1/29/2019
Second Review:	Carole Cenci	1/18/2019; 5/22/2019
Applicant Name:	Christy McDonough	5/28/2019