H.F. Lee Energy Complex
Duke Energy Progress
1199 Black Jack Church Road
Goldsboro, N.C. 27530

November 6, 2017

Mr. William Willets, Section Chief
Division of Air Quality
North Carolina Department of Environmental Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Reference: Construction Permit Application for STAR® Facility
Duke Energy Progress, LLC
H. F. Lee Steam Electric Plant
Goldsboro, North Carolina; Wayne County
Air Quality Permit No. 01812T; Facility ID: 9600017

Dear Mr. Willets:

Duke Energy Progress, LLC currently operates the H.F. Lee Steam Electric Plant under Air Quality Permit No. 01812T42 which will expire on June 30, 2020. Enclosed please find 3 copies of an air permit application including associated application forms and fee to construct an ash beneficiation facility at the H.F. Lee Plant. An additional copy has been sent to the attention of Robert Fisher at the Washington Regional Office.

If you have any questions concerning the contents of this submittal, please contact Erin Wallace at (919) 546-5797 or Mike Graham at (919) 722-6551.

Certification statement:

Based on information and belief formed after reasonable inquiry, the undersigned certifies under penalty of law that all information and statements provided in the enclosure are true, accurate, and complete.

Respectfully submitted,

Jeffery Hines
Station Manager

cc: Robert Fisher, Washington Regional Office
Erin Wallace, Duke Energy
Mike Graham, Duke Energy

PERMIT APPLICATION FOR MODIFICATION OF THE H.F. LEE STEAM ELECTRIC PLANT GOLDSBORO, NORTH CAROLINA

Prepared for:

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Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

This document has been authored and reviewed by the following employees:

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Date

Joshua Ralph
Peer Review

Signature

October XX, 2017
Date

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1.0 INTRODUCTION

Duke Energy Progress, LLC (Duke Energy) is currently permitted (Air Permit No. 01812T42) to operate the H.F. Lee Steam Electric Plant (H.F. Lee Plant) located in Wayne County, North Carolina, which is currently attainment for all regulated pollutants. H.F. Lee Plant currently consists of five (5) combustion turbine generators (CTGs) operating in simple cycle mode. H.F. Lee Plant also consists of three (3) CTGs with supplemental duct firing operating in a 3x1 combined cycle mode and simple cycle mode.

Duke Energy is proposing to install and operate a fly ash processing facility consisting of a Staged Turbulent Air Reactor (STAR®) plant and associated ancillary activities. To support this project, Duke Energy is submitting this application for a minor source construction permit.

North Carolina Department of Environmental Quality (NC DEQ) application forms and tables are located in Appendix A. Supporting emission calculations are presented in Appendix B. Emission calculations support documentation is present in Appendix C. A site plan, plot plan and process flow diagrams for the proposed project can be found in Appendix D. The toxic air dispersion modeling files are presented in Appendix E. The non-hazardous secondary material (NHSM) determination is provided in Appendix F. A draft CAM Plan is provided in Appendix G and Appendix H contains Zoning Commission documentation.

1.1 GENERAL APPLICATION INFORMATION

Following is the applicant's primary point of contact and the address and telephone number where he/she can be reached:

Duke Energy Contact

Erin Wallace, Sr. Environmental Specialist
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1.2 PROJECT LOCATION

The H.F. Lee STAR® facility will be located on the property associated with Duke Energy's H.F. Lee Plant, which is located at 1199 Black Jack Church Road, Goldsboro, NC 27530. Figure 1-1 provides a regional topographic map showing the site location.

1.3 PROJECT OVERVIEW

The STAR® system is a patented technology developed by The SEFA Group Inc. (SEFA) to process feedstock (of any carbon content) like fly ash (wet or dry) along with other ingredient materials into a variety of commercial products. These products are used, not only for application as a partial cement replacement, but for many other commercial and industrial applications. For example, there are several products that SEFA is currently capable of producing because of the flexibility embodied in the STAR® process, including STAR® RP, Ultrix®, Spherix®, Fortimix®, and Permanix™.

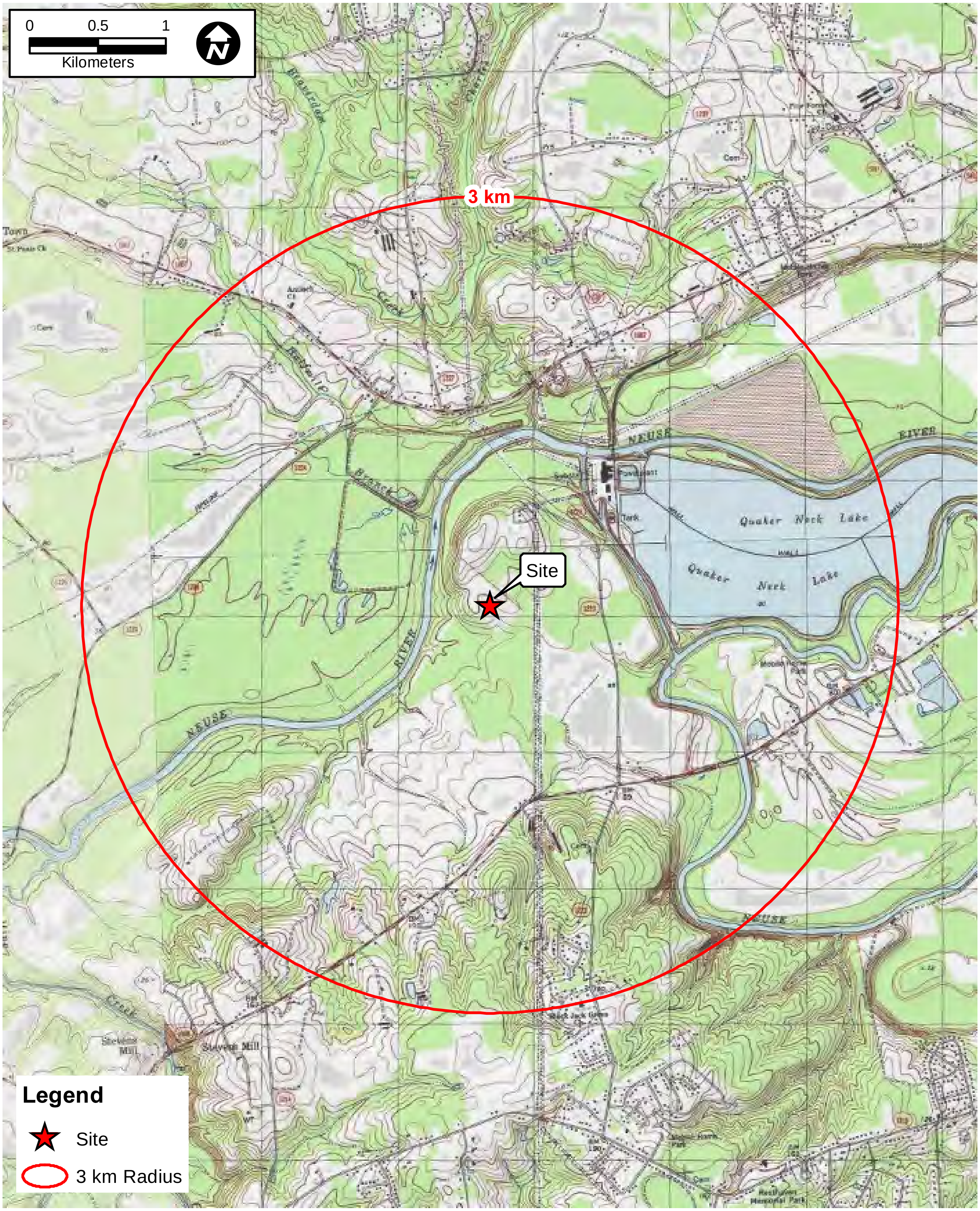


FIGURE 1-1.
SITE LOCATION TOPOGRAPHIC MAP

Sources: Esri Basemap USGS Topographic Quadrangles, ECT 2017.

ECT Environmental Consulting & Technology of North Carolina, PLLC

The associated sources of air emissions proposed to support the STAR® system includes the following:

- Ash Basin excavation.
- Ash Handling/Processing.
- Haul Roads.
- Screener.
- Crusher.
- Two diesel engines associated with a Screener and a Crusher.
- Wet ash receiving area and storage shed.
- Wet ash feed hopper.
- Wet ash unloading pile.
- Two External heat exchangers (EHE) (with baghouses).
- Transfer silo filling and unloading (with bin vent product capture device).
- Feed silo filling and unloading (with bin vent product capture device).
- Storage dome filling and unloading (with bin vent product capture device).
- Loadout silo (with bin vent product capture device).
- Loadout silo chute 1A (with bin vent product capture device).
- Loadout silo chute 1B (with bin vent product capture device).
- FGD Byproduct Silo (with bin vent product capture device).
- FGD Absorbent Silo (with bin vent product capture device).

The H.F. Lee STAR® facility will be designed to produce up to 400,000 tons of fly ash product annually. Figure 1-2 illustrates a general process flow diagram for proposed facility.

1.4 CONTENTS OF THE MODIFICATION PERMIT APPLICATION

Section 2.0 of this document provides a source description of the facility. Section 3.0 presents the projected air emissions. Section 4.0 discusses the regulatory applicability, and Section 5.0 presents the air toxic dispersion modeling methodology and results. The appendices are organized as follows:

- Appendix A—Required North Carolina permit application forms.
- Appendix B—Supporting emission calculations.
- Appendix C—Emission calculations support documentation.
- Appendix D— Facility Drawings.
- Appendix E— Electronic air dispersion modeling.
- Appendix F—NHSM Determination.
- Appendix G—CAM Plan.
- Appendix H—Zoning Commission Documentation.

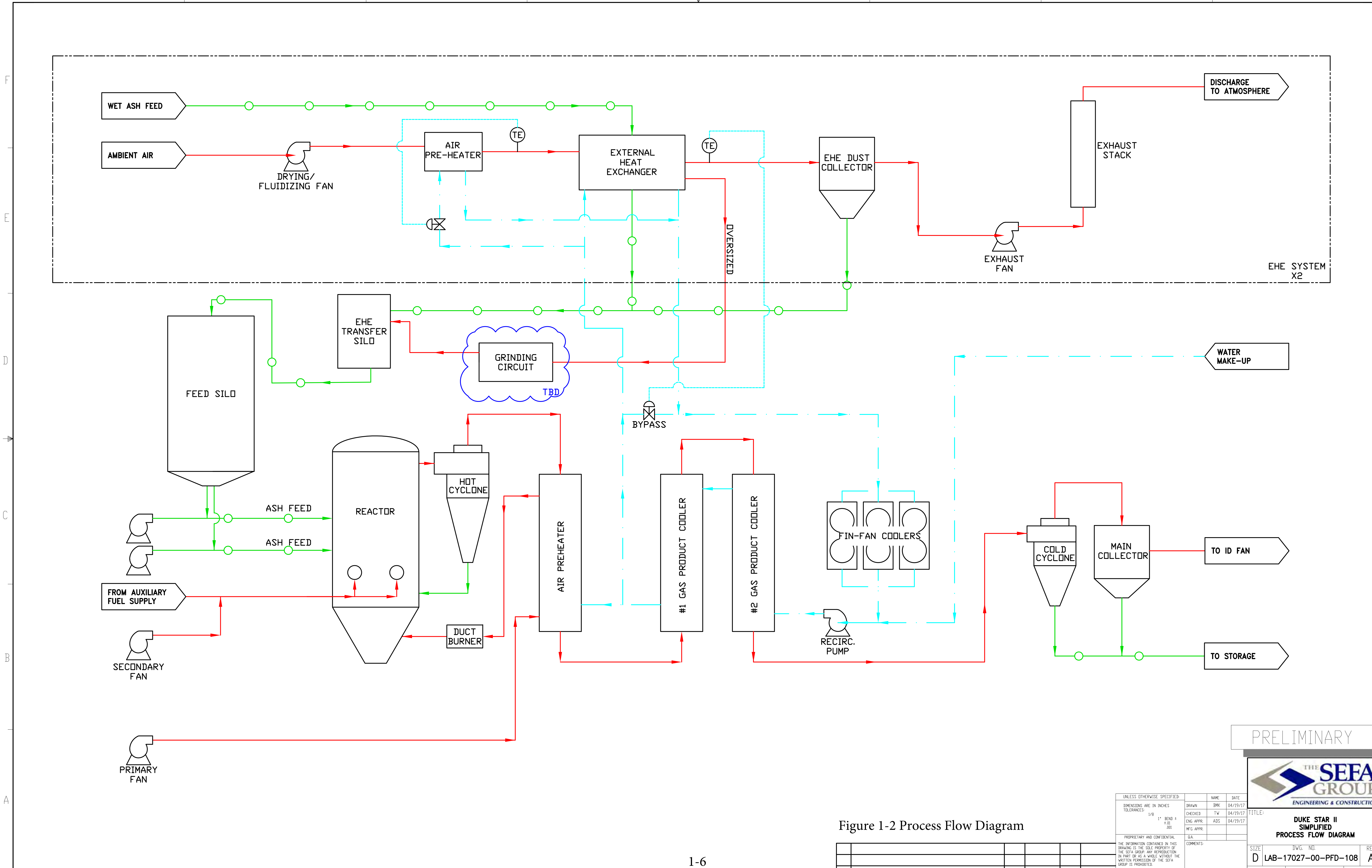


Figure 1-2 Process Flow Diagram

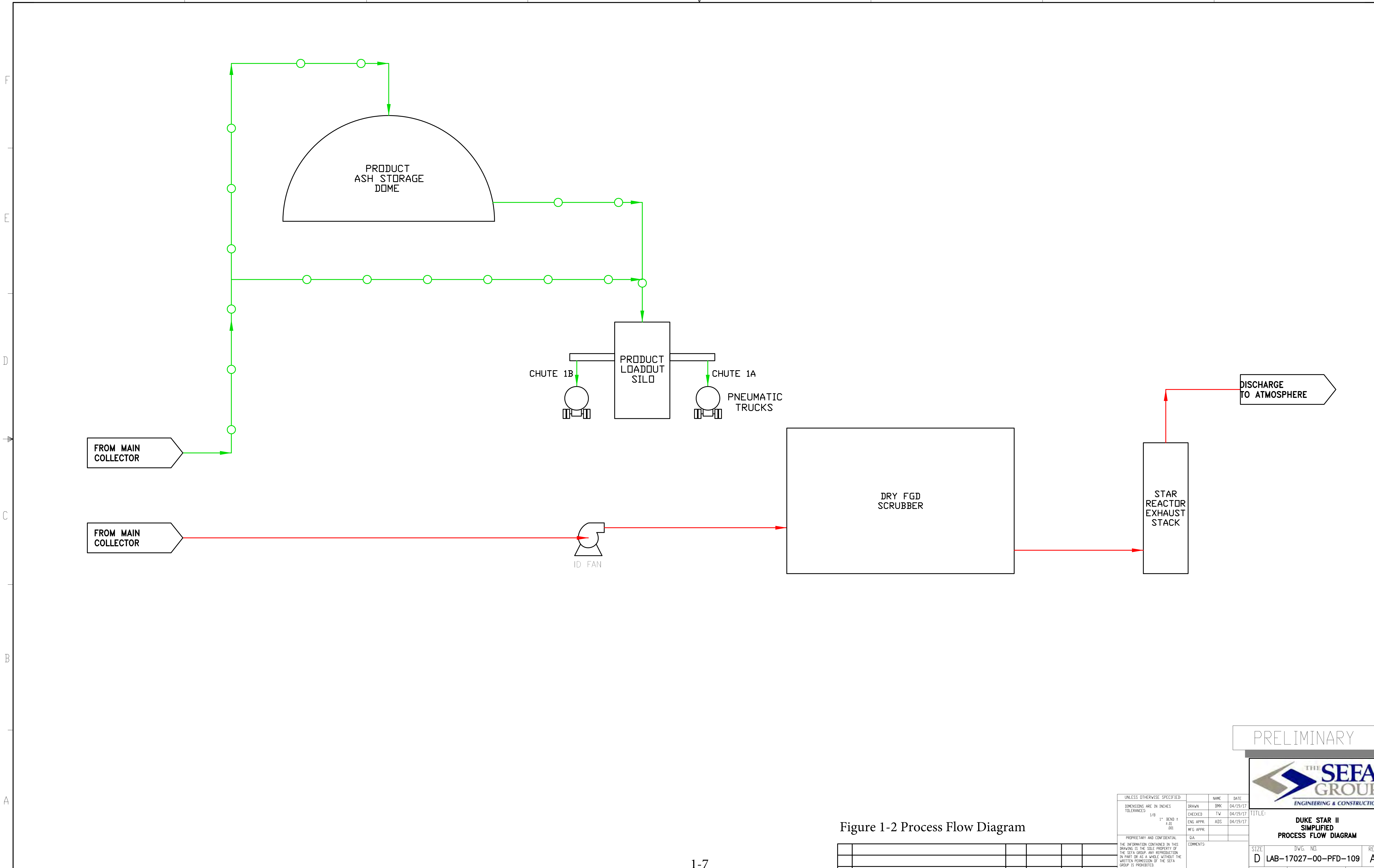


Figure 1-2 Process Flow Diagram

2.0 PROCESS DESCRIPTION

2.1 PRE-REACTOR MATERIAL HANDLING EQUIPMENT

Excavation and processing of materials from the ash ponds to meet the STAR® system fly ash (ingredient) specifications will be under the control of Duke Energy. All fly ash reclaimed from an ash pond delivered for use as an ingredient in the STAR® system must first undergo processing by the owner to be:

A. Free of all, but minimal contaminants (e.g., organic debris, slag);
B. Finely-divided and free-flowing,
C. Have consistent moisture content of ≤ 25%; and
D. Have a consistent chemical composition, including organic content measured by loss on ignition.

The processing sequence of events will include fly ash being excavated and staged to allow for dewatering (ensures moisture content of ≤ 25%). Dewatered fly ash will then be screened to remove contaminants (organic debris, slag, etc.), to produce a consistent chemical composition and a finely divided free-flowing ingredient.

Wet fly ash, nominal 15 percent by weight moisture (water) is delivered via trucks. The wet fly ash can be unloaded from the trucks into the storage shed, unloaded from the trucks to a pile that is then transferred to a storage shed by a front-end loader, or unloaded from the trucks directly into the feed hopper. The wet fly ash in the shed is transferred via front-end loader to a hopper at up to 70 wet "short" tons per hour (tph) (one "short" ton = 2,000 lb), which then conveys the wet fly ash to the mechanical conveyance equipment. The material is discharged from the mechanical conveyance equipment into a material delumper unit to reduce the "overs" material. The material discharged from the delumper unit is then introduced into the EHE by gravity, where it is continually fluidized using preheated air.

The fluidized material is dried by two heat transfer means: (1) intimate contact of the wet, fluidized material with the heated fluidizing air and (2) direct contact of the wet material with hot water heat exchangers located in the EHE. By contact of the material with the outer surfaces of the heat exchanger tube, heating energy is transferred from the tube-side hot water (hot water that is a part of the facility's cooling loop at approximately 350 degrees Fahrenheit [°F] at 250 pounds per square inch gauge [psig]) to the material such that the material heats and, consequently, dries, while the supplied hot water temperature is reduced.

The material is discharged from the EHE units via two means. The primary method of material discharge from the unit is via the fixed-height overflow weir located at the discharge end of the unit. This overflow stream (comprising the majority of the material discharged from the unit) enters the integrally-constructed discharge box/chute of the unit. The second method of material discharge from the unit is via an integrally-constructed underflow discharge screw or rotary valve. The purpose of this underflow discharge stream is to discharge large or oversized material from the unit that, due to these particles' size, may not sufficiently fluidize to the point that they would reach the normal overflow weir height. The material is discharged from the unit at less than 2.0 percent by weight moisture and at a temperature range of 150 to 300°F to downstream material-handling equipment (transfer silos).

The exhaust air is discharged from each EHE through interconnecting ductwork to a high-efficiency bag filter unit operation for feedstock recovery/exhaust air treatment. The moisture- and dust-laden exhaust air enters the unit, and, as the air passes through the filter media, dust is separated from the exhaust air stream with high fractional removal efficiency. The high-efficiency filter media used will be able to achieve a particulate matter (PM) exhaust rate of 0.025 grain per dry standard cubic foot (gr/dscf) of exhaust air (or less).

After the bag filter unit, the cleaned exhaust air stream passes through interconnecting ductwork to the exhaust air fan. The exhaust air volumetric rate is estimated at approximately 41,550 actual cubic feet per minute (acfm) at 10 inches in the water column (water gauge) static pressure (atmospheric pressure) and at approximately between 150-300°F (and at or below the dust loading rate of 0.025 gr/dscf).

2.2 STAR® TECHNOLOGY

As discussed previously, the STAR® process is a patented technology developed by SEFA to process feedstock (of any carbon content) like fly ash (wet or dry) along with other ingredient materials into a variety of commercial products. These products are used not only for application as a partial cement replacement but also as an ingredient in many other commercial and industrial applications.

The STAR® process is inherently flexible in that operating parameters can be varied and different ingredients can be added to produce a desired product. The primary component of the STAR® is a cylindrical refractory-lined vessel in which the majority of the process reactions take place. These reactions can include a range of both chemical and physical reactions. Air required for pneumatic uplift of the solids and for the process reactions enters through the floor of the STAR® system as well as through the walls at multiple locations. The raw feedstock and any other ingredients are introduced through the walls of the STAR®. All of the solids and gases exit together at the top of the reactor. The gas/solids mixture enters a hot cyclone, where the majority of solids are separated from the gas and recycled back to the STAR® system. The high rate of hot recycle solids increases the operating flexibility of the process. The process reactions can occur through this reactor/hot cyclone loop. Due to the high gas velocity, multiple injection points, and recycle solids, there is a significant amount of turbulence created that enhances the mixing of the ingredients and optimizes the reactions. The gas and remaining solids not collected by the hot cyclone are passed over a heat exchanger, which can be designed to preheat the process air, used in heat recovery or to simply cool the gas/solids mixture. Once cooled, the solids are separated from the gas in a fabric filter recovery device. The STAR® system's integral design allows for solids to be removed from the bottom of the reactor or from the recycle loop ultimately to be combined with the solids/gas stream before the heat recovery equipment. By design the STAR® operates under a wide range of process parameters to produce a high-quality class F fly ash for beneficial use in ready mix concrete or other specialty products.

Fly ash entering the reactor is sprayed with water and it is assumed that 90% of the time the water used is recycled instead of raw water. Process wash-down water, Storm water and fly ash contact water may be recycled.

During startup, the process air is heated with a startup burner firing auxiliary fuel (i.e., natural gas or propane) until reactor temperatures reach auto-ignition. At this point, the residual carbon in the fly ash reacts and becomes the heat source for the self-sustaining process. Under certain conditions, auxiliary fuel may be co-fired with the residual carbon in the fly ash. Process controls meter additional raw fly ash through a feeder into the reactor as necessary. As additional material is added to the reactor, processed fly ash is entrained in the exhaust and exits the top of the reactor.

After exiting the reactor, the fly ash entrained in the flue gas passes through a hot cyclone where solids are returned to the reactor for temperature control. The fly ash and flue gas leaving the hot cyclone is conveyed to the air preheater then passes through a gas cooler. The cooled flue gas and fly ash passes through a fabric filter baghouse, which is an integral part of the process for product capture, and then exhausts to a Dry Flue Gas Desulfurization (FGD) system (using hydrated lime as a reagent and an additional fabric filter control device) to reduce sulfur dioxide (SO_2) emissions. The FGD exhaust is vented to the atmosphere through a stand-alone stack.

The Dry FGD system consist of a Circulating Dry Scrubbing System (CDS) and a Fabric Filter baghouse (FF). Flue gas, reagent (hydrated lime) and water are mixed homogenously in the CDS to absorb the acid gas, sulfur oxides, and is collected in the FF baghouse. The clean gas will then flow from the CDS-FF system to an Induced Draft (ID) fan which forces the clean exhaust gas up the stack where it discharges to atmosphere. The byproduct solids are discharged from the FF baghouse into a byproduct storage silo. The system is comprised of a three (3) day storage silo with vent filter, fluidizing air stones and dry unloading chutes. Dry dust unloading chutes are telescoping chutes equipped with small ventilation fans that recirculate displaced air back to the top of the byproduct storage silo.

2.3 POST-REACTOR MATERIAL HANDLING EQUIPMENT

Once the fly ash leaves the reactor, it is collected in the product recovery baghouse and pneumatically transferred to either the storage dome or the loadout silo, each equipped with a bin vent. The truck loadout station uses telescoping chutes and a negative pressure ventilation system to reduce fugitive emissions.

3.0 EMISSIONS CALCULATIONS

For the emission sources to be added for the proposed Project, emission rates are based on process information developed and provided by SEFA, Duke Energy, manufacturers' data, and/or published emission factors such as those contained in the U.S. Environmental Protection Agency's (EPA) Compilation of Air Pollutant Emission Factors, AP-42. Unit design parameters and operational practices have been incorporated into the analysis to make the emission estimates conservative and representative of on-site conditions. Emission estimates are provided for criteria pollutants, hazardous air pollutants (HAP) and toxic air pollutants (TAP).

3.1 PROJECT EMISSIONS

3.1.1 STAR® SYSTEM

Emissions from the STAR® system, include PM/particulate matter with a diameter less than 10 microns (PM_{10})/particulate matter with a diameter less than 2.5 microns ($PM_{2.5}$), SO_2, nitrogen dioxide (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and greenhouse gases (GHG) from the auxiliary fuels and residual carbon in the fly ash. Emissions from the auxiliary fuels were estimated using the most recent emissions factors for natural gas and propane-fired boilers contained in the EPA's Compilation of Air Pollutant Emissions Factors, AP-42. The auxiliary fuel burners are a low-NO_x design intended to comply with North Carolina NO_x control regulations.

Fly ash generated from the combustion of coal may contain trace quantities of heavy metals. Duke Energy performed site-specific ash analysis, data obtained was used to calculate the emission rates for each metal.

Emission factors of the heavy metals in the fly ash before entering the reactor are based on the site specific ash analysis data. Emission factors of the heavy metals in the fly ash after exiting from the reactor are based on the site specific ash analysis data with a contribution from the use of process water in the reactor.

Emissions of NO_x and CO from the processing of the residual carbon in the fly ash were estimated based on emissions estimates from other existing STAR® units. Particulate emissions for the STAR® are based on the baghouse manufacturer's data of 0.025 grain per actual cubic foot (gr/acf). The induced draft fan providing the motive force for the product transfer is rated at 77,500 acfm, at the expected process conditions of 350°F and nominal atmospheric pressure.

SO_2 emissions are a function of the amount of fly ash processed through the reactor, the sulfur content of the fly ash, the amount of sulfur remaining in the product ash exiting the STAR® reactor, and the SO_2 air pollution control equipment removal efficiency, in this case the dry scrubber. Assuming ash sulfur content of 0.15 percent and 100 percent oxidation of the sulfur, the dry scrubber will be designed to provide 100 percent capture and can be operated with an SO_2 control efficiency of 95 percent.

The STAR® system will normally fire auxiliary fuels during system startup and will cut back on auxiliary fuel feed as the reactor reaches self-sustaining conditions. However, emissions have been estimated conservatively by combining the total emissions associated with firing the worst-case auxiliary fuel at full capacity with the total emissions from fly ash processing.

GHG emissions were also calculated from the STAR® reactor. GHG emissions were based on the annual natural gas and propane usages and emissions factors from Table C-1 of Chapter 40, Part 98, Code of Federal Regulations (CFR), Subpart C, along with the loss of ignition of the fly ash. Appendix B provides detailed spreadsheets and example calculations.

3.1.2 MATERIAL HANDLING

The material handling system includes one wet ash raw feed unloading pile, one wet ash storage shed, one wet ash EHE feed hopper, two EHE's, raw feed silos, one loadout silo, two loadout chutes, transfer silos, a product storage dome, FGD byproduct silo, FGD absorbent silo, screener, crusher, ash basin and handling and haul roads. The silos are each equipped with a bin vent product capture device to minimize product losses associated with the pneumatic transfer process. The truck loadout station uses telescoping chutes and a negative pressure ventilation system to reduce fugitive emissions.

Particulate emissions from the silos were estimated using the maximum short- and long-term transfer rates and appropriate emissions factors from previous STAR® facilities.

Trace metal concentration data discussed previously for the STAR® system were used in conjunction with the calculated PM emissions rates to estimate emissions of trace metal from the material handling activities. Appendix B contains detailed spreadsheets and example calculations.

3.1.3 FUGITIVE EMISSIONS

Additional particulate emissions were also calculated for the wet ash receiving process, ash handling process (including screening and crushing activities) and haul roads. Windblown fugitive dust emissions were also calculated from the unloading pile. The emissions were calculated using the appropriate emissions factors from AP-42. Appendix B contains detailed spreadsheets and example calculations.

3.1.4 PROJECT EMISSIONS

Table 3-1 presents a summary of the proposed project emissions.

Table 3-1. Proposed Project Emissions

Pollutant	Proposed Project Emissions	
	lb/hr	tpy
PM	26.52	112.49
PM_{10}	23.50	99.43
$PM_{2.5}$	13.52	55.73
SO_2	24.94	98.53
NO_x	59.72	198.96
CO	25.01	92.26
VOC	3.21	9.54
Lead	5.30E-04	2.31E-03
GHG (mass basis)	--	116,599
GHG (CO_2e basis)*	--	116,604
Sulfuric acid mist	0.10	0.44

Note: lb/hr = pound per hour.
PM_{10} = particulate matter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers.
CO_2e = carbon dioxide equivalent.

Source: ECT, 2017.

3.2 MODIFIED PREVENTION OF SIGNIFICANT DETERIORATION AVOIDANCE CONDITION

Duke Energy will maintain emissions below the Prevention of Significant Deterioration (PSD) avoidance limits under conditions in Section 2.1.D.5.a of Air Permit No. 01812T42 for each PSD pollutant ($PM/PM_{10}/PM_{2.5}$, SO_2, NO_x, CO, VOCs, sulfuric acid and lead). Specifically, Duke Energy is requesting that the PSD avoidance condition will address each PSD pollutant emissions without any change to the respective avoidance limits indicated in Section 2.1.D.5.a Air Permit No. 01812T42 for the following units:

Existing units:

- Three natural gas/No. 2 fuel oil-fired simple/combined-cycle internal combustion turbines - Lee IC Unit 1A, Lee IC Unit 1B and Lee IC Unit 1C (Units 15, 16 and 17).

Proposed units:

STAR® unit (ES-31) and associated sources proposed to support the STAR® system as mentioned in Section 1.3.

The PSD Avoidance limits are shown in Table 3-2. Please note that GHG emissions are expected to increase by a value more than the Significant Emission Rate (SER) for GHG emissions. GHG emissions have been categorized as an "anyway" pollutant and require another PSD pollutant to be subject to PSD review before PSD review applies to GHG emissions. Therefore, GHG are not subject to PSD review for the proposed project. The emission calculation methodologies used to prepare the values are provided in Appendix B.

Table 3-2. PSD Avoidance Limits

Pollutant	Limits (tpy)
PM/ PM_{10}/ $PM_{2.5}$	218.2
SO_2	14,663.1
NO_x	3,414.6
CO	829.3
VOC	65.1
Lead	0.77
Sulfuric acid mist	64.3

Source: Section 2.1.D.5.a of Air Permit No. 01812T42.

3.3 TOXIC EMISSIONS

The toxic permitting emission rate (TPER) analysis was performed using the procedures outlined in 15A NCAC 2Q.0706.

The first step of the TPER analysis is to determine if the modification results in "a net increase in emissions of any toxic air pollutant that the facility was emitting before the modification" or if the modification results in "emissions of any toxic air pollutant that the facility was not emitting before the modification if such emissions exceed the levels contained in Rule .0711." The proposed modification is the installation of the STAR® unit and associated equipment. Table 3-3 presents the potential emissions of the TAPs from the proposed modification at the H.F. Lee STAR® facility. Please note that the diesel engines (ES-39B and ES-40B) were not included in the TPER analysis per 15A NCAC 2Q.0702 (a)(27). Additional calculation information is provided in Appendix B.

Using the list of TAPs determined from the first step of the TPER analysis, the emissions from the H.F. Lee STAR® facility, including the proposed modifications (Table 3-3) and the existing equipment, were compared to the TPERs, presented in Table 3-4, to identify the compounds exceeding their respective TPERs. The emissions for the existing turbines and auxiliary equipment were taken from the Toxic Modeling Analysis Appendix A Table for Potential Emissions (April 2011). Once the compounds exceeding the TPERs were identified, an air dispersion modeling analysis was completed for the whole H.F. Lee STAR® facility including the STAR® unit, existing combined and simple cycle turbines and auxiliary equipment.

To maximize operational flexibility of the H.F. Lee STAR® facility, Duke Energy is requesting permit limits based on the optimization of the potential emissions from the STAR® unit and existing equipment, which are presented in Tables 3-5 through 3-7 for the short-term and annual pollutants, respectively. Appendix B presents the calculations of the potential TAP emissions from the STAR® unit and from existing equipment. It also includes summary of the potential and optimized emissions for the H.F. Lee facility.

Table 3-3. Net Emission Increases – Proposed STAR® Project

Compound	Total Emissions		
	lb/hr	lb/day	lb/yr
Sulfuric acid	1.00E-01	2.40	-
Benzene	-	-	3.34
Formaldehyde	7.64E-03	-	-
n-Hexane	-	2.54	-
Toluene	1.32E-03	3.17E-02	-
Arsenic	-	-	8.60
Beryllium	-	-	0.94
Cadmium	-	-	0.61
Chromium VI (Soluble Chromate)	-	4.05E-04	
Manganese	-	3.34E-02	-
Mercury	-	4.64E-04	-
Nickel	-	1.71E-02	-

Table 3-4. Summary of Potential TAP Emissions from the H.F. Lee facility and Comparison the TPERs

Compound	Total Emissions			TPER			Exceed TPER		
	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr
Sulfuric acid	270.61	6,494.64		0.025	0.25		YES	YES	
Benzene			1,787.54			8.1			YES
Formaldehyde	11.61			0.04			YES		
n-Hexane		64.18			23.0			YES	
Toluene	4.42	106.11		14.4	98.0		NO	YES	
Arsenic			289.30			0.053			YES
Beryllium			8.86			0.28			YES
Cadmium			124.13			0.37			YES
Chromium VI (Soluble Chromate)		2.12			0.013			YES	
Manganese		302.91			0.630			YES	
Mercury		0.46			0.013			YES	
Nickel		1.79			0.013			YES	

Table 3-5. Comparison of Potential and Optimized 1-hr TAP Emissions from the H.F. Lee Facility

Compound	Potential Emissions (lb/hr)	Optimized Emissions (lb/hr)	Ratio of Potential to Optimized Emissions
Formaldehyde	11.61	1,776.30	0.0065
Sulfuric acid	270.61	947.13	0.29
Toluene	4.42	961,534.32	0.0000046

Table 3-6. Comparison of Potential and Optimized Daily TAP Emissions from the H.F. Lee Facility

Compound	Potential Emissions (lb/day)	Optimized Emissions (lb/day)	Ratio of Potential to Optimized Emissions
Sulfuric acid	6,494.64	10,781.10	0.60
n-Hexane	64.18	138,647.28	0.00046
Toluene	106.11	11,593,642.41	0.0000092
Chromic VI	2.12	616.41	0.0034
Manganese	302.91	62,703.25	0.0048
Mercury	0.46	1,204.33	0.00038
Nickel	1.79	232.17	0.0077

Table 3-7. Comparison of Potential and Optimized Annual TAP Emissions from the H.F. Lee Facility

Compound	Potential Emissions (lb/yr)	Optimized Emissions (lb/yr)	Ratio of Potential to Optimized Emissions
Arsenic	289.30	387.55	0.75
Benzene	1,787.54	510,598.49	0.0035
Beryllium	8.86	212.67	0.042
Cadmium	124.13	14,274.49	0.0087

4.0 REGULATORY ANALYSIS

Federal and state regulations were reviewed to determine their applicability to and implications for the various emissions sources at the H.F. Lee STAR® facility. The regulations that may apply only to the proposed emissions sources as a result of modification at the facility are discussed in the following subsections.

EPA promulgated regulations that set the national ambient air quality standards (NAAQS) for seven criteria compounds: SO_2, CO, NO_x, PM_{10}, $PM_{2.5}$, lead, and ozone (O_3). Two classes of ambient air quality standards have been established: (1) primary standards defining levels of air quality that the EPA has judged as necessary to protect public health; and (2) secondary standards defining levels for protecting soils, vegetation, wildlife, and other aspects of public welfare. Table 4-1 lists the national primary and secondary and state ambient air quality standards in micrograms per cubic meter ($\mu g/m^3$). The NC DEQ ambient air quality standards are also included in Table 4-1.

According to 40 CFR §81.334, the current attainment status for the project area, Wayne County, for each of the criteria pollutants is provided in Table 4-2. The proposed facility is located in an area that is in attainment of the NAAQS.

4.1 PSD (40 CFR 52.21)/ 15A NCAC 02D .0530

The determination of whether PSD regulations are applicable to a specific project is conducted in two parts: first dealing with the air quality status of the location of the project and second evaluating the type and quantity of PSD-regulated pollutants that will be emitted. For the regulations to apply to a given project, it must first be determined whether the proposed location is in an area that has been classified as attainment or as unclassifiable. The H.F. Lee facility is in Wayne County, which is designated as attainment or unclassifiable/attainment for all the criteria pollutants.

Table 4-1. Ambient Air Quality Standards

Pollutant	Averaging Period*	NAAQS (µg/m³†)		NC DEQ Regulation Standards (µg/m³†)	
		Primary	Secondary	Primary	Secondary
SO_2	Annual‡	80	—§	80	—§
	24-hour‡	365	—§	365	—§
	1-hour	196	—§	196	—§
	3-hour	—§	1,300	—§	1,300
PM_{10}	24-hour	150	150	150	150
$PM_{2.5}$	Annual	12	15	12	15
	24-hour	35	35	35	35
CO	8-hour	10,000	—§	10,000	—§
	1-hour	40,000	—§	40,000	—§
Ozone	8-hour	0.070 ppm	0.070 ppm	0.075 ppm	0.075 ppm
NO_2	Annual	100	100	100	100
	1-hour	188	—§	188	—§
Lead	3-month£	0.15	0.15	0.15	0.15

Note: ppm = part per million.
ppb = part per billion. NO_2 = nitrogen dioxide.

*National short-term ambient standards may be exceeded once per year; annual standards may never be exceeded. North Carolina short-term standards may be exceeded once per year, annual standards may never be exceeded. Ozone standard is attained when the expected number of days of an exceedance is equal to or less than one.
†Standards expressed in micrograms per cubic meter (µg/m³) unless otherwise noted.
‡Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in this rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.
§No ambient standard for this pollutant and/or averaging period.
£The rule signed October 15, 2008, finalized a new lead standard. The 1978 lead standard of 1.5 µg/m³ as a quarterly average remains in effect until one year after an area is designated for the 2008 standard, except in areas designated nonattainment for the 1978 standard, where, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

Sources: 40 CFR 50.
15A NCAC 2D .0400.

Table 4-2. Attainment Status for Wayne County, North Carolina

Pollutant	Attainment Status
CO	Unclassifiable/attainment
SO_2	Attainment
NO_2	Unclassifiable/attainment
PM_{10}	Unclassifiable/attainment
$PM_{2.5}$	Unclassifiable/attainment
Ozone (8-hour)	Unclassifiable/attainment
Lead	Unclassifiable/attainment

Source: 40 CFR 81.334.

The project's potential to emit (PTE) is then reviewed to determine whether it constitutes a major stationary source or major modification. A major stationary source is defined as either one of the sources identified in 40 CFR 52.21 and which has a PTE 100 tons or more per year of any regulated pollutant, or any other stationary source which has the PTE 250 tons or more per year of a regulated pollutant. A major modification is defined as a source having an increase in emissions above the PSD significant emission rates.

As explained in Section 3.2, Duke Energy will maintain emissions below the PSD avoidance limits under conditions in Section 2.1.D.5.a of Air Permit No. 01812T42 for each PSD pollutant. Again, GHG emissions are expected to increase by a value more than the Significant Emission Rate (SER) for GHG emissions. GHG emissions have been categorized as an "anyway" pollutant and require another PSD pollutant to be subject to PSD review before PSD review applies to GHG emissions. Therefore, GHG are not subject to PSD review for the proposed project.

4.2 NORTH CAROLINA AMBIENT AIR QUALITY STANDARDS

4.2.1 15A NCAC 2Q .0101 - REQUIRED AIR QUALITY PERMITS

This regulation requires the owner or operator of all sources for which there is an ambient air quality or emission control standard, which is not exempted from permit requirements, to apply for an air quality permit. The owner or operator of a source required to have a permit shall not begin construction or operation of the source without first obtaining a permit. The STAR® system and the material handling equipment listed in Section 1.3 are not categorically exempt from permitting. Thus, Duke Energy is submitting this air permit application to obtain a permit prior to any construction or change in method of operation of these sources. Duke Energy will submit a separate Title V permit application within 12 months after the initial start-up of the proposed project.

4.2.2 15A NCAC 2D .0400. AMBIENT AIR QUALITY STANDARDS

The purpose of the ambient air quality standards is to establish certain maximum limits on parameters of air quality considered desirable for the preservation and enhancement of the quality of the State's air resources. The ambient air quality standards for North Carolina are the same as those promulgated by the EPA. All standards promulgated by the EPA as of June 22, 1988, have been adopted and incorporated by reference as the official ambient air quality standards of the State of North Carolina. Duke Energy expects that the proposed project will be in compliance with the applicable air quality standards.

4.2.3 15A NCAC 2D .0515 – PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

Allowable emissions of particulate matter from any industrial process for which no other emission control standards are applicable shall not exceed the amounts calculated by the following equation:

$E = 4.10 \times P^{0.67}$ for $P \leq 30$ tons per hour

or

$E = 55.0 \times P^{0.11} - 40$ for $P > 30$ tons per hour

where: E = allowable emission rate in pounds per hour

P = process weight in tons per hour

Solid fuels charged are considered as part of the process weight, liquid and gaseous fuels and combustion air are not.

Table 4-3 presents the process weight rates and associated allowable emissions for the equipment onsite. Compliance with this requirement is expected and appropriate monitoring and recordkeeping will be performed to verify this expectation.

Table 4-3. 15A NCAC 2D .0515 Allowable Emissions

Emissions Source	Process Rate (tph)	Allowable PM (lb/hr)
EHE (Units1 and 2)	70	47.8
Feed silo filling	125	53.5
Feed silo unloading	75	48.4
FGD Byproduct Silo filling	1.75	5.97
FGD Byproduct Silo unloading	300	63
FGD Absorbent Silo filling	25	35.4
FGD Absorbent Silo unloading	1.5	5.4
STAR® Reactor	75	48.4
Storage dome filling	75	48.4
Storage dome unloading	275	62.02
Transfer silo filling	125	53.5
Transfer silo unloading	75	48.4
Loadout	300	63
Loadout chute 1A	100	51.3
Loadout chute 1B	100	51.3
Screener	165	56.4
Crusher	7	15.1

Note: lb/hr = pound per hour.

Source: 15A NCAC 2D .0515.

4.2.4 15A NCAC 02D .0516 – SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

Emission of sulfur dioxide from any source of combustion that is discharged from any vent, stack, or chimney shall not exceed 2.3 pounds of sulfur dioxide per million BTU input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. Sulfur dioxide formed or reduced as a result of treating flue gases with sulfur trioxide or other materials shall also be accounted for when determining compliance with this standard.

A source subject to an emission standard for sulfur dioxide in Rules 2D .0524, .0527, .1110, .1111, .1205, .1206, .1210, or .1211 of 15A NCAC shall meet the standard in that particular rule instead of the standard in the above paragraph.

The STAR® unit is not subject to any sulfur dioxide standards; therefore, it is subject to the requirements in 2D .0516. Compliance with the emission standard of 2.3 lb/million Btu is expected based on the conceptual design of the SO_2 device. Appropriate monitoring and recordkeeping will be performed to verify this expectation.

4.2.5 15A NCAC 2D .0521 – CONTROL OF VISIBLE EMISSIONS

The intent of this Rule is to prevent, abate and control emissions generated from fuel burning operations and industrial processes where visible emissions can be reasonably expected to occur, except during startup, shutdowns, and malfunctions approved as such according to procedures approved under 15A NCAC 2D .0535.

This Rule shall apply to all fuel burning sources and to other processes that may have a visible emission. However, sources subject to a visible emission standard in Rules .0506, .0508, .0524, .0543, .0544, .1110, .1111, .1205, .1206, .1210, .1211, or .1212 of this Subchapter shall meet that standard instead of the standard contained in this Rule.

For sources manufactured after July 1, 1971, visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period. However, except for sources required to install, operate, and maintain continuous opacity monitoring systems (COMS), compliance with the 20 percent opacity limit shall be determined as follows:

i. No six-minute period exceeds 87 percent opacity;

ii. No more than one six-minute period exceeds 20 percent opacity in any hour; and

iii. No more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

Duke Energy assumes the proposed STAR® unit and associated sources of air emissions will be subject to this rule. Compliance will be achieved through the use of the proposed emission control equipment.

4.2.6 15A NCAC 02D .0530 PREVENTION OF SIGNIFICANT DETERIORATION

As explained above in Section 4.1, the Project will maintain emissions below the PSD avoidance limits under conditions in Section 2.1.D.5.a of Air Permit No. 01812T42, therefore the PSD review provisions of this rule do not apply.

4.2.7 15A NCAC 2D .0535 - EXCESS EMISSIONS REPORTING AND MALFUNCTIONS

This regulation applies to all permitted facilities and outlines the procedures of reporting excess emissions as a result of malfunctions or operational upsets. The facility owner/operator must notify the appropriate regional office of any excess emissions that last for greater than four hours. This report must be made by 9:00 a.m. Eastern time of the Division's next business day of becoming aware of the occurrence. Notify the Director or designee immediately when the corrective measures have been accomplished. Submit a written report to the Director within 15 days after the request.

4.2.8 15A NCAC 02D .0540 - PARTICULATES FROM FUGITIVE DUST EMISSION SOURCES

This rule requires that fugitive dust emissions not cause or contribute to substantive complaints, excessive fugitive dust emissions at the property boundary, or NAAQS violations. Dust emissions from the Ash handling and Loading/Unloading sources are expected to be in compliance. Appropriate monitoring and recordkeeping will be performed to verify this expectation.

4.2.9 15A NCAC 02D .0544 - PREVENTION OF SIGNIFICANT DETERIORATION REQUIREMENTS FOR GREENHOUSE GASES

This rule indicates that a major stationary source or major modification shall not be required to obtain a PSD permit on the sole basis of its greenhouse gases emissions. Duke Energy will maintain emissions below the PSD avoidance limits under conditions in Section 2.1.D.5.a of Air Permit No. 01812T42 for each PSD pollutant, thus, PSD review for GHGs does not apply.

4.2.10 15A NCAC 02D .1100 - CONTROL OF TOXIC AIR POLLUTANTS

This rule applies to all facilities that emit a toxic air pollutant that are required to have a permit under 15A NCAC 2Q .0700. NC DEQ requires any facility that emits a regulated TAP at a rate greater than the TPER, as listed in the 15A NCAC 2Q .0711, demonstrate through air dispersion modeling that emissions from the facility are not resulting in the exceedance of the Acceptable Ambient Level (AAL) for that pollutant, as listed in 15A NCAC 2D .1104. Per 2Q.0700, The H.F. Lee facility has the potential to emit TAPs in excess of de minimis thresholds. Detailed explanation of toxic modeling analyses is presented in Section 5 of this application.

4.2.11 15A NCAC 02D .1200 - CONTROL OF EMISSIONS FROM INCINERATORS

Fly ash is not a waste material; instead, it is a feedstock (or an ingredient) for the H.F. Lee STAR® facility. The coal fly ash is a raw material for the proposed H.F. Lee STAR® facility. It is required to produce beneficiated product as per the standards of American Society for Testing and Materials (ASTM) Standard C618, and American Association of State

Highway and Transportation Officials (AASHTO) Standard M 295 for pozzolan-grade fly ash.

Based on the determination that fly ash, as proposed to be used, is not a waste material, the H.F. Lee STAR® facility is not subject to this requirement. NC DEQ's concurrence with this conclusion is supported by the documentation included in Appendix F.

4.2.12 15A NCAC 02D .1400 – NITROGEN OXIDES

Under this Section Rules .1407 through .1409(b) and .1413 applies to facilities with potential emissions of NO_x equal to or greater than 100 tons per year or 560 pounds per calendar day beginning May 1 through September 30 of any year in the following areas: (1) Cabarrus County; (2) Gaston County; (3) Lincoln County; (4) Mecklenburg County; (5) Rowan County; (6) Union County; and (7) Davidson Township and Coddle Creek Township in Iredell County. The H.F. Lee STAR® facility is in Wayne county which is not in the list provided above, hence this rule is not applicable.

Under the same Section Rules .1416 through .1423 apply statewide and Rule .1409(c) applies to Gas Pipeline Stations. Rule .2400 has expired and is no longer valid, Rules .1416, .1417, .1419, .1420, .1421 and .1422 are being repealed and H.F. Lee STAR® facility does not fall under the category of a Gas Pipeline Station, hence this section is not applicable. Rule .1418 applies to any fossil fuel-fired stationary boiler, combustion turbine, or combined cycle system having a maximum design heat input greater than 250 million Btu per hour and large reciprocating internal combustion (IC) engines rated at equal to or greater than 2,400 brake horsepower. The H.F. Lee STAR® facility is not proposing any boiler or turbine or large IC engine which will meet the definition above, hence Rule .1418 is not applicable.

Under this standard, Rule .1400 is not applicable to incinerator or thermal or catalytic oxidizer used primarily for the control of air pollution, emergency generator, emergency use internal combustion engine and stationary internal combustion engine less than 2400 brake horsepower that operates no more than the following hours between May 1 and September 30:

(A) for diesel engines:

t = 833,333 / ES

(B) for natural gas-fired engines:

t= 700,280 / ES

where t equals time in hours and ES equals engine size in horsepower.

There are two stationary internal combustion diesel engines proposed at the site:

- Screener Engine – 91 hp, 2,600 hr/yr
- Crusher Engine – 300 hp; 365 hr/yr.

Based on the equation provide above the diesel engines will be exempt if they operate less than the following hours:

- Screener Engine – 9,157 hours
- Crusher Engine – 2,777 hours

The diesel engines will operate less than the allowable hours; therefore, they are exempt.

The STAR® process does not meet the definition of a fuel-burning operation or meet the definition of any such unit mentioned previously. The combustion of natural gas or propane during startup is direct-fired with all of the STAR® ingredients, including fly ash. As described above, rule .1400 is not applicable to the STAR® unit or any other units of the H.F. Lee STAR® facility.

4.3 FEDERAL REGULATIONS

Federal regulations were reviewed to determine their applicability to the proposed H.F. Lee STAR® facility. The federal regulations that were found to be potentially applicable only to the proposed STAR® are discussed as follows:

4.3.1 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS are technology-based standards applicable to new and modified stationary sources. The standards relevant to the proposed H.F. Lee STAR® facility are discussed in this sub-section.

4.3.1.1 NSPS for Commercial and Industrial Solid Waste Incineration Units (40 CFR 60, Subpart CCCC)

Unless exempt, combustion of a NHSM as defined in 40 C.F.R. Part 241 would subject an emissions unit to 40 CFR 60 Subpart CCCC-Standards Of Performance For Commercial And Industrial Solid Waste Incineration Units (CISWI). In accordance with 40 CFR 241.3(b)(3), "non-hazardous secondary materials used as an ingredient in a combustion unit that meet the legitimacy criteria…" are not solid wastes. Additionally, in accordance with 40 CFR 241.3(b)(4), "…ingredient products that are used in a combustion unit and are produced from the processing of discarded non-hazardous secondary materials and that meet the legitimacy criteria" are not solid wastes. Based on this it is determined that use of fly ash is not a waste but an ingredient. Therefore, the H.F. Lee STAR® unit is not subject to CISWI.

4.3.1.2 NSPS for Large Municipal Waste Combustors (40 CFR 60, Subpart Eb)

These standards apply to large municipal waste combustor units with a combustion capacity greater than 250 tons per day of municipal solid waste that initiated construction after September 20, 1994. According to 40 CFR 60.51b, a municipal waste combustor means "any equipment that combusts solid, liquid, or gasified municipal solid waste." Municipal solid waste means household, commercial, retail, or institutional waste and specifically excludes "industrial process or manufacturing wastes." Even if the raw fly ash were considered a solid waste, it does not meet the definition of municipal solid waste. The proposed H.F. Lee STAR® unit, therefore, is not subject to the NSPS codified under 40 CFR 60, Subpart Eb.

4.3.1.3 NSPS Subpart IIII—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Per 40 CFR 60.4200(a)(2), the provisions of this subpart are applicable to, "Owners and operators of stationary compression ignition internal combustion engines that commence construction after July 11, 2005, where the stationary compression ignition internal combustion engines are:

(i) Manufactured after April 1, 2006, and are not fire pump engines, or

(ii) Manufactured as a certified National Fire Protection Association fire pump engine after July 1, 2006."

The diesel-fired engines will commence construction (be ordered) after July 11, 2005, and be manufactured after April 1, 2006; therefore, are subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Per 40 CFR 60.4201(a), Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later non-emergency stationary CI ICE with a maximum engine power less than or equal to 2,237 kilowatt (KW) (3,000 horsepower (HP)) and a displacement of less than 10 liters per cylinder to the certification emission standards for new nonroad CI engines in 40 CFR 89.112, 40 CFR 89.113, 40 CFR 1039.101, 40 CFR 1039.102, 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, and 40 CFR 1039.115, as applicable, for all pollutants, for the same model year and maximum engine power. Proposed diesel engines (ES-39B and ES-40B) have displacement less than 10 liters per cylinder and engine power is less than 3000 HP, the emissions standards under this rule are applicable. Duke Energy will comply with all applicable Subpart IIII emissions limitation, monitoring, recordkeeping, and reporting requirements.

4.3.2 NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANT (NESHAP)

NESHAP are standards for HAPs from stationary sources. In general, the 40 CFR 63 NESHAP are only applicable to major HAP sources (i.e., facilities that have potential emissions of an individual HAP of 10 tpy or more and potential emissions of total HAPs of 25 tpy or more). The H.F. Lee facility has potential HAP emissions above the NESHAP standard. Therefore, the H.F. Lee facility is a major source of HAP emissions. The applicability of relevant NESHAP is discussed in the following subsections.

4.3.2.1 NESHAP for Stationary Reciprocating Internal Combustion Engines (40 CFR 63, Subpart ZZZZ)

NESHAP Subpart ZZZZ applies to new and existing internal combustion engines located at major and area sources. The engines associated with the screening and crushing are subject to Subpart ZZZZ. Since the engines are new and located at a major source of HAP, the requirements of 40 CFR 60, Subpart IIII, must be met to meet the requirements of Subpart ZZZZ. The engines will meet applicable NSPS requirements.

4.3.2.2 NESHAP for Industrial, Commercial and Institutional Boilers and Process Heaters (40 CFR 63, Subpart DDDDD)

40 CFR 63 Subpart DDDDD, establishes national emission limitations and work practice standards for HAP emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. None of the proposed units at the H.F Lee STAR® facility meet the definition of a boiler or a process heater under 40 CFR 63.7575. Therefore, the STAR® system is not subject to the NESHAP codified under 40 CFR 63, Subpart DDDDD.

4.3.2.3 NESHAP for Industrial, Commercial and Institutional Boilers Area Sources (40 CFR 63, Subpart JJJJJJ)

These standards apply to industrial, commercial, and institutional boilers at an area source of HAP. An area HAP source is defined as a facility that has the potential to emit less than 10 tpy of any individual HAP or less than 25 tpy of any combination of HAPs (40 CFR 63.2). The H.F. Lee facility is major source of HAPs. Therefore, no sources are subject to the NESHAP codified under 40 CFR 63, Subpart JJJJJJ. In addition, no proposed units for the project meet the definition of a boiler under 40 CFR 63.11237.

4.3.3 40 CFR 64 - COMPLIANCE ASSURANCE MONITORING REGULATIONS

On October 27, 1997, EPA promulgated the Compliance Assurance Monitoring (CAM) Rule, 40 CFR Part 64, which addresses monitoring for certain emission units at major sources, thereby assuring that facility owners and operators conduct effective monitoring of their air pollution control equipment. In order to be subject to CAM, the following criteria must be met:

- The unit is subject to an emissions limitation or standard for the pollutant of concern;
- An "active" control device is used to achieve compliance with the emission limit; and
- The emission unit's pre-control potential-to-emit is greater than the applicable major source threshold.

For emissions of SO_2 from the STAR® system (ES-31), Duke Energy is subject to CAM requirements for the state SO_2 standard, i.e., 2.3 lb/MMBtu per 15A NCAC 02D .0516. A preliminary draft of a CAM plan is included in Appendix G for the agency's review.

5.0 AIR QUALITY IMPACT ASSESSMENT

5.1 MODEL SELECTION

For this modeling analysis, the American Meteorological Society (AMS)/EPA Regulatory Model Improvement Committee (AERMIC) model (AERMOD) system components were used. These include the existing regulatory components (AERMOD, AERMOD meteorological preprocessor program [AERMET], AERMOD terrain preprocessor program [AERMAP], and Building Profile Input Program [BPIP] for Plume Rise Model Enhancement [PRIME] [BPIPPRM]), AERSURFACE and AERMINUTE. AERMOD (Version 16216r) was used in the refined modeling analyses for flat, elevated, and complex terrain.

The procedures used in conducting the air quality modeling analyses followed the requirements outlined in the 40 CFR 51, Appendix W, Guidelines on Air Quality Models; NC DEQ Air Toxic Quality Modeling Guidelines, February 2014; and direction received from the NC DEQ Modeling Section. Supporting information for the air quality modeling study included building downwash analyses, meteorological data, and terrain data.

5.1.1 PHYSICAL SOURCE GEOMETRY/GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

A good engineering practice (GEP) stack height/building wake effect analysis was conducted to identify which building structures influence plume dispersion from each emissions source. Based on the formula, GEP stack height and region of influence, the Building Profile Input Program (BPIP) PRIME program was run for the point source emissions points and related building structures. Figure 5-1 shows the H.F. Lee facility layout (including the modeled sources) and property lines. The BPIP PRIME (Version 04274 dated September 30, 2004) program was used to calculate the GEP height and wind direction-specific building dimensions for input to the air dispersion model.

The GEP analysis was used to identify critical buildings and to determine wind direction-specific building dimensions for use in the modeling analysis. GEP was also used to demonstrate compliance with applicable state and federal stack height regulations. Following the Guideline for Determination of GEP Stack Height (Technical Document for the Stack Height Regulation), GEP height was calculated using the following equation:

$$Hg = H + 1.5\ L$$

where: Hg = good engineering practice stack height.
H = height of the structure or nearby structure.
L = lesser dimension (height or projected width of the structure or nearby building).

In a situation where a nearby structure consists of multiple tiers or there are several structures nearby, the GEP height was calculated for each tier or structure, and the one resulting in the greatest calculated GEP height determined both the GEP height and the wind direction-specific building dimension used when modeling a stack that is lower than the GEP height.

The direction-specific building dimensions obtained from the BPIP PRIME analysis were put into the air dispersion model to simulate the effects of building-induced downwash. The BPIP files are included with the air dispersion modeling files on the DVD included in Appendix E.

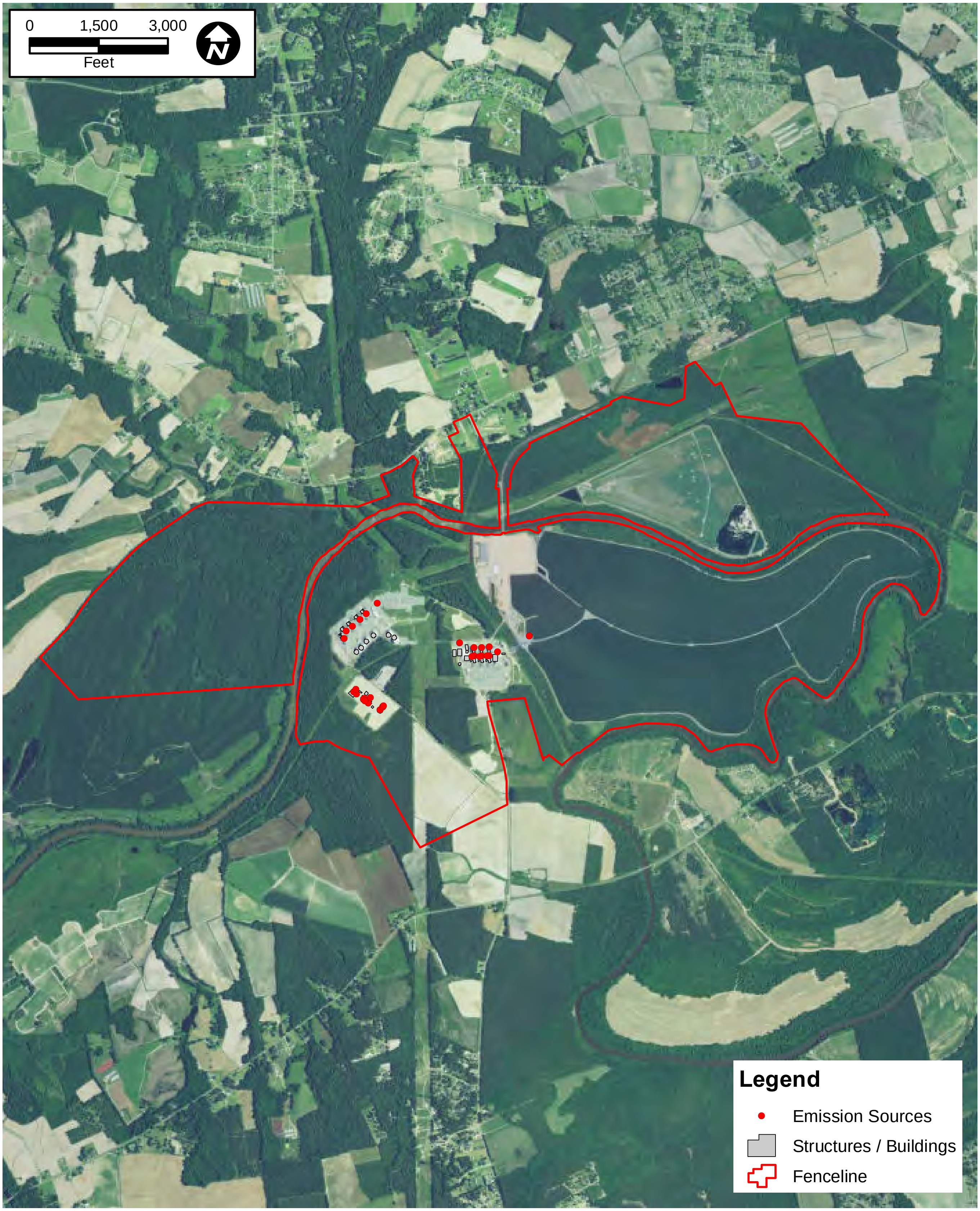


FIGURE 5-1.
FACILITY LAYOUT - SOURCE AND BUILDING LOCATIONS IN AERMOD

Sources: Esri Basemap Imagery, ECT 2017.

ECT Environmental Consulting & Technology of North Carolina, PLLC

5.1.2 LOCAL TOPOGRAPHY

Local topography played an important role in the selection of the appropriate dispersion model. Available dispersion models can be divided into two general categories: those applicable to terrain that is below stack top (simple terrain) and above stack top (complex terrain). The terrain near the H.F. Lee facility can be described as generally flat terrain. A model that simulated both simple and complex terrain was used.

5.2 AERMOD MODEL APPLICATION

The AERMOD modeling system consists of two preprocessors and the dispersion model. AERMET is the meteorological preprocessor component, and AERMAP is the terrain preprocessor component that characterizes the terrain and generates receptor elevations along with critical hill heights for those receptors.

AERMOD has the following capabilities applicable to this study:

- Handles all terrain features.
- Simulates PRIME aerodynamic building downwash.
- Simulates both short- and long-term averaging periods.
- Handles large numbers of receptors.
- Calculates concentrations within the building cavity and within 5L of the stack.

5.2.1 METEOROLOGICAL DATA

For this project, refined modeling analyses were conducted using a data set downloaded from the NC DEQ Website that consisted of 5 years (2012 through 2016) of hourly meteorological data from Rocky Mount-Wilson, North Carolina (surface), and Newport, North Carolina (upper air). This data set was processed by NC DEQ.

5.2.2 RECEPTORS AND TOPOGRAPHY FOR AERMOD

A single nested Cartesian receptor grid was generated for use in the AERMOD refined modeling. Receptors were spaced 100 meters apart along the property boundary, except where a source was within 100 meters, receptors were spaced 25 meters apart. Receptors were spaced 100 meters apart extending from the property boundary out to 1,000 meters. Receptors were spaced 500 meters apart extending from 1,000 meters out to 10,000 meters. The receptor grid used in the modeling analysis was based on North American Datum of 1983 (NAD 83) and in Zone 17. The AERMAP (Version 11103) processor program was used to calculate terrain elevations and critical hill heights for the receptor grid (NAD 83 and Zone 17) using National Elevation Data (NED). The NED dataset was downloaded from the Multi-Resolution Land Characteristics Consortium (MRLC) website.

The base elevation for the buildings and emissions sources was also obtained from the NED. The base elevation for each building and emission source was then manually adjusted to be the lowest elevation for the buildings and sources in a particular area.

5.2.3 PHYSICAL SOURCE AND EMISSIONS DATA

The air dispersion modeling analysis was conducted with emissions rates and exhaust characteristics (flow rate and temperature) that are expected to represent the worst-case parameters for the proposed and existing sources.

Please note that this toxic analysis included the existing combustion turbines in combined-cycle mode at 100-percent load with duct burners and in simple-cycle mode at 100-percent load with evaporative cooler to account for the worst-case stack parameters. The annual emissions were modeled with four scenarios that are based on the following combinations:

- Scenario #1—Each combustion turbine operating in:
  - Combined-cycle mode for 6,760 hours per year (hr/yr) operating on natural gas.
  - Simple-cycle mode for 1,000 hr/yr operating on natural gas and 1,000 hr/yr operating on fuel oil.
- Scenario #2—Each combustion turbine operating in:
  - Combined-cycle mode for 5,760 hr/yr operating on natural gas and 1,000 hr/yr operating on fuel oil.
  - Simple-cycle mode for 2,000 hr/yr operating on natural gas.

- Scenario #3—Each combustion turbine operating in combined-cycle mode for 8,760 hr/yr operating on natural gas.
- Scenario #4—Each combustion turbine operating in combined-cycle mode for 7,760 hr/yr operating on natural gas and 1,000 hr/yr operating on fuel oil.

Tables 5-1 through 5-3 provide summaries of the exhaust data. Tables 5-4 through 5-6 present summaries of optimized emission rates for the air pollutants addressed in this modeling analysis.

Table 5-1. Source Parameters—Existing and Proposed Point Sources

Source ID and Description	Stack Height (ft)	Stack Diameter (ft)	Temperature (°F)	Exit Velocity (fps) €
Existing Units				
SC_FO10 & SC_FO11 – Unit 10 & 11*	100	20	962.01	129.10
SC_FO12 & SC_FO13 – Unit 12 & 13*	115	18	1,065.99	154.90
SC_FO14 – Unit 40	115	18	1,065.99	151.80
SC_NG10 & SC_NG11 – Unit 10 & 11*	100	20	973	129.80
SC_NG12 & SC_NG13 – Unit 12 & 13*	115	18	1,068.01	150.90
SC_NG14 – Unit 40	115	18	1,068.01	147.90
CC_NG15, CC_NG16 & CC_NG17 – Unit 15, 16 & 17 (100% w/ Evap Clr)*	175	18	171	65.28
CC_FO15, CC_FO16 & CC_FO17 – Unit 15, 16&17 (Base Load w/ Evap Clr)*	175	18	260.01	76.09
SC_NG15, SC_NG16 & SC_NG17 – Unit 15, 16 & 17 (100% w/ Evap Clr)*	120	22	1,087	111.35
SC_FO15, SC_FO16 & SC_FO17 – Unit 15, 16&17 (Base Load w/ Evap Clr)*	120	22	1,053	109.11
AUX_BLR – Auxiliary Boiler	55	3	570	47.50
FGH – Fuel Gas Heater	25	2	717.01	18.91
DPH15, DPH16 & DPH17 – Dew Point Heater for Unit 15, 16 & 17*	45	1.30	70	6.30
FWP – Fire Water Pump	20	0.50	840	119.18
EXST_FGH – Fuel Gas Heater at Wayne site	25	2	717.01	18.91
Proposed Units				
EP30 (ES-30A&B) – Feed Silo	111	1.5	70	0.003281
EP31 (ES-31) – STAR® Reactor (Exhaust Stack)	110	4	155	102.79
EP34 (ES-34) – EHE – 1 (Dust Collector)	51	4	187	55.11
EP35 (ES-35) – EHE – 2 (Dust Collector)	51	4	187	55.11
EP36 (ES-36A&B) – Transfer Silo	100	0.667	70	0.003281
EP37 (ES-37A&B) – Storage Dome (Ash)	125	1.5	70	0.003281
EP38 (ES-38) – Loadout Silo (1500 Ton)	111	1.5	70	0.003281
EP38A (ES-38A) – Loadout Silo Chute 1A	111	1.5	70	0.003281
EP38B (ES-38B) – Loadout Silo Chute 1B	111	1.5	70	0.003281

Note: °F = degree Fahrenheit.
fps = foot per second.
ft = foot.

€ Horizontal exhaust orientation is represented as 0.003281 fps.
* Stack parameters for individual stack units.
Source: ECT, 2017.

Table 5-2. Source Parameters—Proposed Volume Sources

Source ID and Description	Release Height (ft)	Initial Horizontal Dimension (ft)	Initial Vertical (ft)
FEP1 (F-1) - wet ash receiving, transfer to storage shed	5	29.76	13.94
FEP2 (F-2) - wet ash receiving, transfer to hopper	10	6.99	6.99

Note: ft = foot.

Source: ECT, 2017.

Table 5-3. Source Parameters—Proposed Area Sources

Source ID and Description	Release Height (ft)	Easterly Length (ft)	Northerly Length (ft)	Angle from North (degree)
FEP3 (F-3) – Unloading Pile	4	119.75	Default	Default
FEP4A/4B/4C (F-4/F-5/EP39A/EP-40A) – Ash Basin/Ash Handling/Screener/Crusher	10	660.0	Default	Default

Note: ft = foot.

Source: ECT, 2017.

Table 5-4. Modeled (Optimized) Emission Rates—Existing Units Point Sources

Pollutant	Averaging Period	Emissions Rates (lb/hr)														
		SC_FO10 &11*	SC_FO12 &13*	SC_FO14	SC_NG10 &11*	SC_NG12 &13*	SC_NG14	CC_NG1 5,16&17*	CC_FO15 ,16&17*	SC_NG15 ,16&17*	SC_FO15 ,16&17*	AUX_BL R	FGH	DPH15,1 6&17*	FWP	EXST_F GH
Formaldehyde	1-HR	8.25E+01	7.79E+01	8.71E-01	2.10E+02	1.97E+02	2.11E+02	2.49E+02	9.23E+01	2.42E+02	9.23E+01	9.56E-01	5.06E-02	4.50E-02	7.68E-01	6.18E-02
Sulfuric Acid Mist	1-HR	2.84E+01	2.83E+01	2.80E+01	3.19E+00	2.91E+00	2.91E+00	3.61E+00	2.68E+02	6.65E-01	5.84E-01					
Toluene	1-HR	1.55E+05	1.47E+05	1.64E+05	5.44E+04	5.13E+04	5.48E+04	6.39E+04		6.29E+04		3.81E+01	3.26E+00	2.89E+00	3.78E+02	3.98E+00
Sulfuric Acid Mist	24-HR	1.35E+01	1.34E+01	1.33E+01	1.51E+00	1.38E+00	1.38E+00	1.71E+00	1.27E+02	3.15E-01	2.77E+01					
Hexane	24-HR							1.81E+03				3.39E+02	1.80E+01	1.60E+01		2.20E+01
Toluene	24-HR	7.81E+04	7.39E+04	8.24E+04	2.73E+04	2.58E+04	2.75E+04	3.21E+04		3.16E+04		1.91E+01	1.64E+00	1.45E+00	1.90E+02	2.00E+00
Chromium VI (Soluble Chromate)	24-HR	1.00E+00	9.46E-01	1.06E+00				1.81E-01	6.90E+00		6.90E+00	3.40E-02	1.80E-03	1.60E-03		2.20E-03
Manganese	24-HR	3.15E+02	2.98E+02	3.31E+02				3.50E-02	3.52E+02		3.52E+02	6.56E-03	3.48E-04	3.08E-04		4.24E-04
Mercury	24-HR	6.04E+00	5.70E+00	6.38E+00				3.00E-01	6.74E+00		6.74E+00	5.67E-02	3.00E-03	2.67E-03		3.66E-03
Nickel	24-HR	1.15E+00	1.09E+00	1.21E+00				1.21E-01	1.29E+00		1.29E+00	2.28E-02	1.20E-03	1.07E-03		1.47E-03
Arsenic	Annual‡	6.53E-03	6.17E-03	6.89E-03				1.20E-04	3.65E-03		3.65E-03	2.25E-05	1.19E-06	3.17E-06		
Benzene	Annual‡	7.26E+00	6.84E+00	7.65E+00	1.58E+00	1.49E+00	1.60E+00	7.39E+00	3.71E+00	1.67E+00	4.05E+00	5.25E-02	2.78E-03	7.41E-03	6.78E-02	7.77E-04
Beryllium	Annual‡	3.26E-03	3.10E-03	3.46E-03				1.28E-04	1.83E-03		1.83E-03	2.40E-05	1.27E-06	3.38E-06		3.55E-07
Cadmium	Annual‡	2.43E-01	2.29E-01	2.56E-01				5.62E-02	1.32E-01		1.36E-01	1.05E-02	5.58E-04	1.48E-03		1.55E-04

* Stack emission rates are for individual stacks.
‡ Emission rate is the overall maximum emission rate considered over the four operating scenarios.

Source: ECT, 2017.

Table 5-5. Modeled (Optimized) Emission Rates—Proposed Units Point Sources

Pollutant	Averaging Period	Emissions Rates (lb/hr)								
		EP30	EP31	EP34	EP35	EP36	EP37	EP38	EP38A	EP38B
Formaldehyde	1-HR		6.75E-01							
Sulfuric Acid Mist	1-HR		3.50E-01							
Toluene	1-HR		4.35E+01							
Sulfuric Acid Mist	24-HR		1.66E-01							
Hexane	24-HR		2.40E+02							
Toluene	24-HR		2.19E+01							
Chromium VI (Soluble Chromate)	24-HR	1.90E-06	3.23E-03	1.34E-03	1.34E-03	1.90E-06	3.32E-06	2.85E-06	9.49E-07	9.49E-07
Manganese	24-HR	1.10E-04	1.91E-01	7.70E-02	7.70E-02	1.10E-04	1.92E-04	1.64E-04	5.46E-05	5.46E-05
Mercury	24-HR	4.08E-06	4.70E-02	2.87E-03	2.87E-03	4.08E-06	7.13E-06	6.11E-06	2.04E-06	2.04E-06
Nickel	24-HR	2.95E-05	6.64E-02	2.08E-02	2.08E-02	2.95E-05	5.17E-05	4.43E-05	1.48E-05	1.48E-05
Arsenic	Annual‡	2.31E-07	8.82E-04	3.58E-04	3.58E-04	2.31E-07	2.32E-07	1.16E-07	5.79E-08	5.79E-08
Benzene	Annual‡		3.71E-02							
Beryllium	Annual‡	4.54E-07	1.71E-03	7.01E-04	7.01E-04	4.54E-07	4.54E-07	2.27E-07	1.13E-07	1.13E-07
Cadmium	Annual‡	9.22E-08	7.80E-03	1.42E-04	1.42E-04	9.22E-08	9.22E-08	4.62E-08	2.31E-08	2.31E-08

‡ Emission rate is the overall maximum emission rate considered over the four operating scenarios.

Source: ECT, 2017.

Table 5-6. Modeled (Optimized) Emission Rates—Proposed Volume and Area Sources

Pollutant	Averaging Period	Emissions Rates (lb/hr)			
		FEP1	FEP2	FEP3	FEP4A/4B/4C
Formaldehyde	1-HR				
Sulfuric Acid Mist	1-HR				
Toluene	1-HR				
Sulfuric Acid Mist	24-HR				
Hexane	24-HR				
Toluene	24-HR				
Chromium VI (Soluble Chromate)	24-HR	2.91E-07	5.85E-07	6.11E-07	3.26E-04
Manganese	24-HR	1.68E-05	3.37E-05	3.52E-05	1.87E-02
Mercury	24-HR	6.27E-07	1.25E-06	1.31E-06	6.98E-04
Nickel	24-HR	4.55E-6	9.10E-06	9.52E-06	5.06E-03
Arsenic	Annual‡	5.09E-08	1.02E-07	1.63E-07	8.75E-05
Benzene	Annual‡				
Beryllium	Annual‡	9.97E-08	1.99E-07	3.20E-07	1.68E-04
Cadmium	Annual‡	2.02E-08	4.04E-08	6.49E-08	3.41E-05

‡ Emission rate is the overall maximum emission rate considered over the four operating scenarios.

Source: ECT, 2017.

5.3 MODELING RESULTS

This section presents the results of the air quality impact analyses performed for the H.F. Lee STAR® facility. The air quality analyses were conducted using the inputs and methodologies described previously. Methodologies and protocols adhere to the EPA and NC DEQ Guidelines. In accordance with NC DEQ requirements, Appendix E contains a DVD containing the modeling input and output files.

Optimized emissions from the equipment were modeled with AERMOD to estimate the maximum concentrations for the pollutants and corresponding averaging period for each year of meteorological data. Table 5-7 provides a summary of the AERMOD modeling results for each pollutant with the optimized emission rates and averaging period for the Cartesian grid and fenceline receptors discussed in Section 5.2.2.

Based on the results, the H.F. Lee STAR® facility demonstrates compliance with 15A NCAC 02Q .0700.

Table 5-7. Results for AERMOD Dispersion Modeling using Optimized Emission Rates

Chemical	Averaging Period	Rank	Modeled Impact (µg/m³) 2012	2013	2014	2015	2016	Maximum Impact (µg/m³)	Maximum Allowable Concentration (µg/m³)	Percent of AAL (%)	Complies (Yes/No)
Formaldehyde	1-HR	H	107.58	131.19	140.91	106.71	98.47	140.91	150	93.9	Yes
Sulfuric Acid Mist	1-HR	H	76.02	91.01	91.61	68.44	71.39	91.61	100	91.6	Yes
Toluene	1-HR	H	46,702.41	46,920.21	53,600.71	39,975.63	47,744.78	53,600.71	56,000	95.7	Yes
Sulfuric Acid Mist	24-HR	H	5.90	10.51	7.62	7.80	8.68	10.51	12.00	87.6	Yes
Hexane	24-HR	H	1,039.88	807.94	933.07	1063.46	961.91	1,063.46	1,100	96.7	Yes
Toluene	24-HR	H	4,327.50	4,244.73	4,502.69	3,435.96	3,309.75	4,502.69	4,700	95.8	Yes
Chromium VI (Soluble Chromate)	24-HR	H	0.33	0.58	0.43	0.44	0.48	0.58	0.62	93.5	Yes
Manganese	24-HR	H	26.12	29.13	27.13	21.64	24.13	29.13	31	94.0	Yes
Mercury	24-HR	H	0.50	0.57	0.52	0.44	0.48	0.57	0.60	95.4	Yes
Nickel	24-HR	H	0.55	0.53	0.44	0.59	0.42	0.59	0.60	98.4	Yes
Arsenic	Annual‡	H	2.02E-03	1.93E-03	1.64E-03	1.84E-03	1.61E-03	2.02E-03	2.10E-03	96.2	Yes
Benzene	Annual‡	H	8.65E-02	1.15E-01	7.48E-02	7.99E-02	9.08E-02	1.15E-01	1.20E-01	95.9	Yes
Beryllium	Annual‡	H	3.94E-03	3.77E-03	3.21E-03	3.60E-03	3.16E-03	3.94E-03	4.10E-03	96.1	Yes
Cadmium	Annual‡	H	5.15E-03	5.04E-03	5.37E-03	5.21E-03	4.69E-03	5.37E-03	5.50E-03	97.6	Yes

Note: µg/m³ = microgram per cubic meter.
H = highest.

‡Maximum concentration is the overall maximum ground level impact considered over the four operating scenarios.

Source: ECT, 2017.

APPENDIX A

AIR PERMIT APPLICATION FORMS

FORM A

GENERAL FACILITY INFORMATION

REVISED 09/22/16 — NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate — **A**

NOTE- APPLICATION WILL NOT BE PROCESSED WITHOUT THE FOLLOWING:

- ☑ Local Zoning Consistency Determination (new or modification only)
- ☑ Appropriate Number of Copies of Application
- ☑ Application Fee (if required)
- ☑ Responsible Official/Authorized Contact Signature
- ☑ P.E. Seal (if required)

GENERAL INFORMATION

Legal Corporate/Owner Name: Duke Energy Progress, LLC	
Site Name: H.F. Lee Steam Electric Plant	
Site Address (911 Address) Line 1: 1199 Black Jack Church Road	
Site Address Line 2:	
City: Goldsboro	State: NC
Zip Code: 27530	County: Wayne

CONTACT INFORMATION

Responsible Official/Authorized Contact:	***Invoice Contact:***
Name/Title: Jeffery D. Hines / General Manager II, H.F. Lee Steam Electric Plant	Name/Title: Cynthia Winston/ Manager, Permitting & Compliance, Carolinas
Mailing Address Line 1: 1199 Black Jack Church Road	Mailing Address Line 1: 410 S. Wilmington Street
Mailing Address Line 2:	Mailing Address Line 2:
City: Goldsboro State: NC Zip Code: 27530	City: Raleigh State: NC Zip Code: 27601
Primary Phone No.: 919-722-6450 Fax No.:	Primary Phone No.: (919)-546-5538 Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: jeffery.hines@duke-energy.com	Email Address: Cynthia.Winston@duke-energy.com
Facility/Inspection Contact:	***Permit/Technical Contact:***
Name/Title: Mike Graham, Sr. EHS Professional	Name/Title: Erin Wallace, Sr. Environmental Specialist
Mailing Address Line 1: 1199 Black Jack Church Road	Mailing Address Line 1: 410 S. Wilmington Street
Mailing Address Line 2:	Mailing Address Line 2:
City: Goldsboro State: NC Zip Code: 27530	City: Raleigh State: NC Zip Code: 27601
Primary Phone No.: 919-722-6551 Fax No.:	Primary Phone No.: 919-546-5797 Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: mike.graham2@duke-energy.com	Email Address: erin.wallace@duke-energy.com

APPLICATION IS BEING MADE FOR

- ☐ New Non-permitted Facility/Greenfield
- ☑ Modification of Facility (permitted)
- ☐ Renewal Title V
- ☐ Renewal Non-Title V
- ☐ Name Change
- ☐ Ownership Change
- ☐ Administrative Amendment
- ☐ Renewal with Modification

FACILITY CLASSIFICATION AFTER APPLICATION (Check Only One)

☐ General ☐ Small ☐ Prohibitory Small ☐ Synthetic Minor ☑ Title V

FACILITY (Plant Site) INFORMATION

Describe nature of (plant site) operation(s): H.F. Lee Steam Electric Plant - Generation of electricity for sale.	Facility ID No.: 9600017
Primary SIC/NAICS Code: 4911	Current/Previous Air Permit No.: 01812T42 Expiration Date: 06/30/2020
Facility Coordinates: Latitude: 764252.694	Longitude: 3919730.81
Does this application contain confidential data? ☐ **YES** ☑ **NO**	*****If yes, please contact the DAQ Regional Office prior to submitting this application.***** **(See Instructions)**

PERSON OR FIRM THAT PREPARED APPLICATION

Person Name: Thomas O. Pritcher	Firm Name: Environmental Consulting & Technology, Inc.
Mailing Address Line 1: 7208 Falls of Neuse Road, Suite 102	Mailing Address Line 2:
City: Raleigh State: NC	Zip Code: 27615 County: Wake
Phone No.: (919) 861-8888 Fax No.:	Email Address: tpritcher@ectinc.com

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): Jeffery D. Hines	Title: General Manager II, H.F. Lee Steam Electric Plant
X Signature(Blue Ink): Jeffery D. Hines	Date: 11/6/2017

Attach Additional Sheets As Necessary

GENERAL FACILITY INFORMATION

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **A**

SECTION AA1 - APPLICATION FOR NON-TITLE V PERMIT RENEWAL

________________ (Company Name) hereby formally requests renewal of Air Permit No. ________________

There have been no modifications to the originally permitted facility or the operations therein that would require an air permit since the last permit was issued.

Is your facility subject to 40 CFR Part 68 "Prevnetion of Accidental Releases" - Section 112(r) of the Clean Air Act? ☐ YES ☐ NO

If yes, have you already submitted a Risk Manage Plan (RMP) to EPA? ☐ YES ☐ NO Date Submitted: ____________

Did you attach a current emissions inventory? ☐ YES ☐ NO

If no, did you submit the inventory via AERO or by mail? ☐ Via AERO ☐ Mailed Date Mailed: ____________

SECTION AA2- APPLICATION FOR TITLE V PERMIT RENEWAL

In accordance with the provisions of Title 15A 2Q .0513, the responsible official of ________________ (Company Name) hereby formally requests renewal of Air Permit No. ________________ (Air Permit No.) and further certifies that:

(1) The current air quality permit identifies and describes all emissions units at the above subject facility, except where such units are exempted under the North Carolina Title V regulations at 15A NCAC 2Q .0500;

(2) The current air quality permit cits all applicable requirements and provides the method or methods for determing compliance with the applicable requirements;

(3) The facility is currently in compliance, and shall continue to comply, with all applicable requiremetns. (Note: As provided under 15A NCAC 2Q .0512 compliance with the conditions of the permit shall be deemed compliance with the applicable requirements specifically identified in the permit);

(4) For applicable requirements that become effective during the term of the renewed permit that the facility shall comply on a timely basis;

(5) The facility shall fulfill applicable enhanced monitoring requirements and submit a compliance certification as required by 40 CFR Part 64.

The responsible official (signature on page 1) certifies under the penalty of law that all information and statements provided above, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

SECTION AA3- APPLICATION FOR NAME CHANGE

New Facility Name: ________________

Former Facility Name: ________________

An official facility name change is requested as described above for the air permit mentioned on page 1 of this form. Complete the other sections if there have been modifications to the originally premitted facility that would requie an air quality permit since the last permit was issued and if ther has been an ownership change associated with this name change.

SECTION AA4- APPLICATION FOR AN OWNERSHIP CHANGE

By this application we hereby request transfer of Air Quality Permit No. ____________ from the former owner to the new owner as described below. The transfer of permit responsibility, coverage and liability shall be effective ____________ (immediately or insert date.) The legal ownership of the facility described on page 1 of this form has been or will be transferred on ____________ (date). There have been no modifications to the originally permitted facility that would require an air quality permit since the last permit was issued.

<u>Signature of New (Buyer) Responsible Official/Authorized Contact (as typed on page 1):</u>

X Signature (Blue Ink): ________________

Date:

New Facility Name:

Former Facility Name:

<u>Signature of Former (Seller) Responsible Official/Authorized Contact:</u>

Name (typed or print):

Title:

X Signature (Blue Ink): ________________

Date:

Former Legal Corporate/Owner Name:

In lieu of the seller's signature on this form, a letter may be submitted with the seller's signature indicating the ownership change

SECTION AA5- APPLICATION FOR ADMINISTRATIVE AMENDMENT

Describe the requested administrative amendment here (attach additional documents as necessary):

Attach Additional Sheets As Necessary

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **A2**

EMISSION SOURCE LISTING: New, Modified, Previously Unpermitted, Replaced, Deleted			
EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
ES-30A	Feed Silo Filling	CD-30	Bin Vent
ES-30B	Feed Silo Unloading	CD-30	Bin Vent
ES-31	STAR® Reactor	CD-31A & CD-31B	Scrubber and Baghouse
ES-32	FGD Byproduct Silo	CD-32	Bin Vent
ES-33	FGD Absorbent Silo	CD-33	Bin Vent
ES-34	EHE- External Heat Exchanger 1	CD-34	Baghouse
ES-35	EHE- External Heat Exchanger 2	CD-35	Baghouse
ES-36A	Transfer Silo Filling	CD-36	Bin Vent
ES-36B	Transfer Silo Unloading	CD-36	Bin Vent
ES-37A	Storage Dome Filling	CD-37	Bin Vent
ES-37B	Storage Dome Unloading	CD-37	Bin Vent
ES-38	Loadout Silo	CD-38	Bin Vent
ES-38A	Loadout Silo Chute 1A	CD-38A	Bin Vent
ES-38B	Loadout Silo Chute 1B	CD-38B	Bin Vent
ES-39A	Screener	N/A	N/A
ES-39B	Screener-Diesel Engine	N/A	N/A
ES-40A	Crusher	N/A	N/A
ES-40B	Crusher-Diesel Engine	N/A	N/A
F-1	Wet Ash Receiving-Transfer to Shed	N/A	N/A
F-2	Wet Ash Receiving-Transfer to Hopper	N/A	N/A
F-3	Wet Ash Receiving-Unloading Pile	N/A	N/A
F-4	Ash Basin	N/A	N/A
F-5	Ash Handling	N/A	N/A
F-6	Haul Roads	N/A	N/A
Existing Permitted Equipment To Be MODIFIED By This Application			
Equipment To Be DELETED By This Application			

112(r) APPLICABILITY INFORMATION **A 3**

Is your facility subject to 40 CFR Part 68 "Prevention of Accidental Releases" - Section 112(r) of the Federal Clean Air Act? ☐ Yes ☑ No

If No, please specify in detail how your facility avoided applicability: Facility does not use, store or handles any of the regulated substances listed under this rule above their respective threshold quantity.

If your facility is Subject to 112(r), please complete the following:

A. Have you already submitted a Risk Management Plan (RMP) to EPA Pursuant to 40 CFR Part 68.10 or Part 68.150?

☐ Yes ☐ No Specify required RMP submittal date: _____________ If submitted, RMP submittal date: _____________

B. Are you using administrative controls to subject your facility to a lesser 112(r) program standard?

☐ Yes ☐ No If yes, please specify: ______________________________

C. List the processes subject to 112(r) at your facility:

PROCESS DESCRIPTION	PROCESS LEVEL (1, 2, or 3)	HAZARDOUS CHEMICAL	MAXIMUM INTENDED INVENTORY (LBS)

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Feed Silo Filling	EMISSION SOURCE ID NO: ES-30A
	CONTROL DEVICE ID NO(S): CD-30
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-30

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Ash feed silo filled pneumatically at the filling rate of 125 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☑ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Incineration (Form B8)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD DATE MANUFACTURED: TBD

MANUFACTURER / MODEL NO.: TBD EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	(AFTER CONTROLS / LIMITS) lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 5**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	(AFTER CONTROLS / LIMITS) lb/hr	tons/yr
			SEE APPENDIX B, Table 5					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 5		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Feed Silo Filling	EMISSION SOURCE ID NO: ES-30A
	CONTROL DEVICE ID NO(S): CD-30
OPERATING SCENARIO: ______1________ OF ________1_______	EMISSION POINT(STACK) ID NO(S): EP-30

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Ash feed silo filled pneumatically at the filling rate of 125 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural
CAPACITY	CUBIC FEET: 76,000			TONS:
DIMENSIONS (FEET)	HEIGHT: 97	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☑ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: 3

MAXIMUM ACFM: 6600

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): 125

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): N/A

COMMENTS:
This form is for Feed Silo Filling. Unloading data is provided in Form B6 for ES-30B.

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Feed Silo Unloading	EMISSION SOURCE ID NO: ES-30B
	CONTROL DEVICE ID NO(S): CD-30
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-30

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Ash feed silo unloaded at the rate of 75 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 5**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 5					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	EMISSION FACTOR	lb/hr	lb/day	lb/yr
				SEE APPENDIX B, Table 5	

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Feed Silo Unloading			EMISSION SOURCE ID NO: ES-30B	
			CONTROL DEVICE ID NO(S): CD-30	
OPERATING SCENARIO: ______1________ OF ________1_______			EMISSION POINT(STACK) ID NO(S): EP-30	

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Ash feed silo unloaded at the rate of 75 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash			DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural	
CAPACITY	CUBIC FEET: 76,000		TONS:	
DIMENSIONS (FEET)	HEIGHT: 97	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)	ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000	

PNEUMATICALLY FILLED	**MECHANICALLY FILLED**	**FILLED FROM**
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: N/A

MAXIMUM ACFM: 6600

MATERIAL IS UNLOADED TO:

STAR® Reactor

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 75

COMMENTS:
This form is for Feed Silo Unloading. Filling data is provided in Form B6 for ES-30A.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-30	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-30A & ES-30B
EMISSION POINT (STACK) ID NO(S): EP-30	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the feed silo.

POLLUTANTS COLLECTED:	PM (Filling)	PM10/PM2.5 (Filling)	PM (Unloading)	PM10/PM2.5 (Unloading)
BEFORE CONTROL EMISSION RATE (LB/HR):	0.0061	0.00288	0.00365	0.00173
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
EFFICIENCY DETERMINATION CODE:	2	2	2	2
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.0061	0.00288	0.00365	0.00173

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF): Contract MIN MAX	
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) Contract MIN MAX	
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (^oF): Contract	
NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: STAR® Reactor	EMISSION SOURCE ID NO: ES-31
	CONTROL DEVICE ID NO(S): CD-31
OPERATING SCENARIO ________1_________ OF ________1__________	EMISSION POINT (STACK) ID NO(S): EP-31

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
The STAR® Reactor will process feedstock (of any carbon content) like flyash (wet or dry) along with other ingredient materials into a variety of commercial products.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_________________ ☐ NESHAP (SUBPARTS?):_________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS)		**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)			**SEE APPENDIX B, Table 3A & 3B**				
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS)		**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
				SEE APPENDIX B, Table 3A & 3B				

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
			lb/hr	lb/day	lb/yr
				SEE APPENDIX B, Table 3A & 3B	

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: STAR® Reactor	EMISSION SOURCE ID NO: ES-31
	CONTROL DEVICE ID NO(S): CD-31
OPERATING SCENARIO: _______1_______ OF _______1_______	EMISSION POINT (STACK) ID NO(S): EP-31

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): The STAR® Reactor will process feedstock (of any carbon content) like flyash (wet or dry) along with other ingredient materials into a variety of commercial products. The fly ash is not a fuel and does not undergo combustion. The natural gas/propane burners are only used for startup or to maintain temperature in the reactor should the fly ash not contain enough carbon to be self-sustaining. These startup burners have a combined heating capacity of 60 million British thermal units per hour and are low-NOx burners.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION(UNIT/HR)
TYPE	UNITS		
Reactor- Feed Ash	MMBtu	140	140

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN CAPACITY (UNIT/BATCH)	REQUESTED CAPACITY LIMITATION (UNIT/BATCH)
TYPE	UNITS		

MAXIMUM DESIGN (BATCHES / HOUR):

REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: Natural Gas/Propane	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): 140
MAX. CAPACITY HOURLY FUEL USE: NG-58,824 scf/hr & Propane- 663 gal/hr	REQUESTED CAPACITY ANNUAL FUEL USE: NG-58,824 scf/hr & Propane- 663 gal/hr

COMMENTS:

Attach Additional Sheets as Necessary

FORM C9

CONTROL DEVICE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C9**

CONTROL DEVICE ID NO: CD-31A	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-31
EMISSION POINT (STACK) ID NO(S): EP-31	POSITION IN SERIES OF CONTROLS: NO. 1 OF 2 UNITS
OPERATING SCENARIO:	
____1___ OF ___1____	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: Dry scrubber for SO_2 removal.

POLLUTANT(S) COLLECTED:	SO_2			
BEFORE CONTROL EMISSION RATE (LB/HR):	482.79			
CAPTURE EFFICIENCY:	N/A %	%	%	%
CONTROL DEVICE EFFICIENCY:	95 %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	%	%	%
EFFICIENCY DETERMINATION CODE:	2			
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	24.14			

PRESSURE DROP (IN. $H_2$0): ___10___ MIN ___15___ MAX	BULK PARTICLE DENSITY (LB/FT^3) Use gypsum as surrogate.	
INLET TEMPERATURE (^oF): ___335___ MIN ___400___ MAX	OUTLET TEMPERATURE (^oF): __150__ MIN __225__ MAX	
INLET AIR FLOW RATE (ACFM): 65000 operating/77500 maximum	OUTLET AIR FLOW RATE (ACFM): 77,500	
INLET AIR FLOW VELOCITY (FT/SEC):	OUTLET AIR FLOW VELOCITY (FT/SEC):	
INLET MOISTURE CONTENT (%): 15-25% by volume	☐ FORCED AIR ☑ INDUCED AIR	
COLLECTION SURFACE AREA (FT^2): N/A	FUEL USED: N/A	FUEL USAGE RATE: N/A

DESCRIBE MAINTENANCE PROCEDURES: Maintenance to be performed as per manufacturing guidelines.

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM: None

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC: Typical for this type of installations.

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach manufacturer's specifications, schematics, and all other drawings necessary to describe this control.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-31B	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-31
EMISSION POINT (STACK) ID NO(S): EP-31	POSITION IN SERIES OF CONTROLS NO. 2 OF 2 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A baghouse for particulate control on the STAR reactor.

POLLUTANTS COLLECTED:	PM	PM10	PM2.5	
BEFORE CONTROL EMISSION RATE (LB/HR):	16.61	15.28	8.8	
CAPTURE EFFICIENCY:	100 %	100 %	100 %	%
CONTROL DEVICE EFFICIENCY:	> 99.9 %	> 99.9 %	> 99.9 %	%
CORRESPONDING OVERALL EFFICIENCY:	> 99.9 %	> 99.9 %	> 99.9 %	%
EFFICIENCY DETERMINATION CODE:	2	2	2	
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	16.61	15.28	8.8	

PRESSURE DROP (IN H_20): MIN: MAX: Avg: 4-12 inch GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF):	MIN 170 MAX 350
POLLUTANT LOADING RATE: ☐ LB/HR ☑ GR/FT^3 437	OUTLET TEMPERATURE (^oF)	MIN 165 MAX 350
INLET AIR FLOW RATE (ACFM): 77500	FILTER OPERATING TEMP (^oF): 170	

NO. OF COMPARTMENTS: 4	NO. OF BAGS PER COMPARTMENT: 169	LENGTH OF BAG (IN.): 315
NO. OF CARTRIDGES: Bags = 676	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Per bag = 39.63	DIAMETER OF BAG (IN.): 6
TOTAL FILTER SURFACE AREA (FT^2): 26,790	AIR TO CLOTH RATIO: 2.18 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM: The circulating dry scrubber effluent flue gas, containing gypsum and unreacted lime, passes through the baghouse for particulate control.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

See attached jpeg.

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

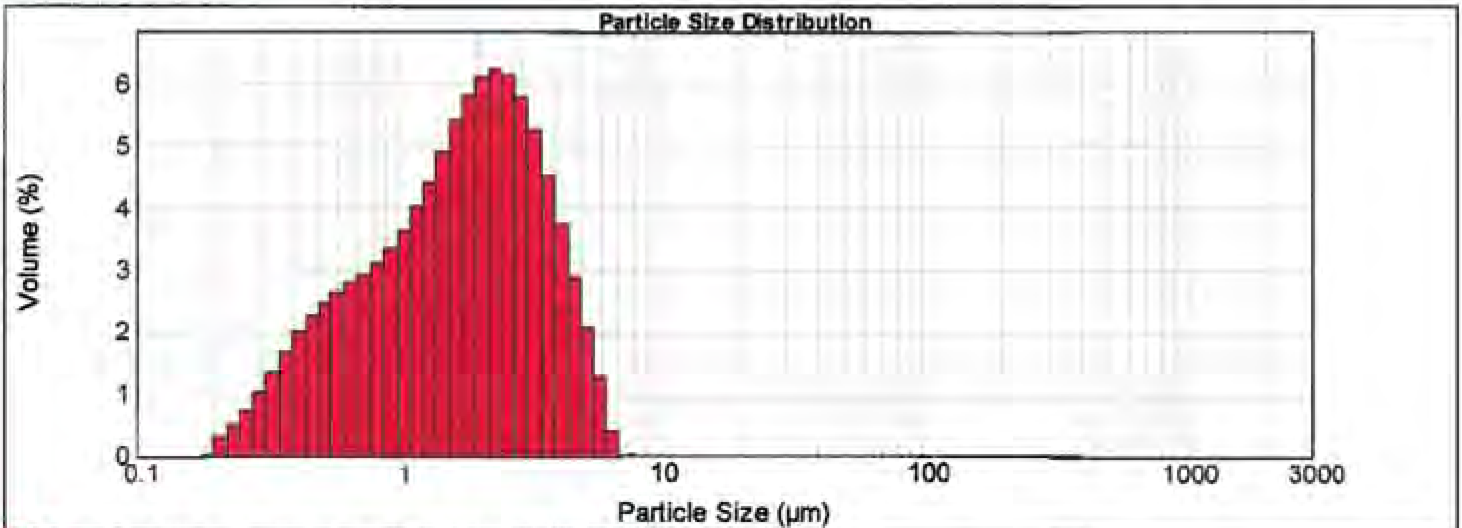
Attach Additional Sheets As Necessary

Specific Surface Area: 5.34 m^2/g

Surface Weighted Mean D[3,2]: 1.123 um

Vol. Weighted Mean D[4,3]: 2.060 um

d(0.1): 0.502 um   **d(0.5):** 1.795 um   **d(0.9):** 4.041 um



Fly Ash Powder - Average, Friday, August 01, 2014 9:43:24 AM

Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.142	0.00	1.002	27.29	7.096	99.98	50.238	100.00	355.656	100.00
0.022	0.00	0.159	0.00	1.125	30.92	7.962	100.00	56.368	100.00	399.052	100.00
0.025	0.00	0.178	0.00	1.262	34.91	8.934	100.00	63.246	100.00	447.744	100.00
0.028	0.00	0.200	0.02	1.416	39.35	10.000	100.00	70.963	100.00	502.377	100.00
0.032	0.00	0.224	0.33	1.589	44.27	11.247	100.00	79.621	100.00	563.677	100.00
0.036	0.00	0.252	0.85	1.783	49.67	12.619	100.00	89.337	100.00	632.456	100.00
0.040	0.00	0.283	1.60	2.000	55.49	14.159	100.00	100.237	100.00	709.627	100.00
0.045	0.00	0.317	2.63	2.244	61.62	15.887	100.00	112.468	100.00	796.214	100.00
0.050	0.00	0.356	3.98	2.518	67.86	17.825	100.00	126.191	100.00	893.357	100.00
0.056	0.00	0.399	5.69	2.825	73.99	20.000	100.00	141.589	100.00	1002.374	100.00
0.063	0.00	0.448	7.72	3.170	79.78	22.440	100.00	158.866	100.00	1124.683	100.00
0.071	0.00	0.502	10.02	3.557	85.03	25.179	100.00	178.250	100.00	1261.915	100.00
0.080	0.00	0.564	12.51	3.991	89.55	28.251	100.00	200.000	100.00	1415.892	100.00
0.089	0.00	0.632	15.16	4.477	93.27	31.698	100.00	224.404	100.00	1588.656	100.00
0.100	0.00	0.710	17.94	5.024	96.16	35.566	100.00	251.785	100.00	1782.502	100.00
0.112	0.00	0.796	20.87	5.637	98.26	39.905	100.00	282.508	100.00	2000.000	100.00
0.126	0.00	0.893	23.97	6.325	99.55	44.774	100.00	316.979	100.00		

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: FGD Byproduct Silo	EMISSION SOURCE ID NO: ES-32
	CONTROL DEVICE ID NO(S): CD-32
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-32

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
The byproduct solids from the dry FGD system are discharged from the Fabric Filter baghouse into a byproduct storage silo.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):__________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 7**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
N/A								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
N/A					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: FGD Byproduct Silo				EMISSION SOURCE ID NO: ES-32
				CONTROL DEVICE ID NO(S): CD-32
OPERATING SCENARIO: _______1_______ OF _______1________				EMISSION POINT(STACK) ID NO(S): EP-32

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
The byproduct solids from the dry FGD system are discharged from the Fabric Filter baghouse into a byproduct storage silo.

MATERIAL STORED: Byproducts from FGD				DENSITY OF MATERIAL (LB/FT3): 30
CAPACITY	CUBIC FEET: 3120			TONS: 47
DIMENSIONS (FEET)	HEIGHT: 65	DIAMETER: 13	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 5694		MAXIMUM DESIGN CAPACITY: 15,100

PNEUMATICALLY FILLED	**MECHANICALLY FILLED**	**FILLED FROM**
☑ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☑ OTHER: Dry Scrubber

NO. FILL TUBES: 1

MAXIMUM ACFM: 1300

MATERIAL IS UNLOADED TO:
Trucks

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
Gravity unloading to trucks.

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): 1.75

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 300

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-32	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-32
EMISSION POINT (STACK) ID NO(S): EP-32	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the FGD Byproduct Silo.

POLLUTANTS COLLECTED:	PM	PM10	PM2.5	
BEFORE CONTROL EMISSION RATE (LB/HR):	0.06	0.05	0.03	
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	%
EFFICIENCY DETERMINATION CODE:	2	2	2	
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.06	0.05	0.03	

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF): Contract MIN MAX	
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) Contract MIN MAX	
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (^oF): Contract	
NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM:

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: FGD Absorbent Silo	EMISSION SOURCE ID NO: ES-33
	CONTROL DEVICE ID NO(S): CD-33
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-33

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Storage of absorbent (hydrated lime) used in the dry FGD system.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):__________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 7**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
N/A								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
N/A					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: FGD Absorbent Silo	EMISSION SOURCE ID NO: ES-33
	CONTROL DEVICE ID NO(S): CD-33
OPERATING SCENARIO: ______1________ OF ______1_________	EMISSION POINT(STACK) ID NO(S): EP-33

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Storage of absorbent (hydrated lime) used in the dry FGD system.

MATERIAL STORED: FGD Absorbent				DENSITY OF MATERIAL (LB/FT3): 25
CAPACITY	CUBIC FEET: 10000			TONS: 125
DIMENSIONS (FEET)	HEIGHT: 100	DIAMETER: 14	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 3723		MAXIMUM DESIGN CAPACITY: 13,140

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☑ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☑ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: 1

MAXIMUM ACFM: 1300

MATERIAL IS UNLOADED TO:

Material is sent to dry scrubber.

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): 25

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 1.5

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-33	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-33	
EMISSION POINT (STACK) ID NO(S): EP-33	POSITION IN SERIES OF CONTROLS	NO. 1 OF 1 UNITS
OPERATING SCENARIO:		
___1___ OF ___1___	P.E. SEAL REQUIRED (PER 2q .0112)?	☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the FGD Absorbent Silo.

POLLUTANTS COLLECTED:	PM	PM10	PM2.5	
BEFORE CONTROL EMISSION RATE (LB/HR):	0.06	0.05	0.03	
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	%
EFFICIENCY DETERMINATION CODE:	2	2	2	
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.06	0.05	0.03	

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (°F): Contract	MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (°F) Contract	MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (°F): Contract	
NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM:

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: EHE- External Heat Exchanger 1 & 2	EMISSION SOURCE ID NO: ES-34 and ES-35
	CONTROL DEVICE ID NO(S): CD-34 and CD-35
OPERATING SCENARIO _______1__________ OF ________1__________	EMISSION POINT (STACK) ID NO(S): EP-34 and EP-35

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Process heat exchanger. Maximum annual emissions are based on the lb/hr of a single unit * 8760 hours per year.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: TBD DATE MANUFACTURED: TBD

MANUFACTURER / MODEL NO.: TBD EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		SEE APPENDIX B, Table 4					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 4					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
			lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 4		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

EMISSION SOURCE DESCRIPTION: EHE- External Heat Exchanger 1 & 2	EMISSION SOURCE ID NO: ES-34 and ES-35
	CONTROL DEVICE ID NO(S): CD-34 and CD-35
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): EP-34 and EP-35

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Process heat exchanger

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Heat Exchanger	Tons	70	70

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-34 & CD-35	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-34 & ES-35
EMISSION POINT (STACK) ID NO(S): EP-34 & EP-35	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A baghouse for particulate control on the EHE- External Heat Exchanger 1 & 2. Emissions below are for one unit.

POLLUTANTS COLLECTED:	PM	PM10	PM2.5	
BEFORE CONTROL EMISSION RATE (LB/HR):	6.86	6.31	3.63	
CAPTURE EFFICIENCY:	99.95 %	99.95 %	99.95 %	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	%
EFFICIENCY DETERMINATION CODE:	2	2	2	
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	6.86	6.31	3.63	

PRESSURE DROP (IN H_20): MIN: MAX: Avg: 10" GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 60	INLET TEMPERATURE (^oF): MIN 180 MAX 325
POLLUTANT LOADING RATE: ☑ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) MIN 150 MAX 300
INLET AIR FLOW RATE (ACFM): 48,000	FILTER OPERATING TEMP (^oF): 250 (excursions to 325)

NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: N/A	LENGTH OF BAG (IN.): N/A
NO. OF CARTRIDGES: N/A	FILTER SURFACE AREA PER CARTRIDGE (FT^2): N/A	DIAMETER OF BAG (IN.): 6
TOTAL FILTER SURFACE AREA (FT^2): N/A	AIR TO CLOTH RATIO: 3:1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ SONIC
- ☐ REVERSE FLOW
- ☐ SIMPLE BAG COLLAPSE
- ☐ MECHANICAL/SHAKER
- ☐ RING BAG COLLAPSE
- ☐ OTHER:

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Particle Size Distribution 0-100 micron with an average of 20

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Transfer Silo Filling	EMISSION SOURCE ID NO: ES-36A
	CONTROL DEVICE ID NO(S): CD-36
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-36

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Transfer silo is filled at the rate of 125 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 5**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 5					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	EMISSION FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 5		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Transfer Silo Filling	EMISSION SOURCE ID NO: ES-36A
	CONTROL DEVICE ID NO(S): CD-36
OPERATING SCENARIO: ______1________ OF ________1_______	EMISSION POINT(STACK) ID NO(S): EP-36

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Transfer silo is filled at the rate of 125 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural
CAPACITY	CUBIC FEET: N/A			TONS: 300
DIMENSIONS (FEET)	HEIGHT: 100	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000

PNEUMATICALLY FILLED	**MECHANICALLY FILLED**	**FILLED FROM**
☑ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: 3

MAXIMUM ACFM: 9000

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): 125

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): N/A

COMMENTS:
This form is for Transfer Silo Filling. Unloading data is provided in Form B6 for ES-36B.

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Transfer Silo Unloading	EMISSION SOURCE ID NO: ES-36B CONTROL DEVICE ID NO(S): CD-36
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-36

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Transfer silo unloaded at the rate of 75 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD | DATE MANUFACTURED: TBD

MANUFACTURER / MODEL NO.: TBD | EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
	EMISSION	AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)		**SEE APPENDIX B, Table 5**					
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
		EMISSION	AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 5					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	EMISSION FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 5		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUF

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Transfer Silo Unloading					EMISSION SOURCE ID NO: ES-36B	
					CONTROL DEVICE ID NO(S): CD-36	
OPERATING SCENARIO: ______1________ OF ________1_______					EMISSION POINT(STACK) ID NO(S): EP-36	
DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Transfer silo unloaded at the rate of 75 ton/hr and equipped with bin vent product capture device.						
MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural		
CAPACITY	CUBIC FEET: N/A			TONS: 300		
DIMENSIONS (FEET)	HEIGHT: 100	DIAMETER: 41	***(OR)***	LENGTH:	WIDTH:	HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000		

PNEUMATICALLY FILLED	**MECHANICALLY FILLED**	**FILLED FROM**
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:
NO. FILL TUBES: N/A		
MAXIMUM ACFM: 9000		

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
Gravity

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 75

COMMENTS:
This form is for Transfer Silo Unloading. Filling data is provided in Form B6 for ES-36A.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C1**

CONTROL DEVICE ID NO: CD-36	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-36A & ES-36B		
EMISSION POINT (STACK) ID NO(S): EP-36	POSITION IN SERIES OF CONTROLS	NO. 1 OF	1 UNITS
OPERATING SCENARIO:			
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)?	☑ YES	☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the transfer silo.

POLLUTANTS COLLECTED:	PM (Filling)	PM10/PM2.5 (Filling)	PM (Unloading)	PM10/PM2.5 (Unloading)
BEFORE CONTROL EMISSION RATE (LB/HR):	0.0061	0.0029	0.0037	0.0017
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
EFFICIENCY DETERMINATION CODE:	2	2	2	2
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.0061	0.0029	0.0037	0.0017

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF): Contract	MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) Contract	MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (^oF): Contract	
NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE | FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Storage Dome Filling	EMISSION SOURCE ID NO: ES-37A
	CONTROL DEVICE ID NO(S): CD-37
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-37

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Storage Dome silo is filled at the rate of 75 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 6**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 6					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	EMISSION FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 6		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Storage Dome Filling				EMISSION SOURCE ID NO: ES-37A CONTROL DEVICE ID NO(S): CD-37
OPERATING SCENARIO: ______1________ OF ________1_______				EMISSION POINT(STACK) ID NO(S): EP-37

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Storage Dome is filled at the rate of 75 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural
CAPACITY	CUBIC FEET: N/A			TONS: 30,000
DIMENSIONS (FEET)	HEIGHT: 125	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☑ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: 1

MAXIMUM ACFM: 7600

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): 75

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): N/A

COMMENTS:
This form is for Storage Dome Filling. Unloading data is provided in Form B6 for ES-37B.

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Storage Dome Unloading	EMISSION SOURCE ID NO: ES-37B
	CONTROL DEVICE ID NO(S): CD-37
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-37

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Storage Dome is unloaded at the rate of 275 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):_______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	(AFTER CONTROLS / LIMITS) lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 6**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	(AFTER CONTROLS / LIMITS) lb/hr	tons/yr
			SEE APPENDIX B, Table 6					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 6		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Storage Dome Unloading				EMISSION SOURCE ID NO: ES-37B
				CONTROL DEVICE ID NO(S): CD-37
OPERATING SCENARIO: ______1________ OF ________1_______				EMISSION POINT(STACK) ID NO(S): EP-37

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Storage Dome is unloaded at the rate of 275 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): 60 bulk, 90 structural
CAPACITY	CUBIC FEET: N/A			TONS: 30,000
DIMENSIONS (FEET)	HEIGHT: 125	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:
NO. FILL TUBES: N/A		
MAXIMUM ACFM: 7600		

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 275

COMMENTS:
This form is for Storage Dome Unloading. Filling data is provided in Form B6 for ES-37A.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C1**

CONTROL DEVICE ID NO: CD-37	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-37A & ES-37B
EMISSION POINT (STACK) ID NO(S): EP-37	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1___ OF ___1___	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the storage dome.

POLLUTANTS COLLECTED:	PM (Filling)	PM10/PM2.5 (Filling)	PM (Unloading)	PM10/PM2.5 (Unloading)
BEFORE CONTROL EMISSION RATE (LB/HR):	0.0037	0.0017	0.0134	0.0063
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	N/A %	N/A %
EFFICIENCY DETERMINATION CODE:	2	2	2	2
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.0037	0.0017	0.0134	0.0063

PRESSURE DROP (IN H_20): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (°F): Contract	MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (°F) Contract	MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (°F): Contract	
NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Loadout Silo	EMISSION SOURCE ID NO: ES-38
	CONTROL DEVICE ID NO(S): CD-38
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-38

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo is unloaded at the rate of 300 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 6**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 6					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
			lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 6		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Loadout Silo	EMISSION SOURCE ID NO: ES-38
	CONTROL DEVICE ID NO(S): CD-38
OPERATING SCENARIO: ______1________ OF ________1_______	EMISSION POINT(STACK) ID NO(S): EP-38

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo is unloaded at the rate of 300 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): N/A
CAPACITY	CUBIC FEET: N/A			TONS: 50,000
DIMENSIONS (FEET)	HEIGHT: 111	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 400,000		MAXIMUM DESIGN CAPACITY: 400,000

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: 1

MAXIMUM ACFM: 6000

MATERIAL IS UNLOADED TO:

Trucks

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
Gravity

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 300

COMMENTS:
This silo only unloads.

Attach Additional Sheets As Necessary

FORM C1
CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-38	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-38
EMISSION POINT (STACK) ID NO(S): EP-38	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the Loadout silo.

POLLUTANTS COLLECTED:	PM	PM10/PM2.5		
BEFORE CONTROL EMISSION RATE (LB/HR):	0.0146	0.0069		
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	%	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	%	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	%	%
EFFICIENCY DETERMINATION CODE:	2	2		
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.0146	0.0069		

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (°F): Contract MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (°F) Contract MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (°F): Contract

NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Loadout Silo Chute 1A	EMISSION SOURCE ID NO: ES-38A
	CONTROL DEVICE ID NO(S): CD-38A
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-38A

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo chute 1A is unloaded at the rate of 100 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD | DATE MANUFACTURED: TBD

MANUFACTURER / MODEL NO.: TBD | EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
		AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 6**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
			AFTER CONTROLS / LIMITS)		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 6					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**		lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 6		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Loadout Silo Chute 1A			EMISSION SOURCE ID NO: ES-38A	
			CONTROL DEVICE ID NO(S): CD-38A	
OPERATING SCENARIO: ______1________ OF ________1_______			EMISSION POINT(STACK) ID NO(S): EP-38A	

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo chute 1A is unloaded at the rate of 100 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash			DENSITY OF MATERIAL (LB/FT3): N/A	
CAPACITY	CUBIC FEET: N/A		TONS: 150 tph	
DIMENSIONS (FEET)	HEIGHT: 111	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 200,000	MAXIMUM DESIGN CAPACITY: 200,000	

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: N/A

MAXIMUM ACFM: 6000

MATERIAL IS UNLOADED TO:

N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 100

COMMENTS:
This silo only unloads.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-38A	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-38A
EMISSION POINT (STACK) ID NO(S): EP-38A	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the Loadout silo chute 1A.

POLLUTANTS COLLECTED:	PM	PM10/PM2.5		
BEFORE CONTROL EMISSION RATE (LB/HR):	0.005	0.002		
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	%	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	%	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	%	%
EFFICIENCY DETERMINATION CODE:	2	2		
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.005	0.002		

PRESSURE DROP (IN H_20): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF): Contract	MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) Contract	MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (^oF): Contract	

NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15
TOTAL FILTER SURFACE AREA (FT^2): Contract	AIR TO CLOTH RATIO: 1 to 4 : 1	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ SONIC
- ☐ REVERSE FLOW
- ☐ SIMPLE BAG COLLAPSE
- ☐ MECHANICAL/SHAKER
- ☐ RING BAG COLLAPSE
- ☐ OTHER:

DESCRIBE INCOMING AIR STREAM: Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Loadout Silo Chute 1B	EMISSION SOURCE ID NO: ES-38B
	CONTROL DEVICE ID NO(S): CD-38B
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-38B

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo chute 1B is unloaded at the rate of 100 ton/hr and equipped with bin vent product capture device.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☑ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD | DATE MANUFACTURED: TBD

MANUFACTURER / MODEL NO.: TBD | EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 6**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 6					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
			lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 6		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUF

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: Loadout Silo Chute 1B				EMISSION SOURCE ID NO: ES-38B
				CONTROL DEVICE ID NO(S): CD-38B
OPERATING SCENARIO: ______1________ OF ________1_______				EMISSION POINT(STACK) ID NO(S): EP-38B

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Loadout silo chute 1B is unloaded at the rate of 100 ton/hr and equipped with bin vent product capture device.

MATERIAL STORED: Fly Ash				DENSITY OF MATERIAL (LB/FT3): N/A
CAPACITY	CUBIC FEET: N/A			TONS: 150 tph
DIMENSIONS (FEET)	HEIGHT: 111	DIAMETER: 41	***(OR)***	LENGTH: WIDTH: HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)		ACTUAL: 200,000		MAXIMUM DESIGN CAPACITY: 200,000

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☐ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES: N/A

MAXIMUM ACFM: 6000

MATERIAL IS UNLOADED TO:
N/A

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
N/A

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): N/A

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): 100

COMMENTS:
This silo only unloads.

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: CD-38B	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-38B
EMISSION POINT (STACK) ID NO(S): EP-38B	POSITION IN SERIES OF CONTROLS NO. 1 OF 1 UNITS
OPERATING SCENARIO:	
___1____ OF ___1____	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: A bin vent for particulate control on the Loadout silo chute 1B.

POLLUTANTS COLLECTED:	PM	PM10/PM2.5		
BEFORE CONTROL EMISSION RATE (LB/HR):	0.005	0.002		
CAPTURE EFFICIENCY:	<= 0.005 gr/dscf %	<= 0.005 gr/dscf %	%	%
CONTROL DEVICE EFFICIENCY:	N/A %	N/A %	%	%
CORRESPONDING OVERALL EFFICIENCY:	N/A %	N/A %	%	%
EFFICIENCY DETERMINATION CODE:	2	2		
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	0.005	0.002		

PRESSURE DROP (IN H_2O): MIN: MAX: Avg: 10-15 wg GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): 25	INLET TEMPERATURE (^oF): Contract MIN MAX
POLLUTANT LOADING RATE: N/A ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) Contract MIN MAX
INLET AIR FLOW RATE (ACFM): 1300	FILTER OPERATING TEMP (^oF): Contract

NO. OF COMPARTMENTS: 1	NO. OF BAGS PER COMPARTMENT: Contract	LENGTH OF BAG (IN.): 20-30
NO. OF CARTRIDGES: Contract	FILTER SURFACE AREA PER CARTRIDGE (FT^2): Contract	DIAMETER OF BAG (IN.): 5-15

TOTAL FILTER SURFACE AREA (FT^2): Contract | AIR TO CLOTH RATIO: 1 to 4 : 1

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: Cartridge Style ☑ WOVEN ☐ FELTED

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM:Air stream will contain fly ash.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

Supplier specific, 94% passing 325 mesh

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Screener	EMISSION SOURCE ID NO: ES-39A
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO ________1_________ OF ________1__________	EMISSION POINT (STACK) ID NO(S): EP-39

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
The screening process will occur to produce free flowing feedstock suitable for the STAR® reactor.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 2600 hours/year

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS)		**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 14A**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL** (AFTER CONTROLS / LIMITS)		**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 14A					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**		lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 14A		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Screener	EMISSION SOURCE ID NO: ES-39A
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: _______1_______ OF _______1_______	EMISSION POINT (STACK) ID NO(S): EP-39

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): The screening process will occur to produce free flowing feedstock suitable for the STAR® reactor

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Capacity	ton	165	165

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Screener-Diesel Engine	EMISSION SOURCE ID NO: ES-39B
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-39

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Diesel Engine to run the Screener.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☑ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 2600 hours/year

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):__________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 14B**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
			(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 14B					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

			EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	SOURCE OF EMISSION FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 14B		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B2

EMISSION SOURCE (INTERNAL COMBUSTION ENGINES/TURBINES/GENERATORS)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **B2**

EMISSION SOURCE DESCRIPTION: Screener-Diesel Engine

EMISSION SOURCE ID NO: ES-39B

CONTROL DEVICE ID NO(S): N/A

OPERATING SCENARIO: _______1_______ OF ______1________

EMISSION POINT (STACK) ID NO(S): EP-39

ENGINE SERVICE (CHECK ALL THAT APPLY): ☐ EMERGENCY ☐ SPACE HEAT ☐ ELECTRICAL GENERATION ☐ PEAK SHAVER ☑ OTHER (DESCRIBE): To operate the screener.________________________

GENERATOR OUTPUT (KW):

ANTICIPATED ACTUAL HOURS OF OPERATION (HRS/YR): 2600

ENGINE OUTPUT (HP): 91

TYPE ICE: ☐ GASOLINE ENGINE ☑ DIESEL ENGINE UP TO 600 HP ☐ DIESEL ENGINE GREATER THAN 600 HP ☐ DUAL FUEL ENGINE ☐ OTHER (DESCRIBE): ______________________________ (complete below)

ENGINE TYPE ☐ RICH BURN ☐ LEAN BURN

EMISSION REDUCTION MODIFICATIONS ☐ INJECTION TIMING RETARD ☐ PREIGNITION CHAMBER COMBUSTION ☐ OTHER ___________

OR ☐ STATIONARY GAS TURBINE (complete below)

FUEL: ☐ NATURAL GAS ☐ OIL ☐ OTHER (DESCRIBE):____________

CYCLE: ☐ COGENERATION ☐ SIMPLE ☐ REGENERATIVE ☐ COMBINED

CONTROLS: ☐ WATER-STEAM INJECTION ☐ UNCONTROLLED ☐ LEAN-PREMIX ☐ OTHER (SPECIFY):________________________

☐ NATURAL GAS PIPELINE COMPRESSOR OR TURBINE (complete below)

ENGINE TYPE: ☐ 2-CYCLE LEAN BURN ☐ 4-CYCLE LEAN ☐ TURBINE ☐ 4-CYCLE RICH BURN ☐ OTHER (DESCRIBE): __________________

CONTROLS: ☐ COMBUSTION MODIFICATIONS (DESCRIBE): _________________________ ☐ NONSELECTIVE CATALYTIC REDUCTION ☐ SELECTIVE CATALYTIC REDUCTION ☐ CLEAN BURN AND PRECOMBUSTION CHAMBER ☐ UNCONTROLLED

FUEL USAGE (INCLUDE STARTUP/BACKUP FUEL)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)
Diesel	gallons	3.75 @ 75 % load	2600 hr/yr

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	BTU/UNIT	UNITS	SULFUR CONTENT (% BY WEIGHT)
Diesel	6.40E+05	Hour	0.0015%

MANUFACTURER'S SPECIFIC EMISSION FACTORS (IF AVAILABLE)

POLLUTANT	NOX	CO	PM	PM10	VOC	OTHER
EMISSION FACTOR LB/UNIT						
UNIT						

DESCRIBE METHODS TO MINIMIZE VISIBLE EMISSIONS DURING IDLING, OR LOW LOAD OPERATIONS:

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Crusher	EMISSION SOURCE ID NO: ES-40A
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO ________1_________ OF ________1__________	EMISSION POINT (STACK) ID NO(S): EP-40

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Fly ash will be processed further by passing through a crusher to remove larger particles and to produce more fine and free flowing feedstock.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 365 hours/year

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):________________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 15A**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 15A					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 15A		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **B9**

EMISSION SOURCE DESCRIPTION: Crusher	EMISSION SOURCE ID NO: ES-40A
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: _______1_______ OF _______1_______	EMISSION POINT (STACK) ID NO(S): EP-40

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Fly ash will be processed further by passing through a crusher to remove larger particles and to produce more fine and free flowing feedstock.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION(UNIT/HR)
TYPE	UNITS		
Capacity	ton	165 ton/day	165 ton/day

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN CAPACITY (UNIT/BATCH)	REQUESTED CAPACITY LIMITATION (UNIT/BATCH)
TYPE	UNITS		

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Crusher-Diesel Engine	EMISSION SOURCE ID NO: ES-40B
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): EP-40

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Diesel Engine to run the Crusher.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☑ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☐ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 365 hours/year

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 15B**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
			SEE APPENDIX B, Table 15B					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
				SEE APPENDIX B, Table 15B	

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B2

EMISSION SOURCE (INTERNAL COMBUSTION ENGINES/TURBINES/GENERATORS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B2**

EMISSION SOURCE DESCRIPTION: Crusher-Diesel Engine	EMISSION SOURCE ID NO: ES-40B
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: _______1_______ OF ______1________	EMISSION POINT (STACK) ID NO(S): EP-40

ENGINE SERVICE (CHECK ALL THAT APPLY): ☐ EMERGENCY ☐ SPACE HEAT ☐ ELECTRICAL GENERATION ☐ PEAK SHAVER ☑ OTHER (DESCRIBE): To operate the crusher.________________________

GENERATOR OUTPUT (KW): | ANTICIPATED ACTUAL HOURS OF OPERATION (HRS/YR): 365

ENGINE OUTPUT (HP): 300

TYPE ICE: ☐ GASOLINE ENGINE ☑ DIESEL ENGINE UP TO 600 HP ☐ DIESEL ENGINE GREATER THAN 600 HP ☐ DUAL FUEL ENGINE ☐ OTHER (DESCRIBE): ____ (complete below)

ENGINE TYPE ☐ RICH BURN ☐ LEAN BURN

EMISSION REDUCTION MODIFICATIONS ☐ INJECTION TIMING RETARD ☐ PREIGNITION CHAMBER COMBUSTION ☐ OTHER ___________

OR ☐ STATIONARY GAS TURBINE (complete below)

FUEL: ☐ NATURAL GAS ☐ OIL ☐ OTHER (DESCRIBE):____________

CYCLE: ☐ COGENERATION ☐ SIMPLE ☐ REGENERATIVE ☐ COMBINED

CONTROLS: ☐ WATER-STEAM INJECTION ☐ UNCONTROLLED ☐ LEAN-PREMIX ☐ OTHER (SPECIFY):_________________________

☐ NATURAL GAS PIPELINE COMPRESSOR OR TURBINE (complete below)

ENGINE TYPE: ☐ 2-CYCLE LEAN BURN ☐ 4-CYCLE LEAN ☐ TURBINE ☐ 4-CYCLE RICH BURN ☐ OTHER (DESCRIBE): __________________

CONTROLS: ☐ COMBUSTION MODIFICATIONS (DESCRIBE): __________________________ ☐ NONSELECTIVE CATALYTIC REDUCTION ☐ SELECTIVE CATALYTIC REDUCTION ☐ CLEAN BURN AND PRECOMBUSTION CHAMBER ☐ UNCONTROLLED

FUEL USAGE (INCLUDE STARTUP/BACKUP FUEL)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)
Diesel	gallons	11.71 @ 75% load	365 hr/yr

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	BTU/UNIT	UNITS	SULFUR CONTENT (% BY WEIGHT)
Diesel	2.10E+06	Hour	0.0015%

MANUFACTURER'S SPECIFIC EMISSION FACTORS (IF AVAILABLE)

POLLUTANT	NOX	CO	PM	PM10	VOC	OTHER
EMISSION FACTOR LB/UNIT						
UNIT						

DESCRIBE METHODS TO MINIMIZE VISIBLE EMISSIONS DURING IDLING, OR LOW LOAD OPERATIONS:

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Transfer to Shed	EMISSION SOURCE ID NO: F-1
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO ________1_________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-1

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Transfer of materials to storage shed.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
		AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 8A**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL		POTENTIAL EMISSIONS			
			AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 8A					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**		lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 8A		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Transfer to Shed	EMISSION SOURCE ID NO: F-1
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: _______1_______ OF ______1________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-1

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Transfer of materials to storage shed.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Transfer	Tons	70	70

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Transfer to Hopper	EMISSION SOURCE ID NO: F-2
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO _________1________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-2

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Transfer of materials to feed hopper.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):_______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 8B**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	(AFTER CONTROLS / LIMITS)		(BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 8B					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF EMISSION	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 8B		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUI

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Transfer to Hopper	EMISSION SOURCE ID NO: F-2
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-2

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Transfer of materials to feed hopper.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Transfer	Tons	70	70

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):

REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Unloading Pile	EMISSION SOURCE ID NO: F-3
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO _________1________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-3

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Unloading Pile Windblown Fugitive Dust Emissions.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: TBD	DATE MANUFACTURED: TBD
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):_______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 10**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
			SEE APPENDIX B, Table 10					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 10		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Wet Ash Receiving-Unloading Pile	EMISSION SOURCE ID NO: F-3
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-3

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Unloading Pile Windblown Fugitive Dust Emissions.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Area	Acres	0.33 Acres	N/A

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Ash Basin	EMISSION SOURCE ID NO: F-4
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO _________1________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Dust may be generated by wind erosion of exposed area within an industrial facility.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: N/A DATE MANUFACTURED: N/A

MANUFACTURER / MODEL NO.: N/A EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________ ☐ NESHAP (SUBPARTS?):______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		**SEE APPENDIX B, Table 11**					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
			SEE APPENDIX B, Table 11					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
			lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 11		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Ash Basin	EMISSION SOURCE ID NO: F-4
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Dust may be generated by wind erosion of exposed area within an industrial facility.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Active Basin Area	Acres	321 Acres	N/A

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS: Maximum ash throughput = 430,000 ton/yr

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Ash Handling	EMISSION SOURCE ID NO: F-5
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO _________1________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Emissions from the handling of material at an industrial site.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Woodworking (Form B4)
- ☐ Manuf. of chemicals/coatings/inks (Form B
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Incineration (Form B8)
- ☐ Liquid storage tanks (Form B3)
- ☐ Storage silos/bins (Form B6)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: N/A	DATE MANUFACTURED: N/A
MANUFACTURER / MODEL NO.: N/A	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR
IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):__________________	☐ NESHAP (SUBPARTS?):_______________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)		SEE APPENDIX B, Table 12					
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	tons/yr
			SEE APPENDIX B, Table 12					

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
			SEE APPENDIX B, Table 12		

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

IPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOU

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

EMISSION SOURCE DESCRIPTION: Ash Handling	EMISSION SOURCE ID NO: F-5
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): Emissions from the handling of material at an industrial site.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Ash throughput	Tons	49.09	N/A

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS: Maximum ash throughput = 430,000 ton/yr

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Haul Roads	EMISSION SOURCE ID NO: F-6
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO _________1________ OF _________1_________	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

A portion of the ash will be moved by truck to an offsite location. Particulate emissions are generated from the haul roads from the force of the wheels on the road surface. This force causes pulverization of the surface material. The particles are lifted and dropped from the rolling wheels and the road surface is exposed to strong air currents, which generate airborne particulate emissions.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: N/A	DATE MANUFACTURED: N/A
MANUFACTURER / MODEL NO.: N/A	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_________________ ☐ NESHAP (SUBPARTS?):_________________

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

	SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
	EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
AIR POLLUTANT EMITTED	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)	**SEE APPENDIX B, Table 13B & 13C**						
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	**EXPECTED ACTUAL**		**POTENTIAL EMISSIONS**			
		EMISSION	AFTER CONTROLS / LIMITS		BEFORE CONTROLS / LIMITS		(AFTER CONTROLS / LIMITS)	
HAZARDOUS AIR POLLUTANT	**CAS NO.**	FACTOR	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
N/A								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

		SOURCE OF	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS		
TOXIC AIR POLLUTANT	**CAS NO.**	EMISSION FACTOR	lb/hr	lb/day	lb/yr
N/A					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

PLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SO

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: Haul Roads	EMISSION SOURCE ID NO: F-6
	CONTROL DEVICE ID NO(S): N/A
OPERATING SCENARIO: ______1________ OF _______1_______	EMISSION POINT (STACK) ID NO(S): FUGITIVE FEP-4

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM): A portion of the ash will be moved by truck to an offsite location. Particulate emissions are generated from the haul roads from the force of the wheels on the road surface. This force causes pulverization of the surface material. The particles are lifted and dropped from the rolling wheels and the road surface is exposed to strong air currents, which generate airborne particulate emissions.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: N/A	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): N/A
MAX. CAPACITY HOURLY FUEL USE: N/A	REQUESTED CAPACITY ANNUAL FUEL USE: N/A

COMMENTS: Loaded truck weight 50 tons and unloaded truck weight 25 tons.

Attach Additional Sheets as Necessary

FORM D1

FACILITY-WIDE EMISSIONS SUMMARY

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **D1**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (AFTER CONTROLS / LIMITATIONS)
AIR POLLUTANT EMITTED	tons/yr	tons/yr	tons/yr
PARTICULATE MATTER (PM)	330.27	N/A	330.27
PARTICULATE MATTER < 10 MICRONS (PM_{10})	322.27	N/A	322.27
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)	322.06	N/A	322.06
SULFUR DIOXIDE (SO_2)	15,183.29	N/A	15,183.29
NITROGEN OXIDES (NOx)	5,258.45	N/A	5,258.45
CARBON MONOXIDE (CO)	1,186.54	N/A	1,186.54
VOLATILE ORGANIC COMPOUNDS (VOC)	128.34	N/A	128.34
LEAD	0.771	N/A	0.771
GREENHOUSE GASES (GHG) (SHORT TONS)	116,604.15	N/A	116,604.15
OTHER			

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

		EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (AFTER CONTROLS / LIMITATIONS)
HAZARDOUS AIR POLLUTANT EMITTED	CAS NO.	tons/yr	tons/yr	tons/yr
Benzene	71-43-2	255.30	N/A	255.30
Formaldehyde	50-00-0	7,780.20	N/A	7,780.20
Hexane	110-54-3	25,303.13	N/A	25,303.13
Naphthalene	91-20-3	5.69E-03	N/A	5.69E-03
Toluene	108-88-3	4,211,520.32	N/A	4,211,520.32
Arsenic	7440-38-2	1.94E-01	N/A	0.19
Antimony	7440-36-0	1.41E-04	N/A	1.41E-04
Beryllium	7440-41-7	1.06E-01	N/A	0.11
Cadmium	7440-43-9	7.14	N/A	7.14
Chromium	7440-47-3	4.84E-03	N/A	4.84E-03
Chromium VI	18540-29-9	112.49	N/A	112.49
Cobalt	7440-48-4	1.42E-03	N/A	1.42E-03
Manganese	7439-96-5	11,443.34	N/A	11,443.34
Mercury	7439-97-6	219.79	N/A	219.79
Nickel	7440-02-0	42.37	N/A	42.37
Selenium	7782-49-2	4.82E-03	N/A	4.82E-03
Xylene	1330-20-7	12.68	N/A	12.68
1,3-Butadiene	106-99-0	0.61	N/A	0.61
Acetaldehyde	75-07-0	3.49	N/A	3.49
Acrolein	107-02-8	2.84	N/A	2.84
Total PAH (including Naphthalene)		2.04E-04	N/A	2.04E-04

TOXIC AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

INDICATE REQUESTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS. EMISSIONS ABOVE THE TOXIC PERMIT EMISSION RATE (TPER) IN 15A NCAC 2Q .0711 MAY REQUIRE AIR DISPERSION MODELING. USE NETTING FORM D2 IF NECESSARY.

					Modeling Required ?	
TOXIC AIR POLLUTANT EMITTED	CAS NO.	lb/hr	lb/day	lb/year	Yes	No
Sulfuric Acid Mist	7664-93-9	947.13	10,781.10		X	
Benzene	71-43-2			510,598.49	X	
Formaldehyde	50-00-0	1,776.30			X	
Hexane	110-54-3		138,647.28		X	
Toluene	108-88-3	961,534.32	11,593,642.41		X	
Arsenic	7440-38-2			387.55	X	
Beryllium	7440-41-7			212.67	X	
Cadmium	7440-43-9			14,274.49	X	
Chromium VI	18540-29-9		616.41		X	
Manganese	7439-96-5		62,703.25		X	
Mercury	7439-97-6		1,204.33		X	
Nickel	7440-02-0		232.17		X	

COMMENTS:

For modeling purposes toxic air pollutant facility wide emissions include emissions from the STAR facility and the Steam Electric Plant. Proposed emission rates of HAPs and TAPs that are modeled are optimized rates, proposed emission rate for all other pollutants are potential emissions. Diesel engines (ES-39B and ES-40B) were not modeled in the TPER analysis per 15A NCAC 2Q.0702 (a)(27).

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Sulfuric Acid Mist CAS NO.: 7664-93-9

EMISSION SOURCE ID NOS.: ES-31, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B and ES-1C

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A		
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A		
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A		

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	10,781	947.13
TPER LEVELS (2Q .0711)	N/A	0.25	0.25

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Benzene CAS NO.: 71-43-2

EMISSION SOURCE ID NOS.: ES-31, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES			
Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE		N/A	N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE		N/A	N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION		N/A	N/A
SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS			
CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			
SECTION C - FACILITY-WIDE EMISSIONS			
TOTAL FACILITY EMISSIONS	510,598	N/A	N/A
TPER LEVELS (2Q .0711)	8.1	N/A	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Formaldehyde CAS NO.: 50-00-0

EMISSION SOURCE ID NOS.: ES-31, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A	N/A	
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A	N/A	
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A	N/A	

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	N/A	1776.30
TPER LEVELS (2Q .0711)	N/A	N/A	0.04

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Hexane CAS NO.: 110-54-3

EMISSION SOURCE ID NOS.: ES-31, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A	N/A	
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A	N/A	
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A	N/A	

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	138,647	N/A
TPER LEVELS (2Q .0711)	N/A	23	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Toluene CAS NO.: 108-88-3

EMISSION SOURCE ID NOS.: ES-31, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A	N/A	
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A	N/A	
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A	N/A	

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	11,593,642	961,534
TPER LEVELS (2Q .0711)	N/A	98	14.4

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Arsenic CAS NO.: 7440-38-2

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE		N/A	N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE		N/A	N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION		N/A	N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	387.55	N/A	N/A
TPER LEVELS (2Q .0711)	0.053	N/A	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Beryllium CAS NO.: 7440-41-7

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES			
Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE		N/A	N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE		N/A	N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION		N/A	N/A
SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS			
CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			
SECTION C - FACILITY-WIDE EMISSIONS			
TOTAL FACILITY EMISSIONS	212.67	N/A	N/A
TPER LEVELS (2Q .0711)	0.28	N/A	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Cadmium CAS NO.: 7440-43-9

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE		N/A	N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE		N/A	N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION		N/A	N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	14,274.49	N/A	N/A
TPER LEVELS (2Q .0711)	0.37	N/A	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Chromium VI CAS NO.: 18540-29-9

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A		N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A		N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A		N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	616.410	N/A
TPER LEVELS (2Q .0711)	N/A	0.013	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Manganese CAS NO.: 7439-96-5

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A		N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A		N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A		N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	62,703.249	N/A
TPER LEVELS (2Q .0711)	N/A	0.63	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Mercury CAS NO.: 7439-97-6

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A		N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A		N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A		N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	1,204.327	N/A
TPER LEVELS (2Q .0711)	N/A	0.0013	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: Nickel CAS NO.: 7440-02-0

EMISSION SOURCE ID NOS.: ES-30A, ES-30B, ES-31, ES-34, ES-35, ES-36A, ES-36B, ES-37A, ES-37B, ES-38, ES-38A, ES-38B, ES-39A, ES-40A, F-1, F-2, F-3, F-4, F-5, ES-10, ES-11, ES-12, ES-13, ES-14, ES-1A, ES-1B, ES-1C and Existing Aux Equip

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES

Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	N/A		N/A
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE	N/A		N/A
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION	N/A		N/A

SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS

CREDITABLE INCREASE			
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			

SECTION C - FACILITY-WIDE EMISSIONS

TOTAL FACILITY EMISSIONS	N/A	232.172	N/A
TPER LEVELS (2Q .0711)	N/A	0.13	N/A

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is greater than the 2Q .0711 Toxic Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☑

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Attach Additional Sheets As Necessary

FORM D5

TECHNICAL ANALYSIS TO SUPPORT PERMIT APPLICATION

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D5**

PROVIDE DETAILED TECHNICAL CALCULATIONS TO SUPPORT ALL EMISSION, CONTROL, AND REGULATORY DEMONSTRATIONS MADE IN THIS APPLICATION. INCLUDE A COMPREHENSIVE PROCESS FLOW DIAGRAM AS NECESSARY TO SUPPORT AND CLARIFY CALCULATIONS AND ASSUMPTIONS. ADDRESS THE FOLLOWING SPECIFIC ISSUES ON SEPARATE PAGES:

A **SPECIFIC EMISSIONS SOURCE (EMISSION INFORMATION) (FORM B and B1 through B9) -** SHOW CALCULATIONS USED, INCLUDING EMISSION FACTORS, MATERIAL BALANCES, AND/OR OTHER METHODS FROM WHICH THE POLLUTANT EMISSION RATES IN THIS APPLICATION WERE DERIVED. INCLUDE CALCULATION OF POTENTIAL BEFORE AND, WHERE APPLICABLE, AFTER CONTROLS. CLEARLY STATE ANY ASSUMPTIONS MADE AND PROVIDE ANY REFERENCES AS NEEDED TO SUPPORT MATERIAL BALANCE CALCULATIONS.

B **SPECIFIC EMISSION SOURCE (REGULATORY INFORMATION)(FORM E2 - TITLE V ONLY) -** PROVIDE AN ANALYSIS OF ANY REGULATIONS APPLICABLE TO INDIVIDUAL SOURCES AND THE FACILITY AS A WHOLE. INCLUDE A DISCUSSION OUTING METHODS (e.g. FOR TESTING AND/OR MONITORING REQUIREMENTS) FOR COMPLYING WITH APPLICABLE REGULATIONS, PARTICULARLY THOSE REGULATIONS LIMITING EMISSIONS BASED ON PROCESS RATES OR OTHER OPERATIONAL PARAMETERS. PROVIDE JUSTIFICATION FOR AVOIDANCE OF ANY FEDERAL REGULATIONS (PREVENTION OF SIGNIFICANT DETERIORATION (PSD), NEW SOURCE PERFORMANCE STANDARDS (NSPS), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), TITLE V), INCLUDING EXEMPTIONS FROM THE FEDERAL REGULATIONS WHICH WOULD OTHERWISE BE APPLICABLE TO THIS FACILITY. SUBMIT ANY REQUIRED INFORMATION TO DOCUMENT COMPLIANCE WITH ANY REGULATIONS. INCLUDE EMISSION RATES CALCULATED IN ITEM "A" ABOVE, DATES OF MANUFACTURE, CONTROL EQUIPMENT, ETC. TO SUPPORT THESE CALCULATIONS.

C **CONTROL DEVICE ANALYSIS (FORM C and C1 through C9) -** PROVIDE A TECHNICAL EVALUATION WITH SUPPORTING REFERENCES FOR ANY CONTROL EFFICIENCIES LISTED ON SECTION C FORMS, OR USED TO REDUCE EMISSION RATES IN CALCULATIONS UNDER ITEM "A" ABOVE. INCLUDE PERTINENT OPERATING PARAMETERS (e.g. OPERATING CONDITIONS, MANUFACTURING RECOMMENDATIONS, AND PARAMETERS AS APPLIED FOR IN THIS APPLICATION) CRITICAL TO ENSURING PROPER PERFORMANCE OF THE CONTROL DEVICES). INCLUDE AND LIMITATIONS OR MALFUNCTION POTENTIAL FOR THE PARTICULAR CONTROL DEVICES AS EMPLOYED AT THIS FACILITY. DETAIL PROCEDURES FOR ASSURING PROPER OPERATION OF THE CONTROL DEVICE INCLUDING MONITORING SYSTEMS AND MAINTENANCE TO BE PERFORMED.

D **PROCESS AND OPERATIONAL COMPLIANCE ANALYSIS - (FORM E3 - TITLE V ONLY)** - SHOWING HOW COMPLIANCE WILL BE ACHIEVED WHEN USING PROCESS, OPERATIONAL, OR OTHER DATA TO DEMONSTRATE COMPLIANCE. REFER TO COMPLIANCE REQUIREMENTS IN THE REGULATORY ANALYSIS IN ITEM "B" WHERE APPROPRIATE. LIST ANY CONDITIONS OR PARAMETERS THAT CAN BE MONITORED AND REPORTED TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REGULATIONS.

E **PROFESSIONAL ENGINEERING SEAL -** PURSUANT TO 15A NCAC 2Q .0112 "APPLICATION REQUIRING A PROFESSIONAL ENGINEERING SEAL," A PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA SHALL BE REQUIRED TO SEAL TECHNICAL PORTIONS OF THIS APPLICATION FOR NEW SOURCES AND MODIFICATIONS OF EXISTING SOURCES. (SEE INSTRUCTIONS FOR FURTHER APPLICABILITY).

I, Thomas O. Pritcher *attest that this application for* Duke Energy Progress, LLC - H.F. Lee Steam Electric Plant *has been reviewed by me and is accurate, complete and consistent with the information supplied in the* ~~engineering plans~~*, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design* **concept** *has been prepared in accordance with the applicable regulations. Although certain portions of this submittal package may have been developed by other professionals, inclusion of these materials under my seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design* **concept***. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $10,000 as well as civil penalties up to $25,000 per violation.*

(PLEASE USE BLUE INK TO COMPLETE THE FOLLOWING)

NAME:	
DATE:	
COMPANY:	Environmental Consulting & Technology of North Ca
ADDRESS:	7208 Falls of Neuse Road, Suite 102, Raleigh, NC
TELEPHONE:	919-861-8888
SIGNATURE:	
PAGES CERTIFIED:	Appendix A & Appendix B

(IDENTIFY ABOVE EACH PERMIT FORM AND ATTACHMENT THAT IS BEING CERTIFIED BY THIS SEAL)

PLACE NORTH CAROLINA SEAL HERE

Attach Additional Sheets As Necessary

FORM D6

NORTH CAROLINA MODELING PROTOCOL CHECKLIST (2 Pages)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D6-1**

The North Carolina Modeling Protocol Checklist may be used in lieu of developing the traditional written modeling plan for North Carolina toxics and criteria pollutant modeling. The protocol checklist is designed to provide the same level of information as requested in a modeling protocol as discussed in Chapter 2 of the ***Guideline for Evaluating the Air Quality Impacts of Toxic Pollutants in North Carolina***. The modeling protocol checklist is submitted with the modeling analysis. The above referenced ***Guideline*** can be found at the following web link:

https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/permits/mets/Guidance.pdf

Although most of the information requested in the modeling protocol checklist is self-explanatory, additional comments are provided, where applicable, and are discussed in greater detail in the toxics modeling ***Guideline*** referenced above. References to sections, tables, figures, appendices, etc., in the protocol checklist are found in the toxics modeling ***Guideline***.

INSTRUCTIONS: The modeling report supporting the compliance demonstration should include most of the information listed below. As appropriate, answer the following questions or indicate by check mark the information provided or action taken is reflected in your report.

FACILITY INFORMATION

Facility Name:	H.F. Lee Steam Electric Plant	**Consultant (if applicable):**	Environmental Consulting & Technology of North Carolina, PLLC
Facility ID:	9600017		
Address:	1199 Black Jack Church Road Goldsboro, NC, 27530		7208 Falls Of Neuse Road Suite 102 Raleigh, NC 27615
Contact Name:	Erin Wallace	**Contact Name:**	Thomas Pritcher
Phone Number:	919-546-5797	**Phone Number:**	919-861-8888
Email Address:	erin.wallace@duke-energy.com	**Email Address:**	tpritcher@ectinc.com

GENERAL INFORMATION

Item	Status
Description of New Source or Source/Process Modification: **P**rovide a short description of the new or modified source(s) and a brief discussion of how this change affects facility production or process operation.	☑ Included ☐ N/A
Source/Pollutant Identification: Provide a table of the affected pollutants, by source, which identifies the source type (point, area, or volume), maximum pollutant emission rates over the applicable averaging period(s), and, for point sources, indicate if the stack is capped or non-vertical (C/N).	☑ Included
Pollutant Emission Rate Calculations: Indicate how the pollutant emission rates were derived (e.g. AP-42 emission factors, mass balance, etc.) and where applicable, provide the calculations	☑ Included ☐ N/A
Site/Facility Diagram: Provide a diagram or drawing showing the location of all existing and proposed emission sources, buildings or structures, public right-of-ways, and the facility property (toxics)/fence line (criteria pollutants) boundaries. The diagram should also include a scale, true north indicator, and the UTM or latitude/longitude of at least one point.	☑ Included
Certified Plat or Signed Survey: a certified plat (map) from the County Register of Deeds or a signed survey must be submitted to validate property boundaries modeled.	☑ Included
Topographic Map: a topographic map covering approximately 5 km around the facility must be submitted. The facility boundaries should be annotated on the map as accurately as possible.	☑ Included ☐ N/A
Cavity Impact Analysis: no cavity analysis is required if using AERMOD. *See Section 4.2*	☐ Included ☑ N/A
Background Concentrations (criteria Pollutant analyses only): Background concentrations must be determined for each pollutant for each averaging period evaluated. The averaged background value used (e.g. high, high-second-high, high-third-high, etc.) is based on the pollutant and averaging period evaluated. The background concentrations are added to the modeled concentrations, which are then compared to the applicable air quality standard to determine compliance.	☐ Included ☑ N/A
Offsite Source Inventories (criteria pollutant analyses only): Offsite source inventories must be developed and modeled for all pollutants for which onsite source emissions are modeled in excess of the specific pollutant significant impact levels (SILs) as defined in the PSD New Source Review Workshop Manual. The DAQ AQAB must approve the inventories. An initial working inventory can be requested from the AQAB.	☐ Included ☑ N/A

Attach Additional Sheets as Necessary

SCREEN LEVEL MODELING

D6-2

Model: The latest version of the AERSCREEN model must be used. The use of other screening models should be approved by NCDAQ prior to submitting the modeling report.	AERSCREEN Version NA
Source/Source Emission Parameters: Provide a table listing the sources modeled and the applicable source emission parameters. See NC Form 3 - Appendix A.	NA
Merged Sources: Identify merged sources and show all appropriate calculations. See Section 3.3	NA
GEP Analysis: See Section 3.2 and NC Form 1 - Appendix A	NA
Terrain: Indicate the terrain modeled: simple (Section 4.4), and complex (Section 4.5 and NC Form 4 -- Appendix A). If complex terrain is within 5 kilometers of the facility, complex terrain must be evaluated. Simple terrain must include terrain elevations if any terrain is greater than the stack base of any source modeled. Mark the appropriate terrain type.	☐ Simple ☐ Complex
Meteorology: Refer to Section 4.1 for AERSCREEN inputs.	NA
Receptors: AERSCREEN - use shortest distance to property boundary for each source modeled and use sufficient range to find maximum [See Section 4.1(i) and (j)]. Terrain above stack base must be evaluated.	NA
Modeling Results: For each affected pollutant, modeling results should be summarized, converted to the applicable averaging period (See Table 3), and presented in tabular format indicating compliance status with the applicable AAL, SIL, or NAAQS. See NC Form S5 - Appendix A.	NA
Modeling Files: Either electronic or hard copies of AERSCREEN output must be submitted.	☐ Electronic ☐ Hard Copy

REFINED LEVEL MODELING

Model: The latest version of AERMOD should be used. The use of other refined models must be approved by NCDAQ prior to submitting the modeling report. The latest version of AERMOD may be found at the following web address: http://www.epa.gov/scram001/dispersion_prefrec.htm	AERMOD Version 16216r
Source/Source Emission Parameters: Provide a table listing the sources modeled and the applicable source emission parameters. See NC Form 3 - Appendix A.	Y
GEP Analysis: Use BPIP-Prime with AERMOD.	
Cavity Impact Analysis: No separate cavity analysis is required when using AERMOD as long as receptors are placed in cavity susceptible areas. See Section 4.2 and 5.2.	NA
Terrain: Use digital elevation data from the USGS NED database. Use of other sources of terrain elevations or the non-regulatory Flat Terrain option will require prior approval from DAQ AQAB. The USGS NED database can be found at the following web address: http://viewer.nationalmap.gov/launch/	☑ USGS NED ☐ Other
Coordinate System: Specify the coordinate system used (e.g. NAD27, NAD83, etc.) to identify the source, building, and receptor locations. Note: Be sure to specify in the AERMAP input file the correct base datum (NADA) to be used for identifying source input data locations. Clearly note in both the protocol checklist and the modeling report which datum was used.	Coordinate System: NAD83
Receptors: The receptor grid should be of sufficient size and resolution to identify the maximum pollutant impact. See Section 5.3.	Y
Meteorology: Indicate the AQAB, pre-processed, 5-year data set used in the modeling demonstration: See Section 5.5 and Appendix B)	Data Set Used: Rocky Mount-Wilson (surface) / Newport
AERMOD Version:	NA
If processing your own raw meteorology, then pre-approval from AQAB is required. Additional documentation files (e.g. AERMET state processing files) will also be necessary. For NC toxics, the modeling demonstration requires only the last year of the standard 5-year data set (e.g. 2005) provided the maximum impacts are less than 50% of the applicable AAL(s).	NA
Modeling Results: For each affected pollutant and averaging period, modeling results should be summarized and presented in tabular format indicating compliance status with the applicable AAL, SIL, or NAAQS. See NC Form R5 - Appendix A.	Y
Modeling Files: Submit input and output files for AERMOD. Also include BPIP-Prime files, AERMAP files, DEM files, and any AERMET input and output files, including raw meteorological data.	Y

Attach Additional Sheets as Necessary

APPENDIX B

SUPPORTING EMISSION CALCULATIONS

Table 1A - Toxic Permitting Emission Rate (TPER) Analysis based on Potential Emissions from the Existing and Proposed Sources

Pollutants	Existing Turbines 10-13			Existing Turbine 14			Existing Turbines 1A, 1B, 1C			Existing Auxiliary Equipment			STAR Facility			Total			TPER			Modeling Required?		
	lb/hr	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**
Sulfuric Acid Mist	3.24E+01	7.78E+02		8.01E+00	1.92E+02		2.30E+02	5.52E+03		0.00E+00	0.00E+00		1.00E-01	2.40E+00		270.61	6494.64		0.025	0.25		**YES**	**YES**	
Benzene			8.23E+02			2.23E+02			7.33E+02			4.16E+00			3.34E+00			1787.54			8.1			**YES**
Formaldehyde	5.32E+00			1.38E+00			4.89E+00			1.22E-02			7.64E-03			11.61			0.04			**YES**		
Hexane							2.40E+00	5.75E+01		1.71E-01	4.11E+00			2.54E+00			64.18			23.0			**YES**	
Toluene	2.78E+00	6.68E+01		7.54E-01	1.81E+01		8.82E-01	2.12E+01		1.95E-03	4.69E-02		1.32E-03	3.17E-02		4.42	106.11		14.4	98.0		NO	**YES**	
Arsenic			1.65E+02			4.47E+01			7.10E+01			2.08E-01			8.60E+00			289.30			0.053			**YES**
Beryllium			4.64E+00			1.26E+00			2.00E+00			1.25E-02			9.42E-01			8.86			0.28			**YES**
Cadmium			7.18E+01			1.95E+01			3.10E+01			1.14E+00			6.07E-01			124.13			0.37			**YES**
Chromium VI	1.34E-02	3.21E-01		3.63E-03	8.71E-02		7.11E-02	1.71E+00		1.33E-04	3.20E-03			4.05E-04			2.12			0.013			**YES**	
Manganese	5.92E+00	1.42E+02		1.60E+00	3.84E+01		5.10E+00	1.22E+02		3.62E-05	8.68E-04			3.34E-02			302.91			0.630			**YES**	
Mercury	8.98E-03	2.16E-01		2.44E-03	5.86E-02		7.74E-03	1.86E-01		2.48E-05	5.94E-04			4.64E-04			0.46			0.013			**YES**	
Nickel	3.45E-02	8.27E-01		9.34E-03	2.24E-01		2.97E-02	7.13E-01		2.00E-04	4.79E-03			1.71E-02			1.79			0.013			**YES**	

Existing Equipment: Emissions from Tables 3-2 through 3-4 (November 2010) and Tables 4-7 through 4-9 and 4-13 (April 2011). Tables provided in Appendix C.

Table 1B - Toxic Permitting Emission Rate (TPER) Analysis based on Optimized Emissions from the Existing and Proposed Sources

Pollutants	Existing Turbines 10-13			Existing Turbine 14			Existing Turbines 1A, 1B, 1C			Existing Auxiliary Equipment			STAR Facility			Total			TPER			Modeling Required?		
	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr
Sulfuric Acid Mist	1.13E+02	1.29E+03		2.80E+01	3.19E+02		8.05E+02	9.17E+03		0.00E+00	0.00E+00		3.50E-01	3.98E+00		947.13	10,781.10		0.025	0.25		**YES**	**YES**	
Benzene			2.47E+05			6.70E+04			1.94E+05			1.25E+03			1.00E+03			510,598.49			8.1			**YES**
Formaldehyde	8.14E+02			2.11E+02			7.48E+02			1.86E+00			1.17E+00			1,776.30			0.04			**YES**		
Hexane							5.42E+03	1.30E+05		1.71E-01				8.58E+03			138,647.28			23.0			**YES**	
Toluene	6.05E+05	7.30E+06		1.64E+05	1.98E+06		1.92E+05	2.31E+06		4.25E+02	5.13E+03		2.87E+02	3.46E+03		961,534.32	11,593,642.41		14.4	98.0		**YES**	**YES**	
Arsenic			2.23E+02			6.03E+01			9.58E+01			2.81E-01			8.60E+00			387.55			0.053			**YES**
Beryllium			1.11E+02			3.03E+01			4.81E+01			2.99E-01			2.26E+01			212.67			0.28			**YES**
Cadmium			8.26E+03			2.25E+03			3.57E+03			1.31E+02			6.97E+01			14,274.49			0.37			**YES**
Chromium VI	3.89E+00	9.34E+01		1.06E+00	2.54E+01		2.07E+01	4.97E+02		3.88E-02	9.32E-01			1.18E-01			616.41			0.013			**YES**	
Manganese	1.23E+03	2.94E+04		3.31E+02	7.95E+03		1.06E+03	2.53E+04		7.49E-03	1.80E-01			6.91E+00			62,703.25			0.630			**YES**	
Mercury	2.35E+01	5.63E+02		6.38E+00	1.53E+02		2.02E+01	4.85E+02		6.47E-02	1.55E+00			1.21E+00			1,204.33			0.013			**YES**	
Nickel	4.48E+00	1.08E+02		1.21E+00	2.91E+01		3.86E+00	9.27E+01		2.60E-02	6.23E-01			2.23E+00			232.17			0.013			**YES**	

Duke Energy H.F. Lee Plant
Table 2A - Facility-wide Emissions Summary - Shortterm

	STAR® Fly Ash + Worst-Case Fuel Controlled Emissions		EHE Emissions		Pre STAR Unit Silo Emissions		Post STAR Unit Silo/Dome Emissions		Pollution Control Silo Emissions		Wet Ash Receiving Emissions		Storage Pile Emissions		Ash Basin	
Pollutant	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	16.61	--	6.86	--	0.02	--	0.04	--	0.11	--	4.50E-03	--	3.14E-03	--	1.61E+00	--
PM_{10}	15.28	--	6.31	--	0.01	--	0.02	--	0.10	--	2.13E-03	--	1.57E-03	--	8.05E-01	--
$PM_{2.5}$	8.80	--	3.63	--	0.01	--	0.02	--	0.06	--	3.22E-04	--	2.35E-04	--	1.21E-01	--
SO_2	24.14	--		--		--		--		--		--		--		--
NO_X	47.60	--		--		--		--		--		--		--		--
CO	22.40	--		--		--		--		--		--		--		--
VOC	2.24	--		--		--		--		--		--		--		--
GHG (Mass Basis)*		--		--		--		--		--		--		--		--
GHG (CO_2e Basis)*		--		--		--		--		--		--		--		--
Sulfuric Acid Mist§	0.10	--		--		--		--		--		--		--		--
Lead	3.59E-04	--	1.36E-04	--	3.87E-07	--	8.22E-07	--		--	8.93E-08	--	6.22E-08	--	3.20E-05	--
Benzene	1.24E-04	--		--		--		--		--		--		--		--
Formaldehyde	4.41E-03	--		--		--		--		--		--		--		--
Hexane	1.06E-01	--		--		--		--		--		--		--		--
Toluene	2.00E-04	--		--		--		--		--		--		--		--
Arsenic	6.53E-04	--	2.64E-04	--	7.51E-07	--	1.60E-06	--		--	1.73E-07	--	1.21E-07	--	6.21E-05	--
Antimony	2.13E-05	--	8.78E-06	--	2.49E-08	--	5.31E-08	--		--	5.76E-09	--	4.01E-09	--	2.06E-06	--
Beryllium	7.13E-05	--	2.91E-05	--	8.28E-08	--	1.76E-07	--		--	1.91E-08	--	1.33E-08	--	6.84E-06	--
Cadmium	6.77E-05	--	1.23E-06	--	3.51E-09	--	7.47E-09	--		--	8.10E-10	--	5.64E-10	--	2.90E-07	--
Chromium	5.01E-04	--	1.73E-04	--	4.91E-07	--	1.04E-06	--		--	1.13E-07	--	7.90E-08	--	4.06E-05	--
Chromium VI	1.11E-05	--	4.59E-06	--	1.31E-08	--	2.77E-08	--		--	3.01E-09	--	2.10E-09	--	1.08E-06	--
Cobalt	2.16E-04	--	8.69E-05	--	2.47E-07	--	5.25E-07	--		--	5.71E-08	--	3.98E-08	--	2.04E-05	--
Manganese	9.24E-04	--	3.72E-04	--	1.06E-06	--	2.25E-06	--		--	2.44E-07	--	1.70E-07	--	8.74E-05	--
Mercury	1.80E-05	--	1.10E-06	--	3.12E-09	--	6.62E-09	--		--	7.20E-10	--	5.02E-10	--	2.58E-07	--
Nickel	5.11E-04	--	1.60E-04	--	4.54E-07	--	9.66E-07	--		--	1.05E-07	--	7.32E-08	--	3.76E-05	--
Selenium	1.41E-04	--	5.71E-05	--	1.62E-07	--	3.49E-07	--		--	3.74E-08	--	2.61E-08	--	1.34E-05	--
Xylenes		--		--		--		--		--		--		--		--
1,3-Butadiene		--		--		--		--		--		--		--		--
Acetaldehyde		--		--		--		--		--		--		--		--
Acrolein		--		--		--		--		--		--		--		--
Total PAH		--		--		--		--		--		--		--		--
Naphthalene	3.59E-05	--		--		--		--		--		--		--		--
Acenaphthalene		--		--		--		--		--		--		--		--
Acenaphthene		--		--		--		--		--		--		--		--
Fluorene		--		--		--		--		--		--		--		--
Phenanthrene		--		--		--		--		--		--		--		--
Anthracene		--		--		--		--		--		--		--		--
Fluoranthene		--		--		--		--		--		--		--		--
Pyrene		--		--		--		--		--		--		--		--
Benzo(a)anthracene		--		--		--		--		--		--		--		--
Chrysene		--		--		--		--		--		--		--		--
Benzo(b)fluoranthene		--		--		--		--		--		--		--		--
Benzo(k)fluoranthene		--		--		--		--		--		--		--		--
Benzo(a)pyrene		--		--		--		--		--		--		--		--
Indeno(1,2,3-cd)pyrene		--		--		--		--		--		--		--		--
Dibenz(a,h)anthracene		--		--		--		--		--		--		--		--
Benzo(g,h,l)perylene		--		--		--		--		--		--		--		--
Maximum HAP																
Total HAP																

	Ash Handling		Haul Roads		Screener		Crusher		Screener/Crusher Engines		Facility Total Controlled Emissions		Facility Total Permitted Emissions	
Pollutant	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	3.22E-02	--	3.49E-01	--	0.02	--	0.01	--	0.86	--	26.52	--	26.52	--
PM_{10}	1.52E-02	--	9.02E-02	--	0.01	--	0.004	--	0.86	--	23.50	--	23.50	--
$PM_{2.5}$	2.30E-03	--	9.03E-03	--	0.0003	--	0.001	--	0.86	--	13.52	--	13.52	--
SO_2		--		--		--		--	0.80	--	24.94	--	24.94	--
NO_X		--		--		--		--	12.12	--	59.72	--	59.72	--
CO		--		--		--		--	2.61	--	25.01	--	25.01	--
VOC		--		--		--		--	0.97	--	3.21	--	3.21	--
GHG (Mass Basis)*		--		--		--		--		--				
GHG (CO_2e Basis)*		--		--		--		--		--				
Sulfuric Acid Mist§		--		--		--		--		--	0.10	--	0.10	--
Lead	6.38E-07	--		--	3.00E-07	--	1.64E-07	--		--	5.30E-04	--	5.30E-04	--
Benzene		--		--		--		--	2.55E-03	--	2.68E-03	--	2.68E-03	--
Formaldehyde		--		--		--		--	3.23E-03	--	7.64E-03	--	7.64E-03	--
Hexane		--		--		--		--		--	1.06E-01	--	1.06E-01	--
Toluene		--		--		--		--	1.12E-03	--	1.32E-03	--	1.32E-03	--
Arsenic	1.24E-06	--		--	5.83E-07	--	3.18E-07	--		--	9.84E-04	--	9.84E-04	--
Antimony	4.12E-08	--		--	1.94E-08	--	1.06E-08	--		--	3.23E-05	--	3.23E-05	--
Beryllium	1.37E-07	--		--	6.43E-08	--	3.51E-08	--		--	1.08E-04	--	1.08E-04	--
Cadmium	5.79E-09	--		--	2.72E-09	--	1.49E-09	--		--	6.92E-05	--	6.92E-05	--
Chromium	8.10E-07	--		--	3.81E-07	--	2.08E-07	--		--	7.17E-04	--	7.17E-04	--
Chromium VI	2.15E-08	--		--	1.01E-08	--	5.53E-09	--		--	1.69E-05	--	1.69E-05	--
Cobalt	4.08E-07	--		--	1.92E-07	--	1.05E-07	--		--	3.24E-04	--	3.24E-04	--
Manganese	1.75E-06	--		--	8.21E-07	--	4.48E-07	--		--	1.39E-03	--	1.39E-03	--
Mercury	5.15E-09	--		--	2.42E-09	--	1.32E-09	--		--	1.93E-05	--	1.93E-05	--
Nickel	7.50E-07	--		--	3.53E-07	--	1.92E-07	--		--	7.12E-04	--	7.12E-04	--
Selenium	2.68E-07	--		--	1.26E-07	--	6.86E-08	--		--	2.13E-04	--	2.13E-04	--
Xylenes		--		--		--		--	7.80E-04	--	7.80E-04	--	7.80E-04	--
1,3-Butadiene		--		--		--		--	1.07E-04	--	1.07E-04	--	1.07E-04	--
Acetaldehyde		--		--		--		--	2.10E-03	--	2.10E-03	--	2.10E-03	--
Acrolein		--		--		--		--	2.53E-04	--	2.53E-04	--	2.53E-04	--
Total PAH		--		--		--		--	4.60E-04	--	4.60E-04	--	4.60E-04	--
Naphthalene		--		--		--		--	2.32E-04	--	2.68E-04	--	2.68E-04	--
Acenaphthalene		--		--		--		--	1.38E-05	--	1.38E-05	--	1.38E-05	--
Acenaphthene		--		--		--		--	3.89E-06	--	3.89E-06	--	3.89E-06	--
Fluorene		--		--		--		--	7.99E-05	--	7.99E-05	--	7.99E-05	--
Phenanthrene		--		--		--		--	8.05E-05	--	8.05E-05	--	8.05E-05	--
Anthracene		--		--		--		--	5.12E-06	--	5.12E-06	--	5.12E-06	--
Fluoranthene		--		--		--		--	2.08E-05	--	2.08E-05	--	2.08E-05	--
Pyrene		--		--		--		--	1.31E-05	--	1.31E-05	--	1.31E-05	--
Benzo(a)anthracene		--		--		--		--	4.60E-06	--	4.60E-06	--	4.60E-06	--
Chrysene		--		--		--		--	9.66E-07	--	9.66E-07	--	9.66E-07	--
Benzo(b)fluoranthene		--		--		--		--	2.71E-07	--	2.71E-07	--	2.71E-07	--
Benzo(k)fluoranthene		--		--		--		--	4.24E-07	--	4.24E-07	--	4.24E-07	--
Benzo(a)pyrene		--		--		--		--	5.15E-07	--	5.15E-07	--	5.15E-07	--
Indeno(1,2,3-cd)pyrene		--		--		--		--	1.03E-06	--	1.03E-06	--	1.03E-06	--
Dibenz(a,h)anthracene		--		--		--		--	1.60E-06	--	1.60E-06	--	1.60E-06	--
Benzo(g,h,l)perylene		--		--		--		--	1.34E-06	--	1.34E-06	--	1.34E-06	--
Maximum HAP											1.06E-01		1.06E-01	
Total HAP											1.26E-01		1.26E-01	

Note: Duke Energy expects 6%-15% LOI. LOI will affect throughput. Duke Energy wont go above 400,000 tpy.

§ Based on SEFA stack test performed September 2016. Sulfuric Acid Mist was 0.05 lb/hr for contingency ECT doubled the number to 0.1 lb/hr.

NC15A NCAC 02Q .0711 EMISSION RATES REQUIRING A PERMIT

Pollutant	Facility Total Controlled Emissions	
	lb/hr	lb/day
Sulfuric Acid Mist	0.10	2.40
Benzene		
Formaldehyde	7.64E-03	
Hexane		2.54
Toluene	1.32E-03	3.17E-02
Arsenic		
Beryllium		
Cadmium		
Chromium VI	1.69E-05	4.05E-04
Manganese		3.34E-02
Mercury		4.64E-04
Nickel		1.71E-02

Duke Energy H.F. Lee Plant
Table 2B - Facility-wide Emissions Summary - Annual

Pollutant	STAR® Fly Ash + Worst-Case Fuel Controlled Emissions		EHE Emissions		Pre STAR Unit Silo Emissions		Post STAR Unit Silo/Dome Emissions		Pollution Control Silo Emissions		Wet Ash Receiving Emissions		Storage Pile Emissions	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	--	72.74	--	30.03	--	0.04	--	0.04	--	0.49	--	1.29E-02	--	1.37E-02
PM_{10}	--	66.92	--	27.63	--	0.02	--	0.02	--	0.45	--	6.08E-03	--	6.87E-03
$PM_{2.5}$	--	38.55	--	15.92	--	0.02	--	0.02	--	0.26	--	9.21E-04	--	1.03E-03
SO_2	--	98.18	--		--		--		--		--		--	
NO_X	--	193.60	--		--		--		--		--		--	
CO	--	91.10	--		--		--		--		--		--	
VOC	--	9.11	--		--		--		--		--		--	
GHG (Mass Basis)*	--	116,401	--		--		--		--		--		--	
GHG (CO_2e Basis)*	--	116,406	--		--		--		--		--		--	
Sulfuric Acid Mist[§]	--	0.44	--		--		--		--		--		--	
Lead	--	1.57E-03	--	5.96E-04	--	7.73E-07	--	7.73E-07	--		--	2.55E-07	--	2.73E-07
Benzene	--	5.41E-04	--		--		--		--		--		--	
Formaldehyde	--	1.93E-02	--		--		--		--		--		--	
Hexane	--	4.64E-01	--		--		--		--		--		--	
Toluene	--	8.76E-04	--		--		--		--		--		--	
Arsenic	--	2.86E-03	--	1.16E-03	--	1.50E-06	--	1.50E-06	--		--	4.96E-07	--	5.29E-07
Antimony	--	9.34E-05	--	3.84E-05	--	4.99E-08	--	5.00E-08	--		--	1.65E-08	--	1.76E-08
Beryllium	--	3.12E-04	--	1.28E-04	--	1.66E-07	--	1.66E-07	--		--	5.46E-08	--	5.84E-08
Cadmium	--	2.97E-04	--	5.41E-06	--	7.01E-09	--	7.03E-09	--		--	2.31E-09	--	2.47E-09
Chromium	--	2.19E-03	--	7.57E-04	--	9.82E-07	--	9.82E-07	--		--	3.24E-07	--	3.46E-07
Chromium VI	--	4.87E-05	--	2.01E-05	--	2.61E-08	--	2.61E-08	--		--	8.61E-09	--	9.20E-09
Cobalt	--	9.44E-04	--	3.81E-04	--	4.94E-07	--	4.94E-07	--		--	1.63E-07	--	1.74E-07
Manganese	--	4.05E-03	--	1.63E-03	--	2.12E-06	--	2.12E-06	--		--	6.98E-07	--	7.46E-07
Mercury	--	7.86E-05	--	4.81E-06	--	6.23E-09	--	6.23E-09	--		--	2.06E-09	--	2.20E-09
Nickel	--	2.24E-03	--	7.01E-04	--	9.09E-07	--	9.09E-07	--		--	3.00E-07	--	3.20E-07
Selenium	--	6.19E-04	--	2.50E-04	--	3.24E-07	--	3.28E-07	--		--	1.07E-07	--	1.14E-07
Xylenes	--		--		--		--		--		--		--	
1,3-Butadiene	--		--		--		--		--		--		--	
Acetaldehyde	--		--		--		--		--		--		--	
Acrolein	--		--		--		--		--		--		--	
Total PAH	--		--		--		--		--		--		--	
Naphthalene	--	1.57E-04	--		--		--		--		--		--	
Acenaphthalene	--		--		--		--		--		--		--	
Acenaphthene	--		--		--		--		--		--		--	
Fluorene	--		--		--		--		--		--		--	
Phenanthrene	--		--		--		--		--		--		--	
Anthracene	--		--		--		--		--		--		--	
Fluoranthene	--		--		--		--		--		--		--	
Pyrene	--		--		--		--		--		--		--	
Benzo(a)anthracene	--		--		--		--		--		--		--	
Chrysene	--		--		--		--		--		--		--	
Benzo(b)fluoranthene	--		--		--		--		--		--		--	
Benzo(k)fluoranthene	--		--		--		--		--		--		--	
Benzo(a)pyrene	--		--		--		--		--		--		--	
Indeno(1,2,3-cd)pyrene	--		--		--		--		--		--		--	
Dibenz(a,h)anthracene	--		--		--		--		--		--		--	
Benzo(g,h,l)perylene	--		--		--		--		--		--		--	
Maximum HAP														
Total HAP														

Pollutant	Ash Basin		Ash Handling		Haul Roads		Screener		Crusher		Screener/Crusher Engines		Facility Total Controlled Emissions		Facility Total Permitted Emissions	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	--	7.05E+00	--	1.41E-01	--	1.53E+00	--	1.97E-02	--	1.51E-03	--	3.81E-01	--	112.49	--	112.49
PM_{10}	--	3.53E+00	--	6.66E-02	--	3.95E-01	--	6.61E-03	--	6.78E-04	--	3.81E-01	--	99.43	--	99.43
$PM_{2.5}$	--	5.29E-01	--	1.01E-02	--	3.95E-02	--	4.47E-04	--	1.25E-04	--	3.81E-01	--	55.73	--	55.73
SO_2	--		--		--		--		--		--	0.35	--	98.53	--	98.53
NO_X	--		--		--		--		--		--	5.36	--	198.96	--	198.96
CO	--		--		--		--		--		--	1.16	--	92.26	--	92.26
VOC	--		--		--		--		--		--	0.43	--	9.54	--	9.54
GHG (Mass Basis)*	--		--		--		--		--		--	198.14	--	116598.85	--	116,599
GHG (CO_2e Basis)*	--		--		--		--		--		--	198.14	--	116604.15	--	116,604
Sulfuric Acid Mist[§]	--		--		--		--		--		--		--	0.44	--	0.44
Lead	--	1.40E-04	--	2.80E-06	--		--	3.90E-07	--	2.99E-08	--		--	2.31E-03	--	2.31E-03
Benzene	--		--		--		--		--		--	1.13E-03	--	1.67E-03	--	1.67E-03
Formaldehyde	--		--		--		--		--		--	1.43E-03	--	2.08E-02	--	2.08E-02
Hexane	--		--		--		--		--		--		--	4.64E-01	--	4.64E-01
Toluene	--		--		--		--		--		--	4.95E-04	--	1.37E-03	--	1.37E-03
Arsenic	--	2.72E-04	--	5.43E-06	--		--	7.58E-07	--	5.80E-08	--		--	4.30E-03	--	4.30E-03
Antimony	--	9.03E-06	--	1.80E-07	--		--	2.52E-08	--	1.93E-09	--		--	1.41E-04	--	1.41E-04
Beryllium	--	3.00E-05	--	5.99E-07	--		--	8.36E-08	--	6.40E-09	--		--	4.71E-04	--	4.71E-04
Cadmium	--	1.27E-06	--	2.54E-08	--		--	3.54E-09	--	2.71E-10	--		--	3.03E-04	--	3.03E-04
Chromium	--	1.78E-04	--	3.55E-06	--		--	4.95E-07	--	3.79E-08	--		--	3.14E-03	--	3.14E-03
Chromium VI	--	4.73E-06	--	9.44E-08	--		--	1.32E-08	--	1.01E-09	--		--	7.38E-05	--	7.38E-05
Cobalt	--	8.94E-05	--	1.79E-06	--		--	2.49E-07	--	1.91E-08	--		--	1.42E-03	--	1.42E-03
Manganese	--	3.83E-04	--	7.65E-06	--		--	1.07E-06	--	8.17E-08	--		--	6.08E-03	--	6.08E-03
Mercury	--	1.13E-06	--	2.25E-08	--		--	3.15E-09	--	2.41E-10	--		--	8.46E-05	--	8.46E-05
Nickel	--	1.65E-04	--	3.29E-06	--		--	4.59E-07	--	3.51E-08	--		--	3.11E-03	--	3.11E-03
Selenium	--	5.87E-05	--	1.17E-06	--		--	1.64E-07	--	1.25E-08	--		--	9.30E-04	--	9.30E-04
Xylenes	--		--		--		--		--		--	3.45E-04	--	3.45E-04	--	3.45E-04
1,3-Butadiene	--		--		--		--		--		--	4.74E-05	--	4.74E-05	--	4.74E-05
Acetaldehyde	--		--		--		--		--		--	9.29E-04	--	9.29E-04	--	9.29E-04
Acrolein	--		--		--		--		--		--	1.12E-04	--	1.12E-04	--	1.12E-04
Total PAH	--		--		--		--		--		--	2.04E-04	--	2.04E-04	--	2.04E-04
Naphthalene	--		--		--		--		--		--	1.03E-04	--	2.60E-04	--	2.60E-04
Acenaphthalene	--		--		--		--		--		--	6.13E-06	--	6.13E-06	--	6.13E-06
Acenaphthene	--		--		--		--		--		--	1.72E-06	--	1.72E-06	--	1.72E-06
Fluorene	--		--		--		--		--		--	3.54E-05	--	3.54E-05	--	3.54E-05
Phenanthrene	--		--		--		--		--		--	3.56E-05	--	3.56E-05	--	3.56E-05
Anthracene	--		--		--		--		--		--	2.27E-06	--	2.27E-06	--	2.27E-06
Fluoranthene	--		--		--		--		--		--	9.22E-06	--	9.22E-06	--	9.22E-06
Pyrene	--		--		--		--		--		--	5.79E-06	--	5.79E-06	--	5.79E-06
Benzo(a)anthracene	--		--		--		--		--		--	2.04E-06	--	2.04E-06	--	2.04E-06
Chrysene	--		--		--		--		--		--	4.28E-07	--	4.28E-07	--	4.28E-07
Benzo(b)fluoranthene	--		--		--		--		--		--	1.20E-07	--	1.20E-07	--	1.20E-07
Benzo(k)fluoranthene	--		--		--		--		--		--	1.88E-07	--	1.88E-07	--	1.88E-07
Benzo(a)pyrene	--		--		--		--		--		--	2.28E-07	--	2.28E-07	--	2.28E-07
Indeno(1,2,3-cd)pyrene	--		--		--		--		--		--	4.54E-07	--	4.54E-07	--	4.54E-07
Dibenz(a,h)anthracene	--		--		--		--		--		--	7.06E-07	--	7.06E-07	--	7.06E-07
Benzo(g,h,l)perylene	--		--		--		--		--		--	5.92E-07	--	5.92E-07	--	5.92E-07
Maximum HAP														4.64E-01		4.64E-01
Total HAP														5.10E-01		5.10E-01

Note: Duke Energy expects 6%-15% LOI. LOI will affect throughput. Duke Energy wont go above 400,000 tpy.

[§] Based on SEFA stack test performed September 2016. Sulfuric Acid Mist was 0.05 lb/hr for contingency ECT doubled the number to 0.1 lb/hr.

NC15A NCAC 02Q .0711 EMISSION RATES REQUIRING A PERMIT

Pollutant	Facility Total Controlled Emissions
	lb/yr
Sulfuric Acid Mist	
Benzene	3.34
Formaldehyde	
Hexane	
Toluene	
Arsenic	8.60
Beryllium	0.94
Cadmium	0.61
Chromium VI	
Manganese	
Mercury	
Nickel	

Duke Energy H.F. Lee Plant

Table 3A - STAR® Emissions - Shortterm (ES-31)

Natural Gas Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Emissions lb/hr	Emissions ton/yr	Reference
$PM/PM_{10}/PM_{2.5}$	7.6	lb/MMscf	58,824	scf/hr	0.45	1.96	EPA AP-42, Table 1.4-2 (07/98)
SO_2	0.6	lb/MMscf	58,824	scf/hr	0.04	0.15	EPA AP-42, Table 1.4-2 (07/98)
NO_X	140	lb/MMscf	58,824	scf/hr	8.24	36.07	EPA AP-42, Table 1.4-1 (07/98)
CO	84	lb/MMscf	58,824	scf/hr	4.94	21.64	EPA AP-42, Table 1.4-1 (07/98)
VOC	5.5	lb/MMscf	58,824	scf/hr	0.32	1.42	EPA AP-42, Table 1.4-2 (07/98)
Lead	0.0005	lb/MMscf	58,824	scf/hr	2.94E-05	1.29E-04	EPA AP-42, Table 1.4-2 (07/98)
Benzene	0.0021	lb/MMscf	58,824	scf/hr	1.24E-04	5.41E-04	EPA AP-42, Table 1.4-3 (07/98)
Formaldehyde	0.075	lb/MMscf	58,824	scf/hr	4.41E-03	1.93E-02	EPA AP-42, Table 1.4-3 (07/98)
Hexane	1.8	lb/MMscf	58,824	scf/hr	1.06E-01	4.64E-01	EPA AP-42, Table 1.4-3 (07/98)
Naphthalene	0.00061	lb/MMscf	58,824	scf/hr	3.59E-05	1.57E-04	EPA AP-42, Table 1.4-3 (07/98)
Toluene	0.0034	lb/MMscf	58,824	scf/hr	2.00E-04	8.76E-04	EPA AP-42, Table 1.4-3 (07/98)
Arsenic	0.0002	lb/MMscf	58,824	scf/hr	1.18E-05	5.15E-05	EPA AP-42, Table 1.4-4 (07/98)
Beryllium	0.000012	lb/MMscf	58,824	scf/hr	7.06E-07	3.09E-06	EPA AP-42, Table 1.4-4 (07/98)
Cadmium	0.0011	lb/MMscf	58,824	scf/hr	6.47E-05	2.83E-04	EPA AP-42, Table 1.4-4 (07/98)
Chromium	0.0014	lb/MMscf	58,824	scf/hr	8.24E-05	3.61E-04	EPA AP-42, Table 1.4-4 (07/98)
Cobalt	0.000084	lb/MMscf	58,824	scf/hr	4.94E-06	2.16E-05	EPA AP-42, Table 1.4-4 (07/98)
Manganese	0.00038	lb/MMscf	58,824	scf/hr	2.24E-05	9.79E-05	EPA AP-42, Table 1.4-4 (07/98)
Mercury	0.00026	lb/MMscf	58,824	scf/hr	1.53E-05	6.70E-05	EPA AP-42, Table 1.4-4 (07/98)
Nickel	0.0021	lb/MMscf	58,824	scf/hr	1.24E-04	5.41E-04	EPA AP-42, Table 1.4-4 (07/98)
Selenium	0.000024	lb/MMscf	58,824	scf/hr	1.41E-06	6.18E-06	EPA AP-42, Table 1.4-4 (07/98)

Sample Calculations

Natural Gas Flow = $\frac{60\ \text{MMBtu}}{\text{hr}} \Big| \frac{10^6\ \text{Btu}}{\text{MMBtu}} \Big| \frac{\text{scf Nat. Gas}}{1020\ \text{Btu}}$ = 58,824 scf/hr Natural Gas

NO_x Emissions = $\frac{58824\ \text{scf}}{\text{hr}} \Big| \frac{\text{MMscf}}{10^6\ \text{scf}} \Big| \frac{140\ \text{lb NOx}}{\text{MMscf}}$ = 8.24 lb/hr NO_x

$\frac{8.24\ \text{lb } NO_x}{\text{hr}} \Big| \frac{8760\ \text{hr}}{\text{yr}} \Big| \frac{\text{ton}}{2000\ \text{lb}}$ = 36.07 tpy NO_x

CO Emissions = $\frac{58824\ \text{scf}}{\text{hr}} \Big| \frac{\text{MMscf}}{10^6\ \text{scf}} \Big| \frac{84\ \text{lb CO}}{\text{MMscf}}$ = 4.94 lb/hr CO

$\frac{4.94\ \text{lb CO}}{\text{hr}} \Big| \frac{8760\ \text{hr}}{\text{yr}} \Big| \frac{\text{ton}}{2000\ \text{lb}}$ = 21.64 tpy CO

Annual Natural Gas usage provided by SEFA

Duke Energy H.F. Lee Plant

Table 3A - STAR® Emissions - Shortterm (ES-31)

Propane Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Emissions lb/hr	Emissions ton/yr	Reference
$PM/PM_{10}/PM_{2.5}$	0.7	$lb/10^3$ gal	663	gal/hr	0.46	2.03	EPA AP-42, Table 1.5-1 (07/08)
SO_2	0.018	$lb/10^3$ gal	663	gal/hr	0.01	0.05	EPA AP-42, Table 1.5-1 (07/08)
NO_X	13	$lb/10^3$ gal	663	gal/hr	8.62	37.75	EPA AP-42, Table 1.5-1 (07/08)
CO	7.5	$lb/10^3$ gal	663	gal/hr	4.97	21.78	EPA AP-42, Table 1.5-1 (07/08)
VOC	1	$lb/10^3$ gal	663	gal/hr	0.66	2.90	EPA AP-42, Table 1.5-1 (07/08)

Propane sulfur content 0.18 gr/100 ft3

Sample Calculations

Propane Flow = $\frac{60\ \text{MMBtu}}{\text{hr}} \left| \frac{10^6\ \text{Btu}}{\text{MMBtu}} \right| \frac{\text{gal Propane}}{90{,}500\ \text{Btu}}$ = 663 gal/hr Propane

NO_x Emissions = $\frac{663\ \text{gal}}{\text{hr}} \left| \frac{10^3\ \text{gal}}{1000\ \text{gal}} \right| \frac{13\ \text{lb NOx}}{10^3\ \text{gal}}$ = 8.62 lb/hr NO_x

$\frac{8.62\ \text{lb}\ NO_x}{\text{hr}} \left| \frac{8760\ \text{hr}}{\text{yr}} \right| \frac{\text{ton}}{2000\ \text{lb}}$ = 37.75 tpy NO_x

CO Emissions = $\frac{663\ \text{gal}}{\text{hr}} \left| \frac{10^3\ \text{gal}}{1000\ \text{gal}} \right| \frac{7.5\ \text{lb CO}}{10^3\ \text{gal}}$ = 4.97 lb/hr CO

$\frac{4.97\ \text{lb CO}}{\text{hr}} \left| \frac{8760\ \text{hr}}{\text{yr}} \right| \frac{\text{ton}}{2000\ \text{lb}}$ = 21.78 tpy CO

Annual Propane usage provided by SEFA

Duke Energy H.F. Lee Plant

Table 3A - STAR® Emissions - Shortterm (ES-31)

Flyash Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Uncontrolled Emissions		Controlled Emissions		Reference
					lb/hr	ton/yr	lb/hr	ton/yr	
NO_X	0.34	lb/MMBtu	140	MMBtu/hr	47.60	208.49	47.60	208.49	Based on SEFA operation experience
CO	0.16	lb/MMBtu	140	MMBtu/hr	22.40	98.11	22.40	98.11	Based on SEFA operation experience
VOC	0.016	lb/MMBtu	140	MMBtu/hr	2.24	9.81	2.24	9.81	Based on stack test performed at a different STAR facility, CO emissions are expected to be 10% (or less) of VOC emissions.
Lead	19.85	ppmw			3.30E-04	1.44E-03	3.30E-04	1.44E-03	Duke Energy Average Ash Analysis and Water Injection
Arsenic	38.58	ppmw			6.41E-04	2.81E-03	6.41E-04	2.81E-03	Duke Energy Average Ash Analysis and Water Injection
Antimony	1.28	ppmw			2.13E-05	9.34E-05	2.13E-05	9.34E-05	Duke Energy Average Ash Analysis and Water Injection
Beryllium	4.25	ppmw			7.06E-05	3.09E-04	7.06E-05	3.09E-04	Duke Energy Average Ash Analysis and Water Injection
Cadmium	0.18	ppmw			3.00E-06	1.31E-05	3.00E-06	1.31E-05	Duke Energy Average Ash Analysis and Water Injection
Chromium	25.20	ppmw			4.19E-04	1.83E-03	4.19E-04	1.83E-03	Duke Energy Average Ash Analysis and Water Injection
Chromium VI	0.67	ppmw			1.11E-05	4.87E-05	1.11E-05	4.87E-05	Duke Energy Average Ash Analysis and Water Injection
Cobalt	12.68	ppmw			2.11E-04	9.22E-04	2.11E-04	9.22E-04	Duke Energy Average Ash Analysis and Water Injection
Manganese	54.31	ppmw			9.02E-04	3.95E-03	9.02E-04	3.95E-03	Duke Energy Average Ash Analysis and Water Injection
Mercury	0.16	ppmw			2.66E-06	1.16E-05	2.66E-06	1.16E-05	Duke Energy Average Ash Analysis and Water Injection
Nickel	23.34	ppmw			3.88E-04	1.70E-03	3.88E-04	1.70E-03	Duke Energy Average Ash Analysis and Water Injection
Selenium	8.43	ppmw			1.40E-04	6.13E-04	1.40E-04	6.13E-04	Duke Energy Average Ash Analysis and Water Injection

HAP/TAP emission factors from the STAR unit are based on site-specific ash analysis with the addition of metals in the water used for water injection

Sample Calculations

NO_x Emissions = $\frac{0.34 \text{ lb } NO_x}{\text{MMBtu}} \times \frac{140 \text{ MMBtu}}{\text{hour}}$ = 47.60 lb/hr NO_x

Arsenic Emissions = $\frac{38.58 \text{ lb As}}{10^6 \text{ lb}} \times \frac{17.79 \text{ lb PM}}{\text{hr}}$ = 6.86E-04 lb/hr Arsenic

(Uncontrolled)

Duke Energy H.F. Lee Plant

Table 3A - STAR® Emissions - Shortterm (ES-31)

Worst-Case STAR® Reactor Unit Emissions

Pollutant	Natural Gas Emissions		Propane Emissions		Fly Ash Emissions		STAR® Reactor Fly Ash + Worst-Case Fuel Controlled Emissions		STAR® Reactor Fly Ash + Worst-Case Fuel Permitted Emissions	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	--	--	--	--	--	--	16.61	--	16.61	--
PM_{10}	--	--	--	--	--	--	15.28	--	15.28	--
$PM_{2.5}$	--	--	--	--	--	--	8.80	--	8.80	--
SO_2	--	--	--	--	--	--	24.14	--	24.14	--
NO_X	8.24	36.07	8.62	37.75	47.60	208.49	35.82	--	47.60	--
CO	4.94	21.64	4.97	21.78	22.40	98.11	17.77	--	22.40	--
VOC	0.32	1.42	0.66	2.90	2.24	9.81	1.94	--	2.24	--
Lead	2.94E-05	1.29E-04			3.30E-04	1.44E-03	3.59E-04	--	3.59E-04	--
Benzene	1.24E-04	5.41E-04					1.24E-04	--	1.24E-04	--
Formaldehyde	4.41E-03	1.93E-02					4.41E-03	--	4.41E-03	--
Hexane	1.06E-01	4.64E-01					1.06E-01	--	1.06E-01	--
Naphthalene	3.59E-05	1.57E-04					3.59E-05	--	3.59E-05	--
Toluene	2.00E-04	8.76E-04					2.00E-04	--	2.00E-04	--
Arsenic	1.18E-05	5.15E-05			6.41E-04	2.81E-03	6.53E-04	--	6.53E-04	--
Antimony	--	--			2.13E-05	9.34E-05	2.13E-05	--	2.13E-05	--
Beryllium	7.06E-07				7.06E-05	3.09E-04	7.13E-05	--	7.13E-05	--
Cadmium	6.47E-05	2.83E-04			3.00E-06	1.31E-05	6.77E-05	--	6.77E-05	--
Chromium	8.24E-05	3.61E-04			4.19E-04	1.83E-03	5.01E-04	--	5.01E-04	--
Chromium VI	--	--			1.11E-05	4.87E-05	1.11E-05	--	1.11E-05	--
Cobalt	4.94E-06	2.16E-05			2.11E-04	9.22E-04	2.16E-04	--	2.16E-04	--
Manganese	2.24E-05	9.79E-05			9.02E-04	3.95E-03	9.24E-04	--	9.24E-04	--
Mercury	1.53E-05	6.70E-05			2.66E-06	1.16E-05	1.80E-05	--	1.80E-05	--
Nickel	1.24E-04	5.41E-04			3.88E-04	1.70E-03	5.11E-04	--	5.11E-04	--
Selenium	1.41E-06	6.18E-06			1.40E-04	6.13E-04	1.41E-04	--	1.41E-04	--

Duke Energy H.F. Lee Plant
Table 3B - STAR® Emissions - Annual (ES-31)

Natural Gas Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Emissions lb/hr	Emissions ton/yr	Reference
$PM/PM_{10}/PM_{2.5}$	7.6	lb/MMscf	58,824	scf/hr	0.45	1.96	EPA AP-42, Table 1.4-2 (07/98)
SO_2	0.6	lb/MMscf	58,824	scf/hr	0.04	0.15	EPA AP-42, Table 1.4-2 (07/98)
NO_X	140	lb/MMscf	58,824	scf/hr	8.24	36.07	EPA AP-42, Table 1.4-1 (07/98)
CO	84	lb/MMscf	58,824	scf/hr	4.94	21.64	EPA AP-42, Table 1.4-1 (07/98)
VOC	5.5	lb/MMscf	58,824	scf/hr	0.32	1.42	EPA AP-42, Table 1.4-2 (07/98)
Lead	0.0005	lb/MMscf	58,824	scf/hr	2.94E-05	1.29E-04	EPA AP-42, Table 1.4-2 (07/98)
Benzene	0.0021	lb/MMscf	58,824	scf/hr	1.24E-04	5.41E-04	EPA AP-42, Table 1.4-3 (07/98)
Formaldehyde	0.075	lb/MMscf	58,824	scf/hr	4.41E-03	1.93E-02	EPA AP-42, Table 1.4-3 (07/98)
Hexane	1.8	lb/MMscf	58,824	scf/hr	1.06E-01	4.64E-01	EPA AP-42, Table 1.4-3 (07/98)
Naphthalene	0.00061	lb/MMscf	58,824	scf/hr	3.59E-05	1.57E-04	EPA AP-42, Table 1.4-3 (07/98)
Toluene	0.0034	lb/MMscf	58,824	scf/hr	2.00E-04	8.76E-04	EPA AP-42, Table 1.4-3 (07/98)
Arsenic	0.0002	lb/MMscf	58,824	scf/hr	1.18E-05	5.15E-05	EPA AP-42, Table 1.4-4 (07/98)
Beryllium	0.000012	lb/MMscf	58,824	scf/hr	7.06E-07	3.09E-06	EPA AP-42, Table 1.4-4 (07/98)
Cadmium	0.0011	lb/MMscf	58,824	scf/hr	6.47E-05	2.83E-04	EPA AP-42, Table 1.4-4 (07/98)
Chromium	0.0014	lb/MMscf	58,824	scf/hr	8.24E-05	3.61E-04	EPA AP-42, Table 1.4-4 (07/98)
Cobalt	0.000084	lb/MMscf	58,824	scf/hr	4.94E-06	2.16E-05	EPA AP-42, Table 1.4-4 (07/98)
Manganese	0.00038	lb/MMscf	58,824	scf/hr	2.24E-05	9.79E-05	EPA AP-42, Table 1.4-4 (07/98)
Mercury	0.00026	lb/MMscf	58,824	scf/hr	1.53E-05	6.70E-05	EPA AP-42, Table 1.4-4 (07/98)
Nickel	0.0021	lb/MMscf	58,824	scf/hr	1.24E-04	5.41E-04	EPA AP-42, Table 1.4-4 (07/98)
Selenium	0.000024	lb/MMscf	58,824	scf/hr	1.41E-06	6.18E-06	EPA AP-42, Table 1.4-4 (07/98)

Sample Calculations

Natural Gas Flow = $\frac{60\ \text{MMBtu}}{\text{hr}} \cdot \frac{10^6\ \text{Btu}}{\text{MMBtu}} \cdot \frac{\text{scf Nat. Gas}}{1020\ \text{Btu}}$ = 58,824 scf/hr Natural Gas

NO_x Emissions = $\frac{58824\ \text{scf}}{\text{hr}} \cdot \frac{\text{MMscf}}{10^6\ \text{scf}} \cdot \frac{140\ \text{lb NOx}}{\text{MMscf}}$ = 8.24 lb/hr NO_x

$\frac{8.24\ \text{lb}\ NO_x}{\text{hr}} \cdot \frac{8760\ \text{hr}}{\text{yr}} \cdot \frac{\text{ton}}{2000\ \text{lb}}$ = 36.07 tpy NO_x

CO Emissions = $\frac{58824\ \text{scf}}{\text{hr}} \cdot \frac{\text{MMscf}}{10^6\ \text{scf}} \cdot \frac{84\ \text{lb CO}}{\text{MMscf}}$ = 4.94 lb/hr CO

$\frac{4.94\ \text{lb CO}}{\text{hr}} \cdot \frac{8760\ \text{hr}}{\text{yr}} \cdot \frac{\text{ton}}{2000\ \text{lb}}$ = 21.64 tpy CO

Anuual Natural Gas usage provided by SEFA

Duke Energy H.F. Lee Plant
Table 3B - STAR® Emissions - Annual (ES-31)

Propane Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Emissions lb/hr	Emissions ton/yr	Reference
$PM/PM_{10}/PM_{2.5}$	0.7	$lb/10^3$ gal	663	gal/hr	0.46	2.03	EPA AP-42, Table 1.5-1 (07/08)
SO_2	0.018	$lb/10^3$ gal	663	gal/hr	0.01	0.05	EPA AP-42, Table 1.5-1 (07/08)
NO_X	13	$lb/10^3$ gal	663	gal/hr	8.62	37.75	EPA AP-42, Table 1.5-1 (07/08)
CO	7.5	$lb/10^3$ gal	663	gal/hr	4.97	21.78	EPA AP-42, Table 1.5-1 (07/08)
VOC	1	$lb/10^3$ gal	663	gal/hr	0.66	2.90	EPA AP-42, Table 1.5-1 (07/08)

Propane sulfur content 0.18 gr/100 ft3

Sample Calculations

Propane Flow = $\frac{60\ \text{MMBtu}}{\text{hr}} \times \frac{10^6\ \text{Btu}}{\text{MMBtu}} \times \frac{\text{gal Propane}}{90{,}500\ \text{Btu}}$ = 663 gal/hr Propane

NO_x Emissions = $\frac{663\ \text{gal}}{\text{hr}} \times \frac{10^3\ \text{gal}}{1000\ \text{gal}} \times \frac{13\ \text{lb NOx}}{10^3\ \text{gal}}$ = 8.62 lb/hr NO_x

$\frac{8.62\ \text{lb}\ NO_x}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{ton}}{2000\ \text{lb}}$ = 37.75 tpy NO_x

CO Emissions = $\frac{663\ \text{gal}}{\text{hr}} \times \frac{10^3\ \text{gal}}{1000\ \text{gal}} \times \frac{7.5\ \text{lb CO}}{10^3\ \text{gal}}$ = 4.97 lb/hr CO

$\frac{4.97\ \text{lb CO}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{ton}}{2000\ \text{lb}}$ = 21.78 tpy CO

Anuual Propane usage provided by SEFA

Duke Energy H.F. Lee Plant

Table 3B - STAR® Emissions - Annual (ES-31)

Flyash Emissions

Pollutant	Emission Factor	Units	Throughput	Units	Uncontrolled Emissions lb/hr	Uncontrolled Emissions ton/yr	Controlled Emissions lb/hr	Controlled Emissions ton/yr	Reference
NO_X	0.34	lb/MMBtu	130	MMBtu/hr	44.20	193.60	44.20	193.60	Based on SEFA operation experience
CO	0.16	lb/MMBtu	130	MMBtu/hr	20.80	91.10	20.80	91.10	Based on SEFA operation experience
VOC	0.016	lb/MMBtu	130	MMBtu/hr	2.08	9.11	2.08	9.11	Based on stack test performed at a different STAR facility, CO emissions are expected to be 10% (or less) of VOC emissions.
Lead	19.85	ppmw			3.30E-04	1.44E-03	3.30E-04	1.44E-03	Duke Energy Average Ash Analysis and Water Injection
Arsenic	38.58	ppmw			6.41E-04	2.81E-03	6.41E-04	2.81E-03	Duke Energy Average Ash Analysis and Water Injection
Antimony	1.28	ppmw			2.13E-05	9.34E-05	2.13E-05	9.34E-05	Duke Energy Average Ash Analysis and Water Injection
Beryllium	4.25	ppmw			7.06E-05	3.09E-04	7.06E-05	3.09E-04	Duke Energy Average Ash Analysis and Water Injection
Cadmium	0.18	ppmw			3.00E-06	1.31E-05	3.00E-06	1.31E-05	Duke Energy Average Ash Analysis and Water Injection
Chromium	25.20	ppmw			4.19E-04	1.83E-03	4.19E-04	1.83E-03	Duke Energy Average Ash Analysis and Water Injection
Chromium VI	0.67	ppmw			1.11E-05	4.87E-05	1.11E-05	4.87E-05	Duke Energy Average Ash Analysis and Water Injection
Cobalt	12.68	ppmw			2.11E-04	9.22E-04	2.11E-04	9.22E-04	Duke Energy Average Ash Analysis and Water Injection
Manganese	54.31	ppmw			9.02E-04	3.95E-03	9.02E-04	3.95E-03	Duke Energy Average Ash Analysis and Water Injection
Mercury	0.16	ppmw			2.66E-06	1.16E-05	2.66E-06	1.16E-05	Duke Energy Average Ash Analysis and Water Injection
Nickel	23.34	ppmw			3.88E-04	1.70E-03	3.88E-04	1.70E-03	Duke Energy Average Ash Analysis and Water Injection
Selenium	8.43	ppmw			1.40E-04	6.13E-04	1.40E-04	6.13E-04	Duke Energy Average Ash Analysis and Water Injection

HAP/TAP emission factors from the STAR unit are based on site-specific ash analysis with the addition of metals in the water used for water injection

Sample Calculations

NO_x Emissions = $\frac{0.34 \text{ lb } NO_x}{\text{MMBtu}} \Big| \frac{130 \text{ MMBtu}}{\text{hour}}$ = 44.20 lb/hr NO_x

Arsenic Emissions = (Uncontrolled) $\frac{38.58 \text{ lb As}}{10^6 \text{ lb}} \Big| \frac{17.79 \text{ lb PM}}{\text{hr}}$ = 6.86E-04 lb/hr Arsenic

Duke Energy H.F. Lee Plant
Table 3B - STAR® Emissions - Annual (ES-31)

Worst-Case STAR® Reactor Unit Emissions

Pollutant	Natural Gas Emissions		Propane Emissions		Fly Ash Emissions		STAR® Reactor Fly Ash + Worst-Case Fuel Controlled Emissions		STAR® Reactor Fly Ash + Worst-Case Fuel Permitted Emissions	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
PM	--	--	--	--	--	--	--	72.74	--	72.74
PM_{10}	--	--	--	--	--	--	--	66.92	--	66.92
$PM_{2.5}$	--	--	--	--	--	--	--	38.55	--	38.55
SO_2	--	--	--	--	--	--	--	98.18	--	98.18
NO_X	8.24	36.07	8.62	37.75	44.20	193.60	--	141.99	--	193.60
CO	4.94	21.64	4.97	21.78	20.80	91.10	--	70.84	--	91.10
VOC	0.32	1.42	0.66	2.90	2.08	9.11	--	7.81	--	9.11
Lead	2.94E-05	1.29E-04			3.30E-04	1.44E-03	--	1.57E-03	--	1.57E-03
Benzene	1.24E-04	5.41E-04					--	5.41E-04	--	5.41E-04
Formaldehyde	4.41E-03	1.93E-02					--	1.93E-02	--	1.93E-02
Hexane	1.06E-01	4.64E-01					--	4.64E-01	--	4.64E-01
Naphthalene	3.59E-05	1.57E-04					--	1.57E-04	--	1.57E-04
Toluene	2.00E-04	8.76E-04					--	8.76E-04	--	8.76E-04
Arsenic	1.18E-05	5.15E-05			6.41E-04	2.81E-03	--	2.86E-03	--	2.86E-03
Antimony	--	--			2.13E-05	9.34E-05	--	9.34E-05	--	9.34E-05
Beryllium	7.06E-07	3.09E-06			7.06E-05	3.09E-04	--	3.12E-04	--	3.12E-04
Cadmium	6.47E-05	2.83E-04			3.00E-06	1.31E-05	--	2.97E-04	--	2.97E-04
Chromium	8.24E-05	3.61E-04			4.19E-04	1.83E-03	--	2.19E-03	--	2.19E-03
Chromium VI	--	--			1.11E-05	4.87E-05	--	4.87E-05	--	4.87E-05
Cobalt	4.94E-06	2.16E-05			2.11E-04	9.22E-04	--	9.44E-04	--	9.44E-04
Manganese	2.24E-05	9.79E-05			9.02E-04	3.95E-03	--	4.05E-03	--	4.05E-03
Mercury	1.53E-05	6.70E-05			2.66E-06	1.16E-05	--	7.86E-05	--	7.86E-05
Nickel	1.24E-04	5.41E-04			3.88E-04	1.70E-03	--	2.24E-03	--	2.24E-03
Selenium	1.41E-06	6.18E-06			1.40E-04	6.13E-04	--	6.19E-04	--	6.19E-04

Duke Energy H.F. Lee Plant
Table 3C - STAR® Emissions - PM - Shortterm (ES-31)

Est. Gas Flow, acfm		77,500
PM Emission Rate, gr/acf		0.025
Estimated Emissions		
PM (lb/hr)		16.61
PM (TPY)		72.74
		lb/hr
	PM	16.61
	PM_{10} (Note 2)	15.28
	$PM_{2.5}$ (Note 3)	8.80

Notes:

1. PM Emission Factor (grains/acf)
2. PM_{10} = 92% of Total PM (From AP-42 Table 1.1-6 (09/98))
3. $PM_{2.5}$ = 53% of Total PM (From AP-42 Table 1.1-6 (09/98))
4. TPY = Tons per Year

Duke Energy H.F. Lee Plant

Table 3D - STAR® Emissions - SO_2 - Shortterm (ES-31)

Process Throughput										
Raw Feed LOI (%)	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	13.0%	14.0%	15.0%
Max Heat Input (MMBtu/hr)	140	140	140	140	140	140	140	140	140	140
Carbon (Btu/lb)	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500
Carbon (lb/hr)	9,655	9,655	9,655	9,655	9,655	9,655	9,655	9,655	9,655	9,655
Raw Feed Rate (TPH)	80.46	68.97	60.34	53.64	48.28	43.89	40.23	37.14	34.48	32.18
Feed Ash Sulfur %	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
Estimated Emissions										
SO_2 (lb/hr) - Uncontrolled - Ash	482.76	413.79	362.07	321.84	289.66	263.32	241.38	222.81	206.90	193.10
SO_2 (lb/hr) - Uncontrolled - NG/Propane	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
SO_2 (lb/hr) - Uncontrolled - Total	482.79	413.83	362.10	321.87	289.69	263.36	241.41	222.85	206.93	193.14
SO_2 (lb/hr) - Controlled										
95.00%	24.14	20.69	18.11	16.09	14.48	13.17	12.07	11.14	10.35	9.66

Duke Energy H.F. Lee Plant

Table 3E - STAR® Emissions - SO_2 - Annual (ES-31)

Process Throughput										
Raw Feed LOI (%)	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	13.0%	14.0%	15.0%
Max Heat Input (MMBtu/hr)	130	130	130	130	130	130	130	130	130	130
Carbon (Btu/lb)	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500
Carbon (lb/hr)	8,966	8,966	8,966	8,966	8,966	8,966	8,966	8,966	8,966	8,966
Raw Feed Rate (TPH)	74.71	64.04	56.03	49.81	44.83	40.75	37.36	34.48	32.02	29.89
Feed Ash Sulfur %	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
Estimated Emissions										
SO_2 (lb/hr) - Uncontrolled - Ash	448.28	384.24	336.21	298.85	268.97	244.51	224.14	206.90	192.12	179.31
SO_2 (lb/hr) - Uncontrolled - NG/Propane	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
SO_2 (lb/hr) - Uncontrolled - Total	448.31	384.27	336.24	298.89	269.00	244.55	224.17	206.93	192.15	179.35
SO_2 (lb/hr) - Controlled										
95.00%	22.42	19.21	16.81	14.94	13.45	12.23	11.21	10.35	9.61	8.97

Duke Energy H.F. Lee Plant
Table 4 - EHE Emissions Unit 1 and Unit 2 (ES-34 and ES-35)

Maximum annual emissions are based on the lb/hr of a single unit * 8760 hours per year.

	Est. Emissions	
	lb/hr (per unit)	TPY (Total for both units)
PM (Note 2)	6.86	30.03
PM_{10} (Note 3)	6.31	27.63
$PM_{2.5}$ (Note 4)	3.63	15.92

Pollutant	Emission Factor	Units	Emissions lb/hr (per unit)	Emissions ton/yr (Total for both units)	Reference
Lead	19.85	ppmw	1.36E-04	5.96E-04	Duke Energy Average Ash Analysis
Arsenic	38.55	ppmw	2.64E-04	1.16E-03	Duke Energy Average Ash Analysis
Antimony	1.28	ppmw	8.78E-06	3.84E-05	Duke Energy Average Ash Analysis
Beryllium	4.25	ppmw	2.91E-05	1.28E-04	Duke Energy Average Ash Analysis
Cadmium	0.18	ppmw	1.23E-06	5.41E-06	Duke Energy Average Ash Analysis
Chromium	25.20	ppmw	1.73E-04	7.57E-04	Duke Energy Average Ash Analysis
Chromium VI	0.67	ppmw	4.59E-06	2.01E-05	Duke Energy Average Ash Analysis
Cobalt	12.68	ppmw	8.69E-05	3.81E-04	Duke Energy Average Ash Analysis
Manganese	54.29	ppmw	3.72E-04	1.63E-03	Duke Energy Average Ash Analysis
Mercury	0.16	ppmw	1.10E-06	4.81E-06	Duke Energy Average Ash Analysis
Nickel	23.33	ppmw	1.60E-04	7.01E-04	Duke Energy Average Ash Analysis
Selenium	8.32	ppmw	5.71E-05	2.50E-04	Duke Energy Average Ash Analysis

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Notes:
1. Exhaust Flow (dSCFM): 32,000
2. PM Emission Factor (grains/dSCF) 0.025 Vendor Guarantee
3. PM_{10} = 92% of Total PM (From AP-42 Table 1.1-6 (09/98))
4. $PM_{2.5}$ = 53% of Total PM (From AP-42 Table 1.1-6 (09/98))
5. TPY = Tons per Year

Duke Energy H.F. Lee Plant
Table 5 - Pre STAR Unit Silo Emissions

Potential Emissions

Pollutant	Emission Factor	Units	ES-30A Feed Silo Filling (125 tph, 400,000 tpy)		ES-30B Feed Silo Unloading (75 tph, 400,000 tpy)		ES-36A Transfer Silo Filling (125 tph, 400,000 tpy)		ES-36B Transfer Silo Unloading (75 tph, 400,000 tpy)		Total Silo Emissions		Reference
			lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
PM	0.0000487	lb/ton	6.09E-03	9.74E-03	3.65E-03	9.74E-03	6.09E-03	9.74E-03	3.65E-03	9.74E-03	1.95E-02	3.90E-02	SEFA Winyah Generating Station Permit Application
PM_{10}	0.000023	lb/ton	2.88E-03	4.60E-03	1.73E-03	4.60E-03	2.88E-03	4.60E-03	1.73E-03	4.60E-03	9.20E-03	1.84E-02	SEFA Winyah Generating Station Permit Application
$PM_{2.5}$	0.000023	lb/ton	2.88E-03	4.60E-03	1.73E-03	4.60E-03	2.88E-03	4.60E-03	1.73E-03	4.60E-03	9.20E-03	1.84E-02	SEFA Winyah Generating Station Permit Application
Lead	19.85	ppmw	1.21E-07	1.93E-07	7.25E-08	1.93E-07	1.21E-07	1.93E-07	7.25E-08	1.93E-07	3.87E-07	7.73E-07	Duke Energy Average Ash Analysis
Arsenic	38.55	ppmw	2.35E-07	3.75E-07	1.41E-07	3.75E-07	2.35E-07	3.75E-07	1.41E-07	3.75E-07	7.51E-07	1.50E-06	Duke Energy Average Ash Analysis
Antimony	1.28	ppmw	7.79E-09	1.25E-08	4.68E-09	1.25E-08	7.79E-09	1.25E-08	4.68E-09	1.25E-08	2.49E-08	4.99E-08	Duke Energy Average Ash Analysis
Beryllium	4.25	ppmw	2.59E-08	4.14E-08	1.55E-08	4.14E-08	2.59E-08	4.14E-08	1.55E-08	4.14E-08	8.28E-08	1.66E-07	Duke Energy Average Ash Analysis
Cadmium	0.18	ppmw	1.10E-09	1.75E-09	6.57E-10	1.75E-09	1.10E-09	1.75E-09	6.57E-10	1.75E-09	3.51E-09	7.01E-09	Duke Energy Average Ash Analysis
Chromium	25.20	ppmw	1.53E-07	2.45E-07	9.20E-08	2.45E-07	1.53E-07	2.45E-07	9.20E-08	2.45E-07	4.91E-07	9.82E-07	Duke Energy Average Ash Analysis
Chromium VI	0.67	ppmw	4.08E-09	6.53E-09	2.45E-09	6.53E-09	4.08E-09	6.53E-09	2.45E-09	6.53E-09	1.31E-08	2.61E-08	Duke Energy Average Ash Analysis
Cobalt	12.68	ppmw	7.72E-08	1.24E-07	4.63E-08	1.24E-07	7.72E-08	1.24E-07	4.63E-08	1.24E-07	2.47E-07	4.94E-07	Duke Energy Average Ash Analysis
Manganese	54.29	ppmw	3.30E-07	5.29E-07	1.98E-07	5.29E-07	3.30E-07	5.29E-07	1.98E-07	5.29E-07	1.06E-06	2.12E-06	Duke Energy Average Ash Analysis
Mercury	0.16	ppmw	9.74E-10	1.56E-09	5.84E-10	1.56E-09	9.74E-10	1.56E-09	5.84E-10	1.56E-09	3.12E-09	6.23E-09	Duke Energy Average Ash Analysis
Nickel	23.33	ppmw	1.42E-07	2.27E-07	8.52E-08	2.27E-07	1.42E-07	2.27E-07	8.52E-08	2.27E-07	4.54E-07	9.09E-07	Duke Energy Average Ash Analysis
Selenium	8.32	ppmw	5.06E-08	8.10E-08	3.04E-08	8.10E-08	5.06E-08	8.10E-08	3.04E-08	8.10E-08	1.62E-07	3.24E-07	Duke Energy Average Ash Analysis

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Sample Calculations

PM_{10} Emissions = $\frac{0.000023 \text{ lb } PM_{10}}{\text{ton ash}} \Big| \frac{125 \text{ ton ash}}{\text{hour}}$ = 2.88E-03 lb/hr PM_{10}

PM_{10} Emissions = $\frac{0.000023 \text{ lb } PM_{10}}{\text{ton ash}} \Big| \frac{400{,}000 \text{ tons ash}}{\text{year}} \Big| \frac{\text{ton}}{2000 \text{ lb}}$ = 4.60E-03 tpy PM_{10}

Arsenic Emissions = $\frac{38.55 \text{ lb As}}{10^6 \text{ lb}} \Big| \frac{0.00609 \text{ lb PM}}{\text{hr}}$ = 2.35E-07 lb/hr Arsenic

Duke Energy H.F. Lee Plant
Table 6 - Post STAR Unit Silos and Dome Emissions

Potential Emissions

Pollutant	Emission Factor	Units	ES-38 Loadout Silo (300 tph, 400,000 tpy)		ES-38A Loadout Silo Chute 1A (100 tph, 200,000 tpy)		ES-38B Loadout Silo Chute 1B (100 tph, 200,000 tpy)		ES-37A Storage Dome Filling (75 tph, 400,000 tpy)		ES-37B Storage Dome Unloading (275 tph, 400,000 tpy)		Total Silo Emissions		Reference
			lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
PM	0.0000487	lb/ton	1.46E-02	9.74E-03	4.87E-03	4.87E-03	4.87E-03	4.87E-03	3.65E-03	9.74E-03	1.34E-02	9.74E-03	4.14E-02	3.90E-02	SEFA Winyah Generating Station Permit Application
PM_{10}	0.000023	lb/ton	6.90E-03	4.60E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	1.73E-03	4.60E-03	6.33E-03	4.60E-03	1.96E-02	1.84E-02	SEFA Winyah Generating Station Permit Application
$PM_{2.5}$	0.000023	lb/ton	6.90E-03	4.60E-03	2.30E-03	2.30E-03	2.30E-03	2.30E-03	1.73E-03	4.60E-03	6.33E-03	4.60E-03	1.96E-02	1.84E-02	SEFA Winyah Generating Station Permit Application
Lead	19.85	ppmw	2.90E-07	1.93E-07	9.67E-08	9.67E-08	9.67E-08	9.67E-08	7.25E-08	1.93E-07	2.66E-07	1.93E-07	8.22E-07	7.73E-07	Duke Energy Average Ash Analysis and Water Injection
Arsenic	38.58	ppmw	5.64E-07	3.76E-07	1.88E-07	1.88E-07	1.88E-07	1.88E-07	1.41E-07	3.76E-07	5.17E-07	3.76E-07	1.60E-06	1.50E-06	Duke Energy Average Ash Analysis and Water Injection
Antimony	1.28	ppmw	1.88E-08	1.25E-08	6.25E-09	6.25E-09	6.25E-09	6.25E-09	4.69E-09	1.25E-08	1.72E-08	1.25E-08	5.31E-08	5.00E-08	Duke Energy Average Ash Analysis and Water Injection
Beryllium	4.25	ppmw	6.21E-08	4.14E-08	2.07E-08	2.07E-08	2.07E-08	2.07E-08	1.55E-08	4.14E-08	5.69E-08	4.14E-08	1.76E-07	1.66E-07	Duke Energy Average Ash Analysis and Water Injection
Cadmium	0.18	ppmw	2.64E-09	1.76E-09	8.79E-10	8.79E-10	8.79E-10	8.79E-10	6.59E-10	1.76E-09	2.42E-09	1.76E-09	7.47E-09	7.03E-09	Duke Energy Average Ash Analysis and Water Injection
Chromium	25.20	ppmw	3.68E-07	2.45E-07	1.23E-07	1.23E-07	1.23E-07	1.23E-07	9.21E-08	2.45E-07	3.38E-07	2.45E-07	1.04E-06	9.82E-07	Duke Energy Average Ash Analysis and Water Injection
Chromium VI	0.67	ppmw	9.79E-09	6.53E-09	3.26E-09	3.26E-09	3.26E-09	3.26E-09	2.45E-09	6.53E-09	8.97E-09	6.53E-09	2.77E-08	2.61E-08	Duke Energy Average Ash Analysis and Water Injection
Cobalt	12.68	ppmw	1.85E-07	1.24E-07	6.18E-08	6.18E-08	6.18E-08	6.18E-08	4.63E-08	1.24E-07	1.70E-07	1.24E-07	5.25E-07	4.94E-07	Duke Energy Average Ash Analysis and Water Injection
Manganese	54.31	ppmw	7.93E-07	5.29E-07	2.64E-07	2.64E-07	2.64E-07	2.64E-07	1.98E-07	5.29E-07	7.27E-07	5.29E-07	2.25E-06	2.12E-06	Duke Energy Average Ash Analysis and Water Injection
Mercury	0.16	ppmw	2.34E-09	1.56E-09	7.79E-10	7.79E-10	7.79E-10	7.79E-10	5.84E-10	1.56E-09	2.14E-09	1.56E-09	6.62E-09	6.23E-09	Duke Energy Average Ash Analysis and Water Injection
Nickel	23.34	ppmw	3.41E-07	2.27E-07	1.14E-07	1.14E-07	1.14E-07	1.14E-07	8.52E-08	2.27E-07	3.13E-07	2.27E-07	9.66E-07	9.09E-07	Duke Energy Average Ash Analysis and Water Injection
Selenium	8.43	ppmw	1.23E-07	8.21E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	3.08E-08	8.21E-08	1.13E-07	8.21E-08	3.49E-07	3.28E-07	Duke Energy Average Ash Analysis and Water Injection

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis with the addition of metals in the water used for water injection.

Sample Calculations

PM_{10} Emissions = $\frac{0.000023 \text{ lb } PM_{10}}{\text{ton ash}} \Big| \frac{300 \text{ ton ash}}{\text{hour}}$ = 6.90E-03 lb/hr PM_{10}

PM_{10} Emissions = $\frac{0.000023 \text{ lb } PM_{10}}{\text{ton ash}} \Big| \frac{400{,}000 \text{ tons ash}}{\text{year}} \Big| \frac{\text{ton}}{2000 \text{ lb}}$ = 4.60E-03 tpy PM_{10}

Arsenic Emissions = $\frac{38.58 \text{ lb As}}{10^6 \text{ lb}} \Big| \frac{0.0146 \text{ lb PM}}{\text{hr}}$ = 5.64E-07 lb/hr Arsenic

Duke Energy H.F. Lee Plant
Table 7 - Pollution Control Silos

Pollutant	Est. Gas Flow, acfm	PM loading Rate, gr/acf	ES-32 FGD Byproduct Silo		ES-33 FGD Absorbent Silo		Total	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM	1300	0.005	0.06	0.24	0.06	0.24	0.11	0.49
PM_{10} (Note 2)	1300	0.005	0.05	0.22	0.05	0.22	0.10	0.45
$PM_{2.5}$ (Note 3)	1300	0.005	0.03	0.13	0.03	0.13	0.06	0.26

Notes:

1. PM Emission Factor (grains/acf)
2. PM_{10} = 92% of Total PM (From AP-42 Table 1.1-6 (09/98))
3. $PM_{2.5}$ = 53% of Total PM (From AP-42 Table 1.1-6 (09/98))
4. lb/hr = pounds per hour; tpy = Tons per Year

Duke Energy H.F. Lee Plant
Wet Ash Receiving Emissions (F-1 and F-2)

Table 8A - Transfer of material to storage shed (F-1)

Section 13.2-4 Aggregate Handling and Storage Piles, Ap-42 Fifth Edition November 2006

E= k*0.0032 * (((U/5)^1.3)/((M/2)^1.4))

E =	lb/ton	
k =	particle size multiplier (dimensionless)	
	PM	0.74
	PM_{10}	0.35
	$PM_{2.5}$	0.053

U = mean wind speed, miles per hour (mph) 2 — *Average wind speed for 2016 Rosewood Weather Station approximately 1 mile from the site. Source: weatherunderground.com*

M = material moisture content 15 — *15% moisture content is an conservatively low estimate typical moisture is 20%*

70 tph
400,000 tpy — *Based on Air Data Tracking Sheet, Item 13*

	lb/hr	tpy
PM	1.50E-03	4.29E-03
PM_{10}	7.09E-04	2.03E-03
$PM_{2.5}$	1.07E-04	3.07E-04

Note: assumed 50% control as a result of the shed having three side to enclose pile

Pollutant	Emission Factor	Units	Emissions lb/hr	Emissions ton/yr	Reference
Lead	19.85	ppmw	2.98E-08	8.51E-08	Duke Energy Average Ash Analysis
Arsenic	38.55	ppmw	5.78E-08	1.65E-07	Duke Energy Average Ash Analysis
Antimony	1.28	ppmw	1.92E-09	5.49E-09	Duke Energy Average Ash Analysis
Beryllium	4.25	ppmw	6.37E-09	1.82E-08	Duke Energy Average Ash Analysis
Cadmium	0.18	ppmw	2.70E-10	7.71E-10	Duke Energy Average Ash Analysis
Chromium	25.20	ppmw	3.78E-08	1.08E-07	Duke Energy Average Ash Analysis
Chromium VI	0.67	ppmw	1.00E-09	2.87E-09	Duke Energy Average Ash Analysis
Cobalt	12.68	ppmw	1.90E-08	5.43E-08	Duke Energy Average Ash Analysis
Manganese	54.29	ppmw	8.14E-08	2.33E-07	Duke Energy Average Ash Analysis
Mercury	0.16	ppmw	2.40E-10	6.86E-10	Duke Energy Average Ash Analysis
Nickel	23.33	ppmw	3.50E-08	1.00E-07	Duke Energy Average Ash Analysis
Selenium	8.32	ppmw	1.25E-08	3.57E-08	Duke Energy Average Ash Analysis

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Duke Energy H.F. Lee Plant
Wet Ash Receiving Emissions (F-1 and F-2)

Table 8B - Transfer of material to hopper (F-2)

Section 13.2-4 Aggregate Handling and Storage Piles, Ap-42 Fifth Edition November 2006

E= k*0.0032 * (((U/5)^1.3)/((M/2)^1.4))

E =	lb/ton	
k =	particle size multiplier (dimensionless)	
	PM	0.74
	PM_{10}	0.35
	$PM_{2.5}$	0.053

U = mean wind speed, miles per hour (mph) 2 — *Average wind speed for 2016 Rosewood Weather Station approximately 1 mile from the site. Source: weatherunderground.com*

M = material moisture content 15 — *15% moisture content is an conservatively low estimate typical moisture is 20%*

70 tph
400,000 tpy — *Based on Air Data Tracking Sheet, Item 13*

	lb/hr	tpy
PM	3.00E-03	8.57E-03
PM_{10}	1.42E-03	4.05E-03
$PM_{2.5}$	2.15E-04	6.14E-04

Pollutant	Emission Factor	Units	Emissions lb/hr	Emissions ton/yr	Reference
Lead	19.85	ppmw	5.95E-08	1.70E-07	Duke Energy Average Ash Analysis
Arsenic	38.55	ppmw	1.16E-07	3.30E-07	Duke Energy Average Ash Analysis
Antimony	1.28	ppmw	3.84E-09	1.10E-08	Duke Energy Average Ash Analysis
Beryllium	4.25	ppmw	1.27E-08	3.64E-08	Duke Energy Average Ash Analysis
Cadmium	0.18	ppmw	5.40E-10	1.54E-09	Duke Energy Average Ash Analysis
Chromium	25.20	ppmw	7.56E-08	2.16E-07	Duke Energy Average Ash Analysis
Chromium VI	0.67	ppmw	2.01E-09	5.74E-09	Duke Energy Average Ash Analysis
Cobalt	12.68	ppmw	3.80E-08	1.09E-07	Duke Energy Average Ash Analysis
Manganese	54.29	ppmw	1.63E-07	4.65E-07	Duke Energy Average Ash Analysis
Mercury	0.16	ppmw	4.80E-10	1.37E-09	Duke Energy Average Ash Analysis
Nickel	23.33	ppmw	7.00E-08	2.00E-07	Duke Energy Average Ash Analysis
Selenium	8.32	ppmw	2.50E-08	7.13E-08	Duke Energy Average Ash Analysis

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Duke Energy H.F. Lee Plant
Wet Ash Receiving Emissions (F-1 and F-2)

Total Emissions

Pollutant	lb/hr	tpy
PM	4.50E-03	1.29E-02
PM_{10}	2.13E-03	6.08E-03
$PM_{2.5}$	3.22E-04	9.21E-04
Lead	8.93E-08	2.55E-07
Arsenic	1.73E-07	4.96E-07
Antimony	5.76E-09	1.65E-08
Beryllium	1.91E-08	5.46E-08
Cadmium	8.10E-10	2.31E-09
Chromium	1.13E-07	3.24E-07
Chromium VI	3.01E-09	8.61E-09
Cobalt	5.71E-08	1.63E-07
Manganese	2.44E-07	6.98E-07
Mercury	7.20E-10	2.06E-09
Nickel	1.05E-07	3.00E-07
Selenium	3.74E-08	1.07E-07

Duke Energy H.F. Lee Plant
Table 9 - GHG Emissions

Heating Value of Natural Gas	1,028	btu/scf	Table C-1 to subpart C of 40 CFR Part 98 (natural gas)
Heat Input	15,840	MMBtu/yr	Total Supplemental / Auxiliary Fuel = 12 months x 3 cold starts x 400 MM Btu = 14,400 MM Btu's + 10% = 15,840 MM Btu's per year.
Operation Hours	24	hrs/day	
	8,760	hrs/year	

<u>Emission Factors</u>

CO_2	53.06	kg CO_2/MMBtu	Table C-1 to subpart C of 40 CFR Part 98 (natural gas)
CH_4	1.00E-03	kg CH_4/MMBtu	Table C-2 to subpart C of 40 CFR Part 98 (natural gas)
N_2O	1.00E-04	kg N_2O/MMBtu	Table C-2 to subpart C of 40 CFR Part 98 (natural gas)
	2.20462	lb/kg	Table A-2 to subpart A of 40 CFR Part 98
CO_2	116.98	lb/MMBtu	
CH_4	2.20E-03	lb/MMBtu	
N_2O	2.20E-04	lb/MMBtu	

<u>Global Warming Potential</u>

CO_2	1	Table A-1 to subpart A of 40 CFR Part 98
CH_4	25	Table A-1 to subpart A of 40 CFR Part 98
N_2O	298	Table A-1 to subpart A of 40 CFR Part 98

<u>Emission Rates - GHG (CO_2e)</u>

	lb/yr	**tpy**
CO_2	1,852,917.85	926.46
CH_4 (CO_2e)	873.03	0.44
N_2O (CO2e)	1,040.65	0.52
GHG (CO_2e)		**927.42**

	lb/yr	**tpy**
CO_2	1,852,917.85	926.46
CH_4	34.92	0.02
N_2O	3.49	0.00
GHG (Mass Basis)		**926.48**

Duke Energy H.F. Lee Plant
Table 9 - GHG Emissions

Heating Value of Propane	0.091	MMBtu/gal	Table C-1 to subpart C of 40 CFR Part 98 (petroleum products)
Heat Input	15,840	MMBtu/yr	

<u>Emission Factors</u>

CO_2	61.46	kg CO_2/MMBtu	Table C-1 to subpart C of 40 CFR Part 98 (propane - petroleum products)
CH_4	3.00E-03	kg CH_4/MMBtu	Table C-2 to subpart C of 40 CFR Part 98 (petroleum)
N_2O	6.00E-04	kg N_2O/MMBtu	Table C-2 to subpart C of 40 CFR Part 98 (petroleum)
	2.20462	lb/kg	Table A-2 to subpart A of 40 CFR Part 98
CO_2	135.50	lb/MMBtu	
CH_4	6.61E-03	lb/MMBtu	
N_2O	1.32E-03	lb/MMBtu	

<u>Global Warming Potential</u>

CO_2	1	Table A-1 to subpart A of 40 CFR Part 98
CH_4	25	Table A-1 to subpart A of 40 CFR Part 98
N_2O	298	Table A-1 to subpart A of 40 CFR Part 98

<u>Emission Rates - GHG (CO_2e)</u>

	lb/yr	**tpy**
CO_2	2,146,255.77	1,073.13
CH_4 (CO_2e)	2,619.09	1.31
N_2O (CO2e)	6,243.91	3.12
GHG (CO_2e)		**1,077.56**

	lb/yr	**tpy**
CO_2	2,146,255.77	1,073.13
CH_4	104.76	0.05
N_2O	20.95	0.01
GHG (Mass Basis)		**1,073.19**

STAR CO_2 Production

Yearly Feed Rate (TPY)	400,000	
Average Feed LOI	7.80%	
Availability	80.00%	
Avg. Feed Rate (TPH)	57.08	400,000/ (8760*80%)
Avg. Fuel Input (MMBtu/hr)	129.11	57.08*2000*7.80%*14500/1000000
Max. CO_2 Production (TPY)	114,401	57.08*2000*7.80%*3.6667*8760*80%/2000

Note: Duke Energy expects 6%-15% LOI. LOI will affect throughput.

Expected GHG Emission Range

	Natural Gas	**Propane**	**Fly Ash**	**Total**
CO_2	926.46	1,073.13	114,401	116,400.63
CH_4 (CO_2e)	0.44	1.31		1.75
N_2O (CO2e)	0.52	3.12		3.64
GHG (CO_2e)				**116,406.02**
CO_2	926.46	1,073.13	114,401	116,400.63
CH_4	0.02	0.05		0.07
N_2O	0.00	0.01		0.01
GHG (Mass Basis)				**116,400.71**

Duke Energy H.F. Lee Plant
Table 10 - Unloading Pile Windblown Fugitive Dust Emissions (F-3)

Section 13.2.5 of the U.S. EPA's AP-42 document was used to estimate emissions.

The first step is to calculate a height-to-base ratio to determine if Equation (4) can be used to determine the friction velocity (u*):

0.33	acres, Acreage of Fly Ash Pile
4,046.9	m^2/acre, Conversion Factor
1,335.5	m^2, Typical Active Area

Assuming a square area, this active area yields an approximate length as follows:

36.5	m, Linear Dimension of Active Area
3.3	ft/m, Conversion Factor
119.9	ft, Linear Dimension of Active Area

4	ft, Approximate Mean Elevation of the Active Area (Above Grade)

Per page 13.2.5-5 of AP-42, if the height to base ratio is less than 0.2 then Equation (4) can be used to calculate the friction velocity (u*).

0.033	Calculated Height to Base Ratio

Therefore equation (4) from AP-42 13.2.5 can be used for calculation of the friction velocity.

Per the following website: http://www.nc-climate.ncsu.edu/dynamic_scripts/cronos/query.php (maintained by the North Carolina State Climate Office), the anemometer height for the fastest mile data is:

10	m, Anemometer Height

Since the reported fastest wind speeds are from an anemometer of height 10 m, using equation (5) on page 13.2.5-6 is not necessary:

When the calculated friction velocity (u*) exceeds the threshold friction velocity (u_t*), emissions from wind erosion occur. As shown in Equation 3 of AP-42, if u* ≤ u_t*, emissions are zero.

From Table 13.2.5-1 threshold friction velocity (ut*) is as follows. The most conservative value presented in AP-42 has been used.

0.43	m/s, u_t* Threshold Friction Velocity

Therefore, in order to generate emissions, the following wind speed must be exceeded.

3,600	sec/hr, Conversion Factor
1,609.3	m/mile, Conversion Factor

18.15	mph, u_{10}^+
8.11	m/s, u_{10}^+
0.43	m/s, u*

Duke Energy H.F. Lee Plant

Table 10 - Unloading Pile Windblown Fugitive Dust Emissions (F-3)

AERMOD allows users to account for the variability of wind speed when determining offsite impacts. The scalars below are used based on the respective wind speed range. (AERMOD User Guide 3.3.4. Using Variable Emission Rates). There are zero wind based emissions in classes 1 thru 4 because the threshold friction velocity is not exceeded (ut*). The scalar for Class 5 is determined as the ratio of emission factors for Class 5 and Class 6. Emission factor derivation follows.

Wind Speed Range Class	1	2	3	4	5	6
Scalar	0	0	0	0	0.77	1.00

where:

Class 1 = 0 - 3.4 mph
Class 2 = 3.4 - 6.8 mph
Class 3 = 6.8 - 11.3 mph
Class 4 = 11.3 - 18.1 mph
Class 5 = 18.1 - 23.8 mph
Class 6 = greater than 23.8 mph

The emissions rate (which is dependent on the friction velocity (u*)) varies linearly with wind speed. For Class 5, emissions will increase linearly as wind speed increases. AERMOD does not facilitate the variable emission rates based on wind speed. Therefore, the friction velocity for Class 5 is determined using the upper end wind speed of 23.8 mph. Using Equation (4) on page 13.2.5-5, the equivalent friction velocity (u*) may be calculated.

$$u^* = 0.053 u_{10}^{+}$$

	23.8	mph, u_{10}^{+}
	10.64	m/s, u_{10}^{+}
Class 5	0.56	m/s, u*, Class 5 Wind Speed Range

The friction velocity for Class 6 is determined using the average of the maximum daily wind gusts for each month.

	25.08	mph, u_{10}^{+}
	11.21	m/s, u_{10}^{+}
Class 6	0.59	m/s, u*, Class 6 Wind Speed Range

Maximum daily wind gust for each month taken from downtown Goldsboro 2016. Source: wunderground.com

Emission factors for Class 5 and Class 6 are determined using AP-42 Section 13.2.5 Equation (3) which is shown below:

$$PM\left(\frac{g}{m^2}\right) = 58\,(u^* - u_t^*)^2 + 25\,(u^* - u_t^*)$$

Equation (3) from AP-42 13.2.5

Where: u* is the friction velocity (m/s)
u^*_t is the threshold friction velocity (m/s)

Class 5	4.39	g/m² (of Disturbed Area), Class 5 Wind Speed Range
Class 6	5.67	g/m² (of Disturbed Area), Class 6 Wind Speed Range

Duke Energy H.F. Lee Plant

Table 10 - Unloading Pile Windblown Fugitive Dust Emissions (F-3)

As stated in AP-42, on page 13.2.5-2, emissions generated by wind erosion are also dependent on the frequency of disturbance of the erodible surface because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action that results in the exposure of fresh surface material. Only a fraction of the active area is disturbed each day. This disturbed area is used to calculate the potential daily emission rate.

	0.33	acres, Working Area
	100%	Fraction of Active Area Disturbed Daily
	1,335.47	m^2, Average Area Disturbed Daily
	453.6	g/lb, Conversion Factor
Class 5	12.9	lb/day
Class 6	16.7	lb/day

	0%	Fraction of Inactive Area
	0.00	m^2, Average Inactive Area
	453.6	g/lb, Conversion Factor
Class 5	0.0	lb/day
Class 6	0.0	lb/day

The facility will implement mitigation to suppress dust emissions. Control efficiencies are based on engineering judgment and supported by *WRAP Fugitive Dust Handbook, September 7, 2006.* The controlled emission rates for Class 5 and Class 6 emissions are as follows:

	61%	Apply Water every 3.2 hours to disturbed areas
*Class 5***	5.0	lb/day
*Class 6***	6.5	lb/day

	80%	Inherent Moisture and Watering
Class 5	0.0	lb/day
Class 6	0.0	lb/day

For the purposes of determining potential emissions for permitting, wind data has been applied as shown below.

Total Class 5 Emissions	5.0	lb/day
Total Class 6 Emissions	6.5	lb/day
Fraction of time in Class 5	0.0120	(approximately 105 hours in Class 5)
Fraction of time in Class 6	0.0023	(approximately 20 hours in Class 6)

Time fraction spent in Class 5 and Class 6 determined by analyzing hourly wind speeds for the 5 year period required to be modeled 2012-2016 from DAQ Approved Met Data. The worst case year (year with the most hours) was used to determine the time fraction. For Class 5 it was 2016 and for Class 6 it was 2015.

Total emissions per day	0.08	lb/day

Emissions from the unloading pile will only occur when Class 5 and Class 6 wind speed conditions are met. AERMOD will utilize meteorological data to determine when these conditions occur. For the purposes of the PSD analysis, permitting, and TPER evaluation, it is conservatively assumed that Class 6 condition occur year round.

Compound	Avg Ash Analysis (ppm)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (lb/yr)	Emissions (ton/yr)
PM	1.00 **	0.003	0.08	27.47	0.01
PM_{10}	0.50 **	0.002	0.04	13.73	0.007
$PM_{2.5}$	0.08 **	0.0002	0.006	2.06	0.001
Lead	19.85	6.22E-08	1.49E-06	5.45E-04	2.73E-07
Arsenic	38.55	1.21E-07	2.90E-06	1.06E-03	5.29E-07
Antimony	1.28	4.01E-09	9.63E-08	3.52E-05	1.76E-08
Beryllium	4.25	1.33E-08	3.20E-07	1.17E-04	5.84E-08
Cadmium	0.18	5.64E-10	1.35E-08	4.94E-06	2.47E-09
Chromium	25.20	7.90E-08	1.90E-06	6.92E-04	3.46E-07
Chromium VI	0.67	2.10E-09	5.04E-08	1.84E-05	9.20E-09
Cobalt	12.68	3.98E-08	9.54E-07	3.48E-04	1.74E-07
Manganese	54.29	1.70E-07	4.09E-06	1.49E-03	7.46E-07
Mercury	0.16	5.02E-10	1.20E-08	4.39E-06	2.20E-09
Nickel	23.33	7.32E-08	1.76E-06	6.41E-04	3.20E-07
Selenium	8.32	2.61E-08	6.26E-07	2.29E-04	1.14E-07

HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

** PM distribution factors (k value) taken from AP-42 Page 13.2.5-3 All other values in ppm.

Duke Energy H.F. Lee Plant
Table 11 - Emissions Estimate: Wind Erosion at the Ash Basin (F-4)

Dust may be generated by wind erosion of exposed area within an industrial facility. Section 13.2.5 of the U.S. EPA's AP-42 document was used to estimate emissions.

The first step is to calculate a height-to-base ratio to determine if Equation (4) can be used to determine the friction velocity (u*):

321	acres, Typical Active Area of Ash Pond
4,046.9	m^2/acre, Conversion Factor
1,299,045.3	m^2, Typical Active Area

Assuming a square area, this active area yields an approximate length as follows:

1139.8	m, Linear Dimension of Active Area
3.3	ft/m, Conversion Factor
3739.4	ft, Linear Dimension of Active Area

15	ft, Approximate Mean Elevation of the Active Area (Above Grade)

Per page 13.2.5-5 of AP-42, if the height to base ratio is less than 0.2 then Equation (4) can be used to calculate the friction velocity (u*).

0.004	Calculated Height to Base Ratio

Therefore equation (4) from AP-42 13.2.5 can be used for calculation of the friction velocity.

Per the following website: http://www.nc-climate.ncsu.edu/dynamic_scripts/cronos/query.php (maintained by the North Carolina State Climate Office), the anemometer height for the fastest mile data is:

10	m, Anemometer Height

Since the reported fastest wind speeds are from an anemometer of height 10 m, using equation (5) on page 13.2.5-6 is not necessary:

When the calculated friction velocity (u*) exceeds the threshold friction velocity (u_t*), emissions from wind erosion occur. As shown in Equation 3 of AP-42, if $u^* \leq u_t^*$, emissions are zero.

From Table 13.2.5-1 threshold friction velocity (ut*) is as follows. The most conservative value presented in AP-42 has been used.

0.43	m/s, u_t* Threshold Friction Velocity

Therefore, in order to generate emissions, the following wind speed must be exceeded.

3,600	sec/hr, Conversion Factor
1,609.3	m/mile, Conversion Factor

18.15	mph, u_{10}^+
8.11	m/s, u_{10}^+
0.43	m/s, u*

Duke Energy H.F. Lee Plant

Table 11 - Emissions Estimate: Wind Erosion at the Ash Basin (F-4)

AERMOD allows users to account for the variability of wind speed when determining offsite impacts. The scalars below are used based on the respective wind speed range. (AERMOD User Guide 3.3.4. Using Variable Emission Rates). There are zero wind based emissions in classes 1 thru 4 because the threshold friction velocity is not exceeded (ut*). The scalar for Class 5 is determined as the ratio of emission factors for Class 5 and Class 6. Emission factor derivation follows.

Wind Speed Range Class	1	2	3	4	5	6
Scalar	0	0	0	0	0.77	1.00

where:

Class 1 = 0 - 3.4 mph
Class 2 = 3.4 - 6.8 mph
Class 3 = 6.8 - 11.3 mph
Class 4 = 11.3 - 18.1 mph
Class 5 = 18.1 - 23.8 mph
Class 6 = greater than 23.8 mph

The emissions rate (which is dependent on the friction velocity (u*)) varies linearly with wind speed. For Class 5, emissions will increase linearly as wind speed increases. AERMOD does not facilitate the variable emission rates based on wind speed. Therefore, the friction velocity for Class 5 is determined using the upper end wind speed of 23.8 mph. Using Equation (4) on page 13.2.5-5, the equivalent friction velocity (u*) may be calculated.

$$u^* = 0.053 u_{10}^+$$

	23.8	mph, u_{10}^+
	10.64	m/s, u_{10}^+
Class 5	0.56	m/s, u*, Class 5 Wind Speed Range

The friction velocity for Class 6 is determined using the average of the maximum daily wind gusts for each month.

	25.08	mph, u_{10}^+
	11.21	m/s, u_{10}^+
Class 6	0.59	m/s, u*, Class 6 Wind Speed Range

Maximum daily wind gust for each month taken from downtown Goldsboro 2016. Source: wunderground.com

Emission factors for Class 5 and Class 6 are determined using AP-42 Section 13.2.5 Equation (3) which is shown below:

$$PM\left(\frac{g}{m^2}\right) = 58\,(u^* - u_t^*)^2 + 25\,(u^* - u_t^*)$$

Equation (3) from AP-42 13.2.5

Where: u* is the friction velocity (m/s)
u^*_t is the threshold friction velocity (m/s)

Class 5	4.39	g/m^2 (of Disturbed Area), Class 5 Wind Speed Range
Class 6	5.67	g/m^2 (of Disturbed Area), Class 6 Wind Speed Range

Duke Energy H.F. Lee Plant

Table 11 - Emissions Estimate: Wind Erosion at the Ash Basin (F-4)

As stated in AP-42, on page 13.2.5-2, emissions generated by wind erosion are also dependent on the frequency of disturbance of the erodible surface because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action that results in the exposure of fresh surface material. Only a fraction of the active area is disturbed each day. This disturbed area is used to calculate the potential daily emission rate.

	10	acres, Working Area			
	3%	Fraction of Active Area Disturbed Daily		97%	Fraction of Inactive Area
	40,468.70	m^2, Average Area Disturbed Daily		1,258,576.57	m^2, Average Inactive Area
	453.6	g/lb, Conversion Factor		453.6	g/lb, Conversion Factor
Class 5	391.4	lb/day	*Class 5*	12173.0	lb/day
Class 6	506.2	lb/day	*Class 6*	15741.3	lb/day

The facility will implement mitigation to suppress dust emissions. Control efficiencies are based on engineering judgment and supported by *WRAP Fugitive Dust Handbook, September 7, 2006.* The controlled emission rates for Class 5 and Class 6 emissions are as follows:

	61%	Apply Water every 3.2 hours to disturbed areas		80%	Inherent Moisture and Watering
*Class 5***	152.7	lb/day	*Class 5*	2434.6	lb/day
*Class 6***	197.4	lb/day	*Class 6*	3148.3	lb/day

For the purposes of determining potential emissions for permitting, wind data has been applied as shown below.

Total Class 5 Emissions	2587.3	lb/day
Total Class 6 Emissions	3345.7	lb/day
Fraction of time in Class 5	0.0120	(approximately 105 hours in Class 5)
Fraction of time in Class 6	0.0023	(approximately 20 hours in Class 6)

Time fraction spent in Class 5 and Class 6 determined by analyzing hourly wind speeds for the 5 year period required to be modeled 2012-2016 from DAQ Approved Met Data. The worst case year (year with the most hours) was used to determine the time fraction. For Class 5 it was 2016 and for Class 6 it was 2015.

Total emissions per day	38.65	lb/day

Emissions from the ash pond will only occur when Class 5 and Class 6 wind speed conditions are met. AERMOD will utilize meteorological data to determine when these conditions occur. For the purposes of the PSD analysis, permitting, and TPER evaluation, it is conservatively assumed that Class 6 condition occur year round.

Compound	Avg Ash Analysis (ppm)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (lb/yr)	Emissions (ton/yr)
PM	1.00 **	1.61	38.65	14,107.30	7.05
PM_{10}	0.50 **	0.81	19.33	7,053.65	3.53
$PM_{2.5}$	0.08 **	0.12	2.90	1,058.05	0.53
Lead	19.85	3.20E-05	7.67E-04	2.80E-01	1.40E-04
Arsenic	38.55	6.21E-05	1.49E-03	5.44E-01	2.72E-04
Antimony	1.28	2.06E-06	4.95E-05	1.81E-02	9.03E-06
Beryllium	4.25	6.84E-06	1.64E-04	6.00E-02	3.00E-05
Cadmium	0.18	2.90E-07	6.96E-06	2.54E-03	1.27E-06
Chromium	25.20	4.06E-05	9.74E-04	3.56E-01	1.78E-04
Chromium VI	0.67	1.08E-06	2.59E-05	9.45E-03	4.73E-06
Cobalt	12.68	2.04E-05	4.90E-04	1.79E-01	8.94E-05
Manganese	54.29	8.74E-05	2.10E-03	7.66E-01	3.83E-04
Mercury	0.16	2.58E-07	6.18E-06	2.26E-03	1.13E-06
Nickel	23.33	3.76E-05	9.02E-04	3.29E-01	1.65E-04
Selenium	8.32	1.34E-05	3.22E-04	1.17E-01	5.87E-05

HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

** PM distribution factors (k value) taken from AP-42 Page 13.2.5-3 All other values in ppm.

Duke Energy H.F. Lee Plant
Table 12 - Emissions Estimate: Ash Handling Operations (F-5)

Section 13.2.4 (Aggregate Handling and Storage Piles) of U.S. EPA's AP-42 document is used to estimate emissions from the handling of material at an industrial site. The "Drop Equation" is shown below:

$$E = k\,(0.0032)\frac{\left(U/5\right)^{1.3}}{\left(M/2\right)^{1.4}}$$

Where:
E is the emission factor in [lb/ton]
K is the particle size multiplier [dimensionless]
U is the average wind speed [mph]
M is the average moisture content [%]

Constant	$PM_{2.5}$	PM_{10}	PM
k	0.053	0.35	0.74

7	mph, Average Wind Speed
15	%, Moisture

Wind data from Rocky Mount - Wilson Airport 2012-2016

The HAP and TAP emissions are derived from the PM estimate based on the average trace element analysis:
Emissions are calculated assuming a maximum throughput of ash:

430,000	ton/yr, Potential Ash Throughput
3	Number of Drop Points

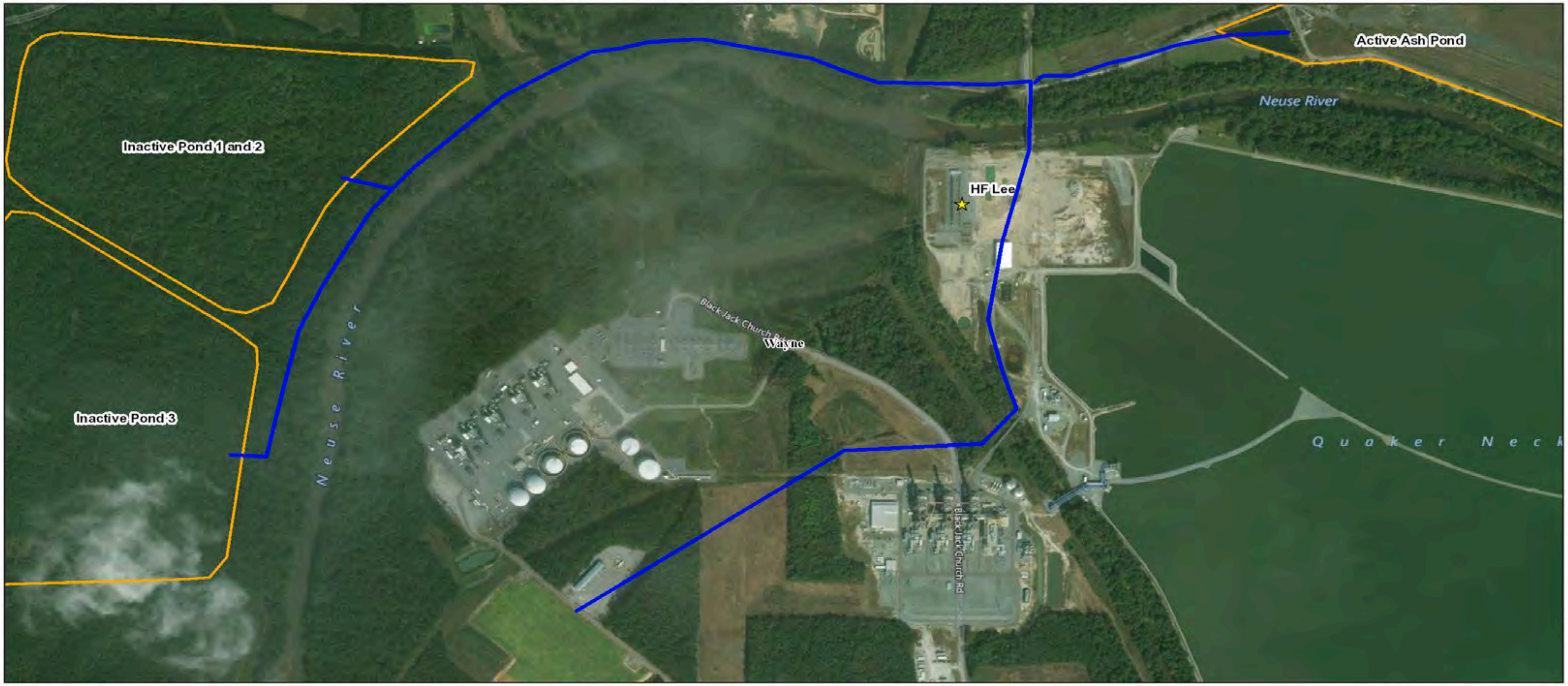
Ash Trace Element Analysis	Average Concentration (ppm)	Emission Factor (lb/ton)	Annual PTE (lb/yr)	Annual PTE (lb/hr)	Total Annual PTE (ton/yr)
PM	--	2.18E-04	281.74	0.03	0.14
PM_{10}	--	1.03E-04	133.26	0.02	0.07
$PM_{2.5}$	--	1.56E-05	20.18	0.002	0.01
Lead	19.85	4.34E-09	5.59E-03	6.38E-07	2.80E-06
Arsenic	38.55	8.42E-09	1.09E-02	1.24E-06	5.43E-06
Antimony	1.28	2.80E-10	3.61E-04	4.12E-08	1.80E-07
Beryllium	4.25	9.28E-10	1.20E-03	1.37E-07	5.99E-07
Cadmium	0.18	3.93E-11	5.07E-05	5.79E-09	2.54E-08
Chromium	25.20	5.50E-09	7.10E-03	8.10E-07	3.55E-06
Chromium VI	0.67	1.46E-10	1.89E-04	2.15E-08	9.44E-08
Cobalt	12.68	2.77E-09	3.57E-03	4.08E-07	1.79E-06
Manganese	54.29	1.19E-08	1.53E-02	1.75E-06	7.65E-06
Mercury	0.16	3.49E-11	4.51E-05	5.15E-09	2.25E-08
Nickel	23.33	5.10E-09	6.57E-03	7.50E-07	3.29E-06
Selenium	8.32	1.82E-09	2.34E-03	2.68E-07	1.17E-06

Note: HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Duke Energy H.F. Lee Plant
Table 13A - Truck Traffic VMT Estimates

	Ash Trucked Offsite (ton/yr)	Truck Capacity (ton/truck)	Truck Loads/Year	Route Distance (miles)	Total Miles Traveled VMT/yr	Total VMT/yr
Empty Trucks to Loading Area	430,000	25.00	17,200	2.33	40,076.00	80,152.00
Loaded Trucks to Offsite				2.33	40,076.00	

H. F. Lee Approximate Haul Routes



August 30, 2017

Override 1	Lay of Land Area	Lay of Land Area
CCP Site Contacts	Unknown, Eng. Wetlands, Landfill, Other	Unknown, Eng. Wetlands, Landfill, Other
<all other values>	<all other values>	Duke Energy
Active Basin	Active Basin	Piedmont Natural Gas
Currently Being Excavated	Currently Being Excavated	Counties
Inactive	Inactive	

1:9,028

0 0.1 0.2 0.4 mi

0 0.175 0.35 0.7 km

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Duke Energy H.F. Lee Plant

Table 13B - Additional Haul Roads Supporting the Movement of Ash Offsite - Loaded Trucks (F-6)

A portion of the ash will be moved by truck to an offsite location. Particulate emissions are generated from the haul roads from the force of the wheels on the road surface. This force causes pulverization of the surface material. The particles are lifted and dropped from the rolling wheels and the road surface is exposed to strong air currents, which generate airborne particulate emissions.

The methodology presented below is taken from Section 13.2.2 (Unpaved Roads) of the U.S. EPA's AP-42 document and is based on the vehicle miles traveled (VMT) at the site.

$$E = k\left(\frac{s}{12}\right)^a \left(\frac{W}{3}\right)^b$$

Equation 1a of AP-42 Section 13.2.2 for vehicles traveling on unpaved surfaces at industrial sites

Where: E is the size-specific emission factor (lb/VMT)
s is the surface material silt content (%)
W is the mean vehicle weight (tons)
k, a, and b are empirical constants

Constant	Industrial Roads		
	$PM_{2.5}$	PM_{10}	PM
k	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45

5.1	%, Average Silt Content of Plant Roads at a Coal Mining Site (Table 13.2.2-1)
50	tons, Mean Vehicle Loaded Weight (Fleet Average)

0.25	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Road Silt Portion)
2.46	lb/VMT, Calculated PM_{10} Emission Factor (Road Silt Portion)
9.55	lb/VMT, Calculated PM Emission Factor (Road Silt Portion)

Emissions associated with the exhaust, brake wear, and tire wear must be added to the values calculated above. The values shown below were taken from Table 13.2.2-4.

Particle Size	$PM_{2.5}$	PM_{10}	PM
lb/VMT "adder"	0.00036	0.00047	0.00047

0.25	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, No natural mitigation)
2.46	lb/VMT, Calculated PM_{10} Emission Factor (Total, No natural mitigation)
9.55	lb/VMT, Calculated PM Emission Factor (Total, No natural mitigation)

All roads are subject to natural mitigation because of rainfall and other precipitation. The following equation accounts for reductions in the emission factor due to natural mitigation.

$$E_{EXT} = E\left[\frac{(365-P)}{365}\right]$$

Where: E_{EXT} is the adjusted emission factor accounting for natural mitigation
E is emission factor from Equation 1a
P is the number of days per year with at least 0.01 inches of precipitation

120	days, Precipitation Greater than 0.01 inches at Plant Location (Figure 13.2.2-1)

0.17	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, With natural mitigation)
1.65	lb/VMT, Calculated PM_{10} Emission Factor (Total, With natural mitigation)
6.41	lb/VMT, Calculated PM Emission Factor (Total, With natural mitigation)

In addition to natural mitigation, the following mitigation will be implemented at the site. Control efficiencies taken from the *WRAP Fugitive Dust Handbook, September 7, 2006.*

57%	Limit on-site vehicle speeds (on unpaved roads) to 15 mph.
84%	Application of Gravel on Dirt Surfaces
90%	Implement watering for industrial unpaved road.

0.04	lb/VMT, Calculated PM Emission Factor (Total, With natural mitigation, and water sprays)
0.01	lb/VMT, Calculated PM_{10} Emission Factor (Total, With natural mitigation, and water sprays)
0.001	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, With natural mitigation, and water sprays)

40,076	miles/year, "Loaded Truck VMT"
2000	lb/ton, Conversion Factor

8.84E-01	tpy, PM Emissions
2.28E-01	tpy, PM_{10} Emissions
2.28E-02	tpy, $PM_{2.5}$ Emissions

2.02E-01	lb/hr, PM Emissions
5.20E-02	lb/hr, PM_{10} Emissions
5.21E-03	lb/hr, $PM_{2.5}$ Emissions

Duke Energy H.F. Lee Plant
Table 13C - Additional Haul Roads Supporting the Movement of Ash Offsite - Unloaded Trucks (F-6)

A portion of the ash will be trucked to an offsite location. Particulate emissions are generated from the haul roads from the force of the wheels on the road surface. This force causes pulverization of the surface material. The particles are lifted and dropped from the rolling wheels and the road surface is exposed to strong air currents, which generate airborne particulate emissions.

The methodology presented below is taken from Section 13.2.2 (Unpaved Roads) of the U.S. EPA's AP-42 document and is based on the vehicle miles traveled (VMT) at the site.

$$E = k\left(\frac{s}{12}\right)^a \left(\frac{W}{3}\right)^b$$

Where: E is the size-specific emission factor (lb/VMT)
s is the surface material silt content (%)
W is the mean vehicle weight (tons)
k, a, and b are empirical constants

Equation 1a of AP-42 Section 13.2.2 for vehicles traveling on unpaved surfaces at industrial sites

Constant	Industrial Roads		
	$PM_{2.5}$	PM_{10}	PM
k	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45

5.1	%, Average Silt Content of Plant Roads at a Coal Mining Site (Table 13.2.2-1)
25	tons, Mean Vehicle Empty Weight (Fleet Average)

0.18	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Road Silt Portion)
1.80	lb/VMT, Calculated PM_{10} Emission Factor (Road Silt Portion)
6.99	lb/VMT, Calculated PM Emission Factor (Road Silt Portion)

Emissions associated with the exhaust, brake wear, and tire wear must be added to the values calculated above. The values shown below were taken from Table 13.2.2-4.

Particle Size	$PM_{2.5}$	PM_{10}	PM
lb/VMT "adder"	0.00036	0.00047	0.00047

0.18	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, No natural mitigation)
1.80	lb/VMT, Calculated PM_{10} Emission Factor (Total, No natural mitigation)
6.99	lb/VMT, Calculated PM Emission Factor (Total, No natural mitigation)

All roads are subject to natural mitigation because of rainfall and other precipitation. The following equation accounts for reductions in the emission factor due to natural mitigation.

$$E_{EXT} = E\left[\frac{(365 - P)}{365}\right]$$

Where: E_{EXT} is the adjusted emission factor accounting for natural mitigation
E is emission factor from Equation 1a
P is the number of days per year with at least 0.01 inches of precipitation

120	days, Precipitation Greater than 0.1 inches at Plant Location (Figure 13.2.2-1)

0.12	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, With natural mitigation)
1.21	lb/VMT, Calculated PM_{10} Emission Factor (Total, With natural mitigation)
4.69	lb/VMT, Calculated PM Emission Factor (Total, With natural mitigation)

In addition to natural mitigation, the following mitigation will be implemented at the site. Control efficiencies taken from the *WRAP Fugitive Dust Handbook, September 7, 2006.*

57%	Limit on-site vehicle speeds (on unpaved roads) to 15 mph.
84%	Application of Gravel on Dirt Surfaces
90%	Implement watering for industrial unpaved road.

0.03	lb/VMT, Calculated PM Emission Factor (Total, With natural mitigation, and water sprays)
0.008	lb/VMT, Calculated PM_{10} Emission Factor (Total, With natural mitigation, and water sprays)
0.0008	lb/VMT, Calculated $PM_{2.5}$ Emission Factor (Total, With natural mitigation, and water sprays)

40,076	miles/day, One-way Vehicle Distance from Source to Offsite
2000	lb/ton, Conversion Factor

6.47E-01	tpy, PM Emissions
1.67E-01	tpy, PM_{10} Emissions
1.67E-02	tpy, $PM_{2.5}$ Emissions

1.48E-01	lb/hr, PM Emissions
3.81E-02	lb/hr, PM_{10} Emissions
3.82E-03	lb/hr, $PM_{2.5}$ Emissions

Duke Energy H.F. Lee Plant

Table 14A - Screener Emissions (ES-39A)

Spyder 514TS Double Deck

Capacity, ton/yr	430,000	Duke Energy
Hours of operation, hr/yr	2600	Based on 50/wk M-F
Capacity, ton/hr	165	Duke Energy

Pollutant	Emission Factor [1]	Potential Emission Rates	
	lb/ton	(lb/hr)	(tpy)
PM	0.0022	0.015	0.020
PM_{10}	0.00074	0.005	0.007
$PM_{2.5}$	0.00005	0.0003	0.0004

Lead	19.85	3.00E-07	3.90E-07	Duke Energy Average Ash Analysis
Arsenic	38.55	5.83E-07	7.58E-07	Duke Energy Average Ash Analysis
Antimony	1.28	1.94E-08	2.52E-08	Duke Energy Average Ash Analysis
Beryllium	4.25	6.43E-08	8.36E-08	Duke Energy Average Ash Analysis
Cadmium	0.18	2.72E-09	3.54E-09	Duke Energy Average Ash Analysis
Chromium	25.20	3.81E-07	4.95E-07	Duke Energy Average Ash Analysis
Chromium VI	0.67	1.01E-08	1.32E-08	Duke Energy Average Ash Analysis
Cobalt	12.68	1.92E-07	2.49E-07	Duke Energy Average Ash Analysis
Manganese	54.29	8.21E-07	1.07E-06	Duke Energy Average Ash Analysis
Mercury	0.16	2.42E-09	3.15E-09	Duke Energy Average Ash Analysis
Nickel	23.33	3.53E-07	4.59E-07	Duke Energy Average Ash Analysis
Selenium	8.32	1.26E-07	1.64E-07	Duke Energy Average Ash Analysis

Notes:

1. Emission Factor for Screening operation from AP-42, Table 11.19.2-2

2. HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Duke Energy H.F. Lee Plant
Table 14B - Screener Engine Emissions (ES-39B)

Engine rating	91	hp				
Permitted Hours:	2,600	hrs/yr				
No. of Engines:	1			Diesel Sulfur Content:	0.0015	weight %
Heat Input:	0.64	MMBtu/hr (HHV)		Diesel Heat Content:	7,000	Btu/hp-hr

Pollutant	Emission Factor	Potential Emission Rates		HAP Pollutant [1]	Emission Factor	Potential Emission Rates	
	lb/hp-hr	(lb/hr)	(tpy)		(lb/MMBtu)	(lb/hr)	(tpy)
NO_x	0.031	2.82	3.667	Benzene	9.33E-04	5.94E-04	7.73E-04
CO	6.68E-03	0.61	0.790	Toluene	4.09E-04	2.61E-04	3.39E-04
VOC	2.47E-03	0.22	0.292	Xylenes	2.85E-04	1.82E-04	2.36E-04
SO_2	2.05E-03	0.19	0.243	1,3-Butadiene	3.91E-05	2.49E-05	3.24E-05
PM	2.20E-03	0.20	0.260	Formaldehyde	1.18E-03	7.52E-04	9.77E-04
PM_{10}	2.20E-03	0.20	0.260	Acetaldehyde	7.67E-04	4.89E-04	6.35E-04
$PM_{2.5}$	2.20E-03	0.20	0.260	Acrolein	9.25E-05	5.89E-05	7.66E-05
				Total PAH	1.68E-04	1.07E-04	1.39E-04
				Naphthalene	8.48E-05	5.40E-05	7.02E-05
				Acenaphthalene	5.06E-06	3.22E-06	4.19E-06
				Acenaphthene	1.42E-06	9.05E-07	1.18E-06
				Fluorene	2.92E-05	1.86E-05	2.42E-05
				Phenanthrene	2.94E-05	1.87E-05	2.43E-05
				Anthracene	1.87E-06	1.19E-06	1.55E-06
				Fluoranthene	7.61E-06	4.85E-06	6.30E-06
				Pyrene	4.78E-06	3.04E-06	3.96E-06
				Benzo(a)anthracene	1.68E-06	1.07E-06	1.39E-06
				Chrysene	3.53E-07	2.25E-07	2.92E-07
				Benzo(b)fluoranthene	9.91E-08	6.31E-08	8.21E-08
				Benzo(k)fluoranthene	1.55E-07	9.87E-08	1.28E-07
				Benzo(a)pyrene	1.88E-07	1.20E-07	1.56E-07
				Indeno(1,2,3-cd)pyrene	3.75E-07	2.39E-07	3.11E-07
				Dibenz(a,h)anthracene	5.83E-07	3.71E-07	4.83E-07
				Benzo(g,h,l)perylene	4.89E-07	3.11E-07	4.05E-07

Summary of GHG Emissions:

Pollutant	Emission Factor (kg/MMBtu)[2]	Emissions (metric tons/yr)[3]	Emissions (US tons/yr)[4]
CO_2	73.96	122.5	134.99
CH_4	3.0E-03	0.005	0.005
N_2O	6.0E-04	0.001	0.001
CO_2e[5]	--	122.91	**135.45**

Notes

Assume PM = PM10 = PM2.5

Emission Factor based on Table 3.3 1, EPA AP 42, Chapter 3.3 Gasoline & Diesel Industrial Engines

1. HAPs Emission Factor based on Table 3.3 2, Chapter 3.3 Gasoline & Diesel Industrial Engines. Per 15A NCAC 2Q.0702 (a)(27) these emissions were not included in the TPER analysis.

2. Based on EPA default factors in Subpart C Tables C-1 and C-2 for Distillate Fuel Oil No. 2.

3. Calculated based on the heat input, emission factors, and equations C-1b and C-8b of Subpart C. CO_2e based on Subpart A Table A-1 factors.

*CO_2, CH_4, or N_2O (metric tpy) = 1E-03 * Gas (MMBtu/yr) * Emission Factor (kg/MMBtu)*

4. 1 metric ton = 1.102 US ton

*5. CO_2e = CO_2, CH_4, or N_2O (tpy) * Global Warming Potential factor (GWP)*

CO_2 GWP	*1*
CH_4 GWP	*25*
N_2O GWP	*298*

Duke Energy H.F. Lee Plant
Table 15A - Crusher Emissions (ES-40A)
4043T Impact Crusher

Capacity, ton/yr	43,000	Duke Energy
Max Hours of operation, hr/day	1	Duke Energy
Hours of operation, hr/yr	365	Based on 1 hr/day 365 days/year
Capacity, ton/day	165	Duke Energy

Pollutant	Emission Factor [1]	Potential Emission Rates	
	lb/ton	(lb/hr)	(tpy)
PM	0.0012	0.008	0.002
PM_{10}	0.00054	0.004	0.001
$PM_{2.5}$	0.0001	0.001	0.0001

Lead	19.85	1.64E-07	2.99E-08	Duke Energy Average Ash Analysis
Arsenic	38.55	3.18E-07	5.80E-08	Duke Energy Average Ash Analysis
Antimony	1.28	1.06E-08	1.93E-09	Duke Energy Average Ash Analysis
Beryllium	4.25	3.51E-08	6.40E-09	Duke Energy Average Ash Analysis
Cadmium	0.18	1.49E-09	2.71E-10	Duke Energy Average Ash Analysis
Chromium	25.20	2.08E-07	3.79E-08	Duke Energy Average Ash Analysis
Chromium VI	0.67	5.53E-09	1.01E-09	Duke Energy Average Ash Analysis
Cobalt	12.68	1.05E-07	1.91E-08	Duke Energy Average Ash Analysis
Manganese	54.29	4.48E-07	8.17E-08	Duke Energy Average Ash Analysis
Mercury	0.16	1.32E-09	2.41E-10	Duke Energy Average Ash Analysis
Nickel	23.33	1.92E-07	3.51E-08	Duke Energy Average Ash Analysis
Selenium	8.32	6.86E-08	1.25E-08	Duke Energy Average Ash Analysis

Notes:

1. Emission Factor for Crushing operation from AP-42, Table 11.19.2-2

2. HAP/TAP emission factors for the fly ash is based on site-specific ash analysis without the addition of metals in the water used for water injection.

Duke Energy H.F. Lee Plant
Table 15B - Crusher Engine Emissions (ES-40B)

Engine rating	300	hp			
Permitted Hours:	365	hrs/yr			
No. of Engines:	1		Diesel Sulfur Content:	0.0015	weight %
Heat Input:	2.10	MMBtu/hr (HHV)	Diesel Heat Content:	7,000	Btu/hp-hr

Pollutant	Emission Factor	Potential Emission Rates		HAP Pollutant [1]	Emission Factor	Potential Emission Rates	
	lb/hp-hr	(lb/hr)	(tpy)		(lb/MMBtu)	(lb/hr)	(tpy)
NO_x	0.031	9.30	1.697	Benzene	9.33E-04	1.96E-03	3.58E-04
CO	6.68E-03	2.00	0.366	Toluene	4.09E-04	8.59E-04	1.57E-04
VOC	2.47E-03	0.74	0.135	Xylenes	2.85E-04	5.99E-04	1.09E-04
SO_2	2.05E-03	0.62	0.112	1,3-Butadiene	3.91E-05	8.21E-05	1.50E-05
PM	2.20E-03	0.66	0.120	Formaldehyde	1.18E-03	2.48E-03	4.52E-04
PM_{10}	2.20E-03	0.66	0.120	Acetaldehyde	7.67E-04	1.61E-03	2.94E-04
$PM_{2.5}$	2.20E-03	0.66	0.120	Acrolein	9.25E-05	1.94E-04	3.55E-05
				Total PAH	1.68E-04	3.53E-04	6.44E-05
				Naphthalene	8.48E-05	1.78E-04	3.25E-05
				Acenaphthalene	5.06E-06	1.06E-05	1.94E-06
				Acenaphthene	1.42E-06	2.98E-06	5.44E-07
				Fluorene	2.92E-05	6.13E-05	1.12E-05
				Phenanthrene	2.94E-05	6.17E-05	1.13E-05
				Anthracene	1.87E-06	3.93E-06	7.17E-07
				Fluoranthene	7.61E-06	1.60E-05	2.92E-06
				Pyrene	4.78E-06	1.00E-05	1.83E-06
				Benzo(a)anthracene	1.68E-06	3.53E-06	6.44E-07
				Chrysene	3.53E-07	7.41E-07	1.35E-07
				Benzo(b)fluoranthene	9.91E-08	2.08E-07	3.80E-08
				Benzo(k)fluoranthene	1.55E-07	3.26E-07	5.94E-08
				Benzo(a)pyrene	1.88E-07	3.95E-07	7.21E-08
				Indeno(1,2,3-cd)pyrene	3.75E-07	7.88E-07	1.44E-07
				Dibenz(a,h)anthracene	5.83E-07	1.22E-06	2.23E-07
				Benzo(g,h,l)perylene	4.89E-07	1.03E-06	1.87E-07

Summary of GHG Emissions:

Pollutant	Emission Factor (kg/MMBtu)[2]	Emissions (metric tons/yr)[3]	Emissions (US tons/yr)[4]
CO_2	73.96	56.7	62.47
CH_4	3.0E-03	0.002	0.003
N_2O	6.0E-04	0.0005	0.0005
CO_2e[5]	--	56.88	**62.69**

Notes

Assume PM = PM10 = PM2.5

Emission Factor based on Table 3.3 1, EPA AP 42, Chapter 3.3 Gasoline & Diesel Industrial Engines

1. HAPs Emission Factor based on Table 3.3 2, Chapter 3.3 Gasoline & Diesel Industrial Engines. Per 15A NCAC 2Q.0702 (a)(27) these emissions were not included in the TPER analysis.

2. Based on EPA default factors in Subpart C Tables C-1 and C-2 for Distillate Fuel Oil No. 2.

3. Calculated based on the heat input, emission factors, and equations C-1b and C-8b of Subpart C. CO_2e based on Subpart A Table A-1 factors.

CO_2, CH_4, or N_2O (metric tpy) = 1E-03 * Gas (MMBtu/yr) * Emission Factor (kg/MMBtu)

4. 1 metric ton = 1.102 US ton

5. CO_2e = CO_2, CH_4, or N_2O (tpy) * Global Warming Potential factor (GWP)

CO_2 GWP	*1*
CH_4 GWP	*25*
N_2O GWP	*298*

Duke Energy H.F. Lee Plant

Goldsboro, North Carolina

Wayne County

Table 16 - Fly Ash and water spray Reactor water spray flow rate 130 GPM

Parameter	Compound Category	Injection Concentration (mg/L) [1]	Injection Concentration (PPM)[2]	Injection Concentration (lb/hr)	Fly Ash Speciation (PPM)	Fly Ash Speciation [3] (lb/hr)	Injection Concentration + Fly ash (lb/hr)	Injection Concentration + Fly ash concentration (PPM)
Aluminum		3.2	3.2	0.208	NA	NA	NA	NA
Antimony	HAP	0.0079	0.0079	0.001	1.28	0.19	0.193	1.283
Arsenic	HAP, TAP	0.08	0.08	0.005	38.55	5.78	5.788	38.585
Barium		0.17	0.17	0.011	548.00	82.20	82.211	548.074
Beryllium	HAP, TAP	ND	ND	ND	4.25	0.64	0.638	4.250
Cadmium	HAP, TAP	0.0009	0.0009	0.000	0.18	0.03	0.027	0.180
Calcium		440.0	440.0	28.638	NA	NA	NA	NA
Chromium	HAP, TAP	0.0064	0.0064	0.000	25.20	3.78	3.780	25.203
Chromium VI	HAP, TAP	ND	ND	ND	0.67	0.10	0.101	0.670
Cobalt	HAP	0.0035	0.0035	0.000	12.68	1.90	1.902	12.682
Copper		ND	ND	ND	46.18	6.93	6.927	46.180
Iron		1.5	1.5	0.098	NA	NA	NA	NA
Lead	HAP	0.0048	0.0048	0.000	19.85	2.98	2.978	19.852
Magnesium		60.0	60.0	3.905	NA	NA	NA	NA
Manganese	HAP, TAP	0.047	0.047	0.003	54.29	8.14	8.147	54.310
Mercury	HAP, TAP	0.000047	0.000047	0.000	0.16	0.02	0.024	0.160
Molybdenum		ND	ND	ND	2.58	0.39	0.387	2.580
Nickel	HAP, TAP	0.012	0.012	0.001	23.33	3.50	3.500	23.335
Potassium		17.0	17.0	1.106	NA	NA	NA	NA
Selenium	HAP	0.25	0.25	0.016	8.32	1.25	1.264	8.428
Silver		ND	ND	ND	0.72	0.11	0.108	0.720
Sodium		120.0	120.0	7.810	NA	NA	NA	NA
Thallium		ND	ND	ND	1.30	0.20	0.195	1.300
Vanadium		0.056	0.056	0.004	65.12	9.77	9.772	65.144
Zinc		0.036	0.036	0.002	23.41	3.51	3.514	23.426

1) Winyah wash water sample analysis
2) mg/L = PPM
3) STAR Reactor hourly throughput = 75 tph

ND - Not Determined in sample analysis
NA - Not in the Fly Ash speciation

APPENDIX C

EMISSION CALCULATIONS SUPPORT DOCUMENATION

Compound	HF Lee Average Lab Ash Analysis (ppm)	EPRI Basis Average Ash Analysis (ppm)
Antimony	1.28	19.47
Arsenic	38.55	118.52
Barium	548.00	1007.45
Beryllium	4.25	24.55
Cadmium	0.18	21.16
Chromium	25.20	143.92
Chromium VI	0.67	15.83
Cobalt	12.68	57.57
Copper	46.18	160.85
Lead	19.85	126.99
Manganese	54.29	253.98
Mercury	0.16	0.76
Molybdenum	2.58	55.03
Nickel	23.33	143.92
Selenium	8.32	38.94
Silver	0.72	2.46
Thallium	1.30	14.39
Vanadium	65.12	279.38
Zinc	23.41	296.31

Compound	HF Lee Average	HF Lee Range
Sulfur	0.03%	0.013 to 0.065%
LOI	9.65%	1.71 to 21.9%

(ID Nos. Lee IC Unit 1A, Lee IC Unit 1B and Lee IC Unit 1C) shall not exceed the following limits.

Regulated Pollutant	Limits/Standards (tons per year)	Applicable Regulation
nitrogen oxides	3,414.6	15A NCAC 02Q.0317(a)(1) (PSD avoidance)
sulfur dioxide	14,663.1	
particulate matter/ PM-10/ PM-2.5	218.2	
carbon monoxide	829.3	
VOCs	65.1	
sulfuric acid	64.3	
lead	0.77	

Monitoring/Recordkeeping [15A NCAC 02Q .0508(f)]

b. The Permittee shall keep records of the monthly emissions from each source (ID Nos. Lee IC Unit 1A, Lee IC Unit 1B and Lee IC Unit 1C), in a logbook (written or in electronic format). The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530(g) if these records are not kept or if any of the above limits are exceeded. Emissions shall be determined as follows:

$$Total\ Emissions = \sum Lee\ IC\ Unit\ 1A + Lee\ IC\ Unit\ 1B + Lee\ IC\ Unit\ 1C$$

Nitrogen Oxides

Emissions of nitrogen oxides shall be determined using a continuous emissions monitoring (CEM) system meeting the requirements of 15A NCAC 02D .0613 - 40 CFR Part 60 Appendix B "Performance Specifications" and Appendix F "Quality Assurance Procedures." If the owner or operator has installed a nitrogen oxides CEMS to meet the requirements of 40 CFR Part 75 and is continuing to meet the ongoing requirements of 40 CFR Part 75, that CEMS may be used to meet the requirements of this section, and used to calculate total nitrogen oxide emissions in accordance with the following equation. Data reported to meet the requirements of this section shall include data substituted using the missing data procedures in subpart D of 40 CFR Part 75 and may be bias adjusted according to the procedures of 40 CFR Part 75.

$$Total\ Emissions\ (NOx) = Lee\ IC\ Unit\ 1A\ CEMS + Lee\ IC\ Unit\ 1B\ CEMS + Lee\ IC\ Unit\ 1C\ CEMS \leq 3414.6 \frac{tons}{12\ months}$$

Table 3-2. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for 1-Hour TAPs

Source	Emission Rates	Acrolein (lb/hr)	Ammonia (lb/hr)	Formaldehyde (lb/hr)	Sulfuric Acid (lb/hr)
Coal-fired Boiler 1 and 2*	Potential	3.73E-03	—	3.53E-02†	2.48E+01
	Optimized	3.73E-03	—	3.53E-02†	2.48E+01
Coal-fired Boiler 3*	Potential	4.88E-03	2.50E+00	4.62E-02†	1.35E+00
	Optimized	4.88E-03	2.50E+00	4.62E-02†	1.35E+00
Lee IC Turbine 4	Potential	1.70E-02	—	7.50E-02	3.49E+00
	Optimized	1.55E+01	—	1.16E+01	2.09E+01
Lee IC Turbine 5	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	3.55E+01
Lee IC Turbine 6	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	3.55E+01
Lee IC Turbine 7	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	3.55E+01
Lee IC Turbine 10 and 11 (fuel oil)	Potential	1.22E-01	—	5.39E-01	3.71/3.77
	Optimized	1.11E+02	—	8.35E+01	1.86E+01/2.26E+01
Lee IC Turbine 10 and 11(natural gas)	Potential	1.23E-02	—	1.37E+00	—
	Optimized	1.12E+01	—	2.12E+02	—
Lee IC Turbine 12 and 13 (fuel oil)	Potential	1.16E-01	—	5.09E-01	3.54/3.59
	Optimized	1.06E+02	—	7.89E+01	2.12E+01/2.15E+01
Lee IC Turbine 12 and 13 (natural gas)	Potential	1.16E-02	—	1.29E+00	—
	Optimized	1.06E+01	—	2.00E+02	—
Lee IC Turbine 14 (fuel oil)	Potential	1.29E-01	—	5.69E-01	3.96E+00
	Optimized	1.17E+02	—	8.82E+01	2.38E+01
Lee IC Turbine 14 (natural gas)	Potential	1.24E-02	—	1.38E+00	—
	Optimized	1.13E+01	—	2.14E+02	—
Fuel gas heater	Potential	—	1.08E-06	4.04E-04	—
	Optimized	—	1.46E-04	6.26E-02	—
Black start engine generator	Potential	1.52E-04	—	1.94E-04	—
	Optimized	1.38E-01	—	3.01E-02	—
Fire water pump	Potential	1.86E-04	—	2.73E-03	—
	Optimized	1.69E-01	—	4.23E-01	—
Coal handling activities*	Potential	—	—	—	—
	Optimized	—	—	—	—

Table 3-2. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for 1-Hour TAPs (Continued, Page 2 of 2)

Source	Emission Rates	Acrolein (lb/hr)	Ammonia (lb/hr)	Formaldehyde (lb/hr)	Sulfuric Acid (lb/hr)
Gasoline Storage Tank	Potential	—	—	—	—
	Optimized	—	—	—	—
Proposed combined-cycle firing natural gas	Potential	1.44E-02	3.62E+01	1.63E+00	1.03E+00
	Optimized	1.31E+01	4.89E+03	2.53E+02	6.18E+00
Proposed combined-cycle firing fuel oil	Potential	0.00E+00	2.93E+01	6.03E-01	2.30E+00
	Optimized	0.00E+00	3.96E+03	9.35E+01	1.38E+01
Proposed simple-cycle firing natural gas	Potential	1.42E-02	—	1.58E+00	1.90E-01
	Optimized	1.29E+01	—	2.45E+02	1.14E+00
Proposed simple-cycle firing fuel oil	Potential	—	—	6.03E-01	5.00E-01
	Optimized	—	—	9.35E+01	3.00E+00
Proposed auxiliary boiler	Potential	—	—	3.86E-03	—
	Optimized	—	—	5.98E-01	—
Proposed fuel gas heater	Potential	—	—	3.31E-04	—
	Optimized	—	—	5.13E-02	—
Proposed dew point heater	Potential	—	—	5.74E-04	—
	Optimized	—	—	8.90E-02	—
Proposed firewater pump	Potential	1.72E-04	—	2.19E-03	—
	Optimized	1.57E-01	—	3.39E-01	—

*Emissions for existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion

Source: ECT Calculations – Appendix A

Table 3-3. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Daily TAPs

Source	Emission Rates	Chromic Acid (lb/hr)	Hexane (lb/hr)	Manganese (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	Sulfuric Acid (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)
Coal-fired Boiler 1 and 2*	Potential	2.98E-03	9.62E-04	3.85E-02	1.04E-02	8.48E-01†	2.48E+01	2.36E-02†	3.04E-03†
	Optimized	2.98E-03	9.62E-04	3.85E-02	1.04E-02	8.48E-01†	2.48E+01	2.36E-02†	3.04E-03†
Coal-fired Boiler 3*	Potential	3.49E-03	1.26E-03	4.40E-02	1.14E-02	1.11E+00†	1.35E+00	3.08E-02†	3.98E-03†
	Optimized	3.49E-03	1.26E-03	4.40E-02	1.14E-02	1.11E+00†	1.35E+00	3.08E-02†	3.98E-03†
Lee IC Turbine 4	Potential	4.79E-04	—	2.12E-01	3.22E-04	1.23E-03	3.49E+00	9.95E-02	6.93E-02
	Optimized	1.65E-01	—	3.88E+01	7.37E-01	7.13E-01	2.09E+01	4.34E+03	2.53E+03
Lee IC Turbine 5	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.80E-01	—	6.57E+01	1.25E+00	1.21E+00	3.55E+01	7.38E+03	4.30E+03
Lee IC Turbine 6	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.80E-01	—	6.57E+01	1.25E+00	1.21E+00	3.55E+01	7.38E+03	4.30E+03
Lee IC Turbine 7	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.80E-01	—	6.57E+01	1.25E+00	1.21E+00	3.55E+01	7.38E+03	4.30E+03
Lee IC Turbine 10 and 11 (fuel oil)	Potential	3.44E-03	—	1.52E+00	2.31E-03	8.86E-03	3.71/3.77	7.15E-01	4.98E-01
	Optimized	1.19E+00	—	2.78E+02	5.29E+00	5.14E+00	1.86E+01/ 2.26E+01	3.12E+04	1.81E+04
Lee IC Turbine 10 and 11(natural gas)	Potential	—	—	—	—	—	6.55E+00	2.50E-01	1.23E-01
	Optimized	—	—	—	—	—	3.93E+01	1.09E+04	4.48E+03
Lee IC Turbine 12 and 13 (fuel oil)	Potential	3.25E-03	—	1.44E+00	2.18E-03	8.37E-03	3.54/3.59	6.76E-01	4.70E-01
	Optimized	1.12E+00	—	2.64E+02	4.99E+00	4.85E+00	2.12E+01/ 2.15E+01	2.95E+04	1.71E+04
Lee IC Turbine 12 and 13 (natural gas)	Potential	—	—	—	—	—	6.19E+00	2.36E-01	1.16E-01
	Optimized	—	—	—	—	—	3.71E+01	1.03E+04	4.23E+03
Lee IC Turbine 14 (fuel oil)	Potential	3.63E-03	—	1.60E+00	2.44E-03	9.34E-03	3.96E+00	7.54E-01	5.25E-01
	Optimized	1.25E+00		2.93E+02	5.58E+00	5.42E+00	2.38E+01	3.29E+04	1.91E+04
Lee IC Turbine 14 (natural gas)	Potential	—	—	—	—	—	6.60E+00	2.52E-01	1.24E-01
	Optimized	—	—	—	—	—	3.96E+01	1.10E+04	4.52E+03
Fuel gas heater	Potential	7.55E-06	9.71E-03	2.05E-06	1.40E-06	1.13E-05	—	1.83E-05	—
	Optimized	2.60E-03	4.11E+01	3.75E-04	3.20E-03	6.55E-03	—	7.99E-01	—
Black start engine generator	Potential	—	—	—	—	—	—	6.72E-04	4.68E-04
	Optimized	—	—	—	—	—	—	2.93E+01	1.71E+01
Firewater pump	Potential	—	—	—	—	—	—	8.22E-04	5.73E-04
	Optimized	—	—	—	—	—	—	3.59E+01	2.09E+01
Coal handling activities*	Potential	1.08E-05	—	1.90E-05	6.96E-08	1.08E-05	—	—	—
	Optimized	3.73E-03	—	3.48E-03	1.59E-04	6.26E-03	—	—	—
Gasoline Storage Tank	Potential	—	1.01E-03	—	—	—	—	4.77E-03	1.64E-03
	Optimized	—	4.28E+00	—	—	—	—	2.08E+02	5.98E+01

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Table 3-3. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Daily TAPs (Continued, Page 2 of 2)

Source	Emission Rates	Chromic Acid (lb/hr)	Hexane (lb/hr)	Manganese (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	Sulfuric Acid (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)
Proposed combined-cycle firing natural gas	Potential	6.22E-04	7.99E-01	1.69E-04	1.15E-04	9.33E-04	1.03E+00	2.94E-01	1.44E-01
	Optimized	2.15E-01	3.38E+03	3.09E-02	2.63E-01	5.41E-01	6.18E+00	1.28E+04	5.25E+03
Proposed combined-cycle firing fuel oil	Potential	2.37E-02	—	1.70E+00	2.58E-03	9.90E-03	2.30E+00	—	—
	Optimized	8.18E+00	—	3.11E+02	5.90E+00	5.74E+00	1.38E+01	—	—
Proposed simple-cycle firing natural gas	Potential	—	—	—	—	—	1.90E-01	2.89E-01	1.42E-01
	Optimized	—	—	—	—	—	1.14E+00	1.26E+04	5.18E+03
Proposed simple-cycle firing fuel oil	Potential	2.37E-02		1.70E+00	2.58E-03	9.90E-03	5.00E-01	—	—
	Optimized	8.18E+00		3.11E+02	5.90E+00	5.74E+00	3.00E+00	—	—
Proposed auxiliary boiler	Potential	7.20E-05	9.26E-02	1.95E-05	1.34E-05	1.08E-04	—	1.75E-04	—
	Optimized	2.48E-02	3.92E+02	3.57E-03	3.07E-02	6.26E-02	—	7.64E+00	—
Proposed fuel gas heater	Potential	6.18E-06	7.94E-03	1.68E-06	1.15E-06	9.26E-06	—	1.50E-05	—
	Optimized	2.13E-03	3.36E+01	3.07E-04	2.63E-03	5.37E-03	—	6.55E-01	—
Proposed dew point heater	Potential	1.07E-05	1.38E-02	2.91E-06	1.99E-06	1.61E-05	—	2.60E-05	—
	Optimized	3.69E-03	5.84E+01	5.33E-04	4.55E-03	9.34E-03	—	1.14E+00	—
Proposed firewater pump	Potential	—	—	—	—	—	—	7.59E-04	5.29E-04
	Optimized	—	—	—	—	—	—	3.31E+01	1.93E+01

*Emissions for existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion.

Source: ECT Calculations – Appendix A

Table 3-4. Worst-Case Emission Rates (Actual, Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs

Source	Emission Rates	1,3-Butadiene (lb/hr)	Arsenic (lb/hr)	Benzene (lb/hr)	Beryllium (lb/hr)	Cadmium (lb/hr)
Coal-fired Boiler 1 and 2*	Actual	1.01E-07	2.61E-06	5.45E-07	3.04E-07	5.59E-07
	Potential	2.08E-01†	3.25E-02	7.66E-03	3.65E-03	7.34E-03
	Optimized	2.08E-01†	3.25E-02	7.66E-03	3.65E-03	7.34E-03
Coal-fired Boiler 3*	Actual	7.49E-08	3.22E-06	7.35E-07	3.67E-07	7.14E-07
	Potential	2.71E-01†	3.52E-02	1.00E-02	3.72E-03	8.57E-03
	Optimized	2.71E-01†	3.52E-02	1.00E-02	3.72E-03	8.57E-03
Lee IC Turbine 4	Actual	3.60E-07	2.02E-07	1.10E-06	6.35E-09	9.83E-08
	Potential	9.79E-04	6.73E-04	3.37E-03	1.90E-05	2.94E-04
	Optimized	2.56E+00	1.08E-03	1.31E-01	6.34E-02	5.88E-02
Lee IC Turbine 5	Actual	3.92E-07	2.66E-07	1.40E-06	7.81E-09	1.26E-07
	Potential	1.66E-03	1.14E-03	5.71E-03	3.22E-05	4.99E-04
	Optimized	4.34E+00	1.82E-03	2.23E-01	1.08E-01	9.98E-02
Lee IC Turbine 6	Actual	3.92E-07	2.66E-07	1.33E-06	7.64E-09	1.26E-07
	Potential	1.66E-03	1.14E-03	5.71E-03	3.22E-05	4.99E-04
	Optimized	4.34E+00	1.82E-03	2.23E-01	1.08E-01	9.98E-02
Lee IC Turbine 7	Actual	3.43E-07	2.96E-07	1.48E-06	8.43E-09	1.31E-07
	Potential	1.66E-03	1.14E-03	5.71E-03	3.22E-05	4.99E-04
	Optimized	4.34E+00	1.82E-03	2.23E-01	1.08E-01	9.98E-02
Lee IC Turbine 10 and 11 (fuel oil)	Actual	1.49E-06/ 7.17E-07	1.04E-06/ 5.00E-07	5.15E-06/ 2.49E-06	2.77E-08/ 1.32E-08	4.51E-07/ 2.17E-07
	Potential	7.03E-03	4.84E-03	2.42E-02	1.36E-04	2.11E-03
	Optimized	1.84E+01	7.74E-03	9.44E-01	4.54E-01	4.22E-01
Lee IC Turbine 10 and 11(natural gas)	Actual	7.94E-08/ 3.15E-08	—	2.06E-06/ 8.78E-07	—	—
	Potential	1.89E-04	—	5.27E-03	—	—
	Optimized	4.95E-01	—	2.06E-01	—	—
Lee IC Turbine 12 and 13 (fuel oil)	Actual	7.55E-07/ 8.92E-07	5.19E-07/ 6.13E-07	2.59E-06/ 3.07E-06	1.87E-08/ 2.20E-08	2.27E-07/ 2.68E-07
	Potential	6.65E-03	4.57E-03	2.28E-02	1.29E-04	1.99E-03
	Optimized	1.74E+01	7.31E-03	8.89E-01	4.31E-01	3.98E-01

Table 3-4. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs (Continued, Page 2 of 3)

Source	Emission Rates	1,3-Butadiene (lb/hr)	Arsenic (lb/hr)	Benzene (lb/hr)	Beryllium (lb/hr)	Cadmium (lb/hr)
Lee IC Turbine 12 and 13 (natural gas)	Actual	5.47E-08/ 5.90E-08	—	1.53E-06/ 1.64E-06	—	—
	Potential	1.79E-04	—	4.98E-03	—	—
	Optimized	4.68E-01	—	1.94E-01	—	—
Lee IC Turbine 14 (fuel oil)	Actual	7.42E-03	5.10E-03	2.55E-02	1.44E-04	2.23E-03
	Potential	7.42E-03	5.10E-03	2.55E-02	1.44E-04	2.23E-03
	Optimized	1.94E+01	8.16E-03	9.95E-01	4.81E-01	4.46E-01
Lee IC Turbine 14 (natural gas)	Actual	1.90E-04	—	5.32E-03	—	—
	Potential	1.90E-04	—	5.32E-03	—	—
	Optimized	4.97E-01	—	2.07E-01	—	—
Fuel gas heater	Actual	—	—	3.60E-09	2.06E-11	1.89E-09
	Potential	—	—	2.59E-06	1.48E-08	1.35E-06
	Optimized	—	—	1.01E-04	4.94E-05	2.70E-04
Black start engine generator	Actual	3.67E-06	—	8.75E-05	—	—
	Potential	3.67E-06	—	8.75E-05	—	—
	Optimized	9.60E-03	—	3.41E-03	—	—
Firewater pump	Actual	4.48E-06	—	1.07E-04	—	—
	Potential	4.48E-06	—	1.07E-04	—	—
	Optimized	1.17E-02	—	4.17E-03	—	—
Coal handling activities*	Actual	—	8.86E-06	—	1.83E-06	1.58E-06
	Potential	—	8.86E-06	—	1.83E-06	1.58E-06
	Optimized	—	8.86E-06	—	1.83E-06	1.58E-06
Gasoline Storage Tank	Actual	—	—	1.27E-03	—	—
	Potential	—	—	1.27E-03	—	—
	Optimized	—	—	4.96E-02	—	—
Proposed combined-cycle firing natural gas	Actual	9.67E-04	8.88E-05	2.79E-02	5.33E-06	4.89E-04
	Potential	9.67E-04	8.88E-05	2.79E-02	5.33E-06	4.89E-04
	Optimized	2.53E+00	1.42E-04	1.09E+00	1.78E-02	9.78E-02
Proposed combined-cycle firing fuel oil	Actual	3.93E-03	2.70E-03	1.35E-02	7.62E-05	1.18E-03
	Potential	3.93E-03	2.70E-03	1.35E-02	7.62E-05	1.18E-03
	Optimized	1.03E+01	4.32E-03	5.27E-01	2.54E-01	2.36E-01

Table 3-4. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs (Continued, Page 3 of 3)

Source	Emission Rates	1,3-Butadiene (lb/hr)	Arsenic (lb/hr)	Benzene (lb/hr)	Beryllium (lb/hr)	Cadmium (lb/hr)
Proposed simple-cycle firing natural gas	Actual	2.18E-04	—	6.09E-03	—	—
	Potential	2.18E-04	—	6.09E-03	—	—
	Optimized	5.71E-01	—	2.38E-01	—	—
Proposed simple-cycle firing fuel oil	Actual	3.93E-03	2.70E-03	1.35E-02	7.62E-05	1.18E-03
	Potential	3.93E-03	2.70E-03	1.35E-02	7.62E-05	1.18E-03
	Optimized	1.03E+01	4.32E-03	5.27E-01	2.54E-01	2.36E-01
Proposed auxiliary boiler	Actual	—	1.03E-05	1.08E-04	6.17E-07	5.66E-05
	Potential	—	1.03E-05	1.08E-04	6.17E-07	5.66E-05
	Optimized	—	1.65E-05	4.21E-03	2.06E-03	1.13E-02
Proposed fuel gas heater	Actual	—	8.82E-07	9.26E-06	5.29E-08	4.85E-06
	Potential	—	8.82E-07	9.26E-06	5.29E-08	4.85E-06
	Optimized	—	1.41E-06	3.61E-04	1.77E-04	9.70E-04
Proposed dew point heater	Actual	—	1.53E-06	1.61E-05	9.18E-08	8.41E-06
	Potential	—	1.53E-06	1.61E-05	9.18E-08	8.41E-06
	Optimized	—	2.45E-06	6.28E-04	3.07E-04	1.68E-03
Proposed firewater pump	Actual	4.14E-06	—	9.88E-05	—	—
	Potential	4.14E-06	—	9.88E-05	—	—
	Optimized	1.08E-02	—	3.85E-03	—	—

*Emissions for the existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion.

Source: ECT Calculations – Appendix A

Table 4-7. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for 1-Hour TAPs

Source	Emission Rates	Acrolein (lb/hr)	Ammonia (lb/hr)	Formaldehyde (lb/hr)	Sulfuric Acid (lb/hr)
Coal-fired Boiler 1 and 2*	Potential	3.73E-03	—	3.53E-02†	2.48E+01
	Optimized	3.73E-03	—	3.53E-02†	2.48E+01
Coal-fired Boiler 3*	Potential	4.88E-03	2.50E+00	4.62E-02†	1.35E+00
	Optimized	4.88E-03	2.50E+00	4.62E-02†	1.35E+00
Lee IC Turbine 4	Potential	1.70E-02	—	7.50E-02	3.49E+00
	Optimized	1.55E+01	—	1.16E+01	1.15E+01
Lee IC Turbine 5	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	1.95E+01
Lee IC Turbine 6	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	1.95E+01
Lee IC Turbine 7	Potential	2.89E-02	—	1.27E-01	5.92E+00
	Optimized	2.63E+01	—	1.97E+01	1.95E+01
Lee IC Turbine 10 and 11 (fuel oil)	Potential	1.22E-01	—	5.39E-01	8.11E+00
	Optimized	1.11E+02	—	8.36E+01	2.68E+01
Lee IC Turbine 10 and 11(natural gas)	Potential	1.23E-02	—	1.37E+00	9.10E-01
	Optimized	1.12E+01	—	2.12E+02	3.00E+00
Lee IC Turbine 12 and 13 (fuel oil)	Potential	1.16E-01	—	5.09E-01	8.09E+00
	Optimized	1.05E+02	—	7.89E+01	2.67E+01
Lee IC Turbine 12 and 13 (natural gas)	Potential	1.16E-02	—	1.29E+00	8.30E-01
	Optimized	1.06E+01	—	2.00E+02	2.74E+00
Lee IC Turbine 14 (fuel oil)	Potential	1.29E-01	—	5.69E-01	8.01E+00
	Optimized	1.17E+02	—	8.81E+01	2.64E+01
Lee IC Turbine 14 (natural gas)	Potential	1.24E-02	—	1.38E+00	8.30E-01
	Optimized	1.13E+01	—	2.14E+02	2.74E+00
Black start engine generator	Potential	1.52E-04	—	1.94E-03	—
	Optimized	1.38E-01	—	3.01E-01	—
Fire water pump	Potential	1.86E-04	—	2.37E-03	—
	Optimized	1.69E-01	—	3.67E-01	—

Table 4-7. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for 1-Hour TAPs (Continued, Page 2 of 2)

Source	Emission Rates	Acrolein (lb/hr)	Ammonia (lb/hr)	Formaldehyde (lb/hr)	Sulfuric Acid (lb/hr)
Coal handling activities*	Potential	—	—	—	—
	Optimized	—	—	—	—
Gasoline storage tank	Potential	—	—	—	—
	Optimized	—	—	—	—
Proposed combined-cycle firing natural gas	Potential	1.44E-02	3.62E+01	1.63E+00	1.03E+00
	Optimized	1.31E+01	4.89E+03	2.53E+02	3.40E+00
Proposed combined-cycle firing fuel oil	Potential	—	2.93E+01	6.03E-01	7.67E+01
	Optimized	—	3.96E+03	9.34E+01	2.53E+02
Proposed simple-cycle firing natural gas	Potential	1.42E-02	—	1.58E+00	1.90E-01
	Optimized	1.30E+01	—	2.45E+02	6.27E-01
Proposed simple-cycle firing fuel oil	Potential	—	—	6.03E-01	1.67E-01
	Optimized	—	—	9.34E+01	5.50E+01
Proposed auxiliary boiler	Potential	—	—	6.25E-03	—
	Optimized	—	—	9.69E-01	—
Proposed dew point heater	Potential	—	—	8.82E-04	—
	Optimized	—	—	1.27E-01	—
Proposed firewater pump	Potential	3.93E-04	—	5.02E-03	—
	Optimized	3.58E-01	—	7.78E-01	—

*Emissions for existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion

Source: ECT, 2011.

Table 4-8. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Daily TAPs

Source	Emission Rates	Chromic Acid (lb/hr)	Hexane (lb/hr)	Manganese (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	Sulfuric Acid (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)
Coal-fired Boiler 1 and 2*	Potential	2.98E-03	9.62E-04	3.85E-02	1.04E-02	8.48E-01†	2.48E+01	2.36E-02†	3.04E-03†
	Optimized	2.98E-03	9.62E-04	3.85E-02	1.04E-02	8.48E-01†	2.48E+01	2.36E-02†	3.04E-03†
Coal-fired Boiler 3*	Potential	3.49E-03	1.26E-03	4.40E-02	1.14E-02	1.11E+00†	1.35E+00	3.08E-02†	3.98E-03†
	Optimized	3.49E-03	1.26E-03	4.40E-02	1.14E-02	1.11E+00†	1.35E+00	3.08E-02†	3.98E-03†
Lee IC Turbine 4	Potential	4.79E-04	—	2.12E-01	3.22E-04	1.23E-03	3.49E+00	9.95E-02	6.93E-02
	Optimized	1.48E-01	—	3.79E+01	7.24E-01	7.25E-01	6.98E+00	1.98E+03	2.07E+03
Lee IC Turbine 5	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.52E-01	—	6.43E+01	1.23E+00	1.23E+00	1.18E+01	3.36E+03	3.51E+03
Lee IC Turbine 6	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.52E-01	—	6.43E+01	1.23E+00	1.23E+00	1.18E+01	3.36E+03	3.51E+03
Lee IC Turbine 7	Potential	8.13E-04	—	3.59E-01	5.46E-04	2.09E-03	5.92E+00	1.69E-01	1.18E-01
	Optimized	2.52E-01	—	6.43E+01	1.23E+00	1.23E+00	1.18E+01	3.36E+03	3.51E+03
Lee IC Turbine 10 and 11 (fuel oil)	Potential	3.44E-03	—	1.52E+00	2.31E-03	8.86E-03	8.11E+00	7.15E-01	4.98E-01
	Optimized	1.07E+00	—	2.72E+02	5.20E+00	5.21E+00	1.62E+01	1.42E+04	1.49E+04
Lee IC Turbine 10 and 11(natural gas)	Potential	—	—	—	—	—	9.10E-01	2.50E-01	1.23E-01
	Optimized	—	—	—	—	—	1.82E+00	4.98E+03	3.68E+03
Lee IC Turbine 12 and 13 (fuel oil)	Potential	3.25E-03	—	1.44E+00	2.18E-03	8.37E-03	8.09E+00	6.76E-01	4.70E-01
	Optimized	1.01E+00	—	2.57E+02	4.91E+00	4.92E+00	1.62E+01	1.34E+04	1.41E+04
Lee IC Turbine 12 and 13 (natural gas)	Potential	—	—	—	—	—	8.30E-01	2.36E-01	1.16E-01
	Optimized	—	—	—	—	—	1.66E+00	4.70E+03	3.48E+03
Lee IC Turbine 14 (fuel oil)	Potential	3.63E-03	—	1.60E+00	2.44E-03	9.34E-03	8.01E+00	7.54E-01	5.25E-01
	Optimized	1.12E+00	—	2.87E+02	5.48E+00	5.49E+00	1.60E+01	1.50E+04	1.57E+04
Lee IC Turbine 14 (natural gas)	Potential	—	—	—	—	—	8.30E-01	2.52E-01	1.24E-01
	Optimized	—	—	—	—	—	1.66E+00	5.01E+03	3.71E+03
Black start engine generator	Potential	—	—	—	—	—	—	6.72E-04	4.68E-04
	Optimized	—	—	—	—	—	—	1.34E+01	1.40E+01
Firewater pump	Potential	—	—	—	—	—	—	8.22E-04	5.73E-04
	Optimized	—	—	—	—	—	—	1.63E+01	1.71E+01
Coal handling activities*	Potential	1.08E-05	—	1.90E-05	6.96E-08	1.08E-05	—	—	—
	Optimized	1.08E-05	—	1.90E-05	6.96E-08	1.08E-05	—	—	—
Gasoline storage tank	Potential	—	1.01E-03	—	—	—	—	4.77E-03	1.64E-03
	Optimized	—	5.96E+00	—	—	—	—	9.48E+01	4.90E+01

Table 4-8. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Daily TAPs (Continued, Page 2 of 2)

Source	Emission Rates	Chromic Acid (lb/hr)	Hexane (lb/hr)	Manganese (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	Sulfuric Acid (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)
Proposed combined-cycle firing natural gas	Potential	6.22E-04	7.99E-01	1.69E-04	1.15E-04	9.33E-04	1.03E+00	2.94E-01	1.44E-01
	Optimized	1.93E-01	4.72E+03	3.02E-02	2.60E-01	5.48E-01	2.06E+00	5.84E+03	5.25E+03
Proposed combined-cycle firing fuel oil	Potential	2.37E-02	—	1.70E+00	2.58E-03	9.90E-03	7.67E+01	—	—
	Optimized	7.34E+00	—	3.04E+02	5.81E+00	5.82E+00	1.53E+02	—	—
Proposed simple-cycle firing natural gas	Potential	—	—	—	—	—	1.90E-01	2.89E-01	1.42E-01
	Optimized	—	—	—	—	—	3.80E+00	5.75E+03	5.18E+03
Proposed simple-cycle firing fuel oil	Potential	2.37E-02	—	1.70E+00	2.58E-03	9.90E-03	1.67E+01	—	—
	Optimized	7.34E+00	—	3.04E+02	5.80E+00	5.82E+00	3.33E+01	—	—
Proposed auxiliary boiler	Potential	7.20E-05	9.26E-02	1.95E-05	1.34E-05	1.08E-04	—	1.75E-04	—
	Optimized	2.23E-02	5.46E+02	3.50E-03	3.01E-02	6.35E-02	—	3.48E+00	—
Proposed dew point heater	Potential	5.49E-06	7.06E-03	1.49E-06	1.02E-06	8.24E-06	—	1.33E-05	—
	Optimized	1.70E-03	4.17E+01	2.67E-04	2.30E-03	4.83E-03	—	2.64E-01	—
Proposed firewater pump	Potential	—	—	—	—	—	—	1.74E-03	1.21E-03
	Optimized	—	—	—	—	—	—	3.46E+01	1.93E+01

*Emissions for existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion.

Source: ECT, 2011.

Table 4-9. Worst-Case Emission Rates (Actual, Potential, and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs

Source	Emission Rates	1,3-Butadiene (lb/hr)	Benzene (lb/hr)	Beryllium (lb/hr)	Cadmium (lb/hr)
Coal-fired Boiler 1 and 2*	Actual	1.01E-07	5.45E-07	3.04E-07	5.59E-07
	Potential	2.08E-01†	7.66E-03	3.65E-03	7.34E-03
	Optimized	2.08E-01†	7.66E-03	3.65E-03	7.34E-03
Coal-fired Boiler 3*	Actual	7.49E-08	7.35E-07	3.67E-07	7.14E-07
	Potential	2.71E-01†	1.00E-02	3.72E-03	8.57E-03
	Optimized	2.71E-01†	1.00E-02	3.72E-03	8.57E-03
Lee IC Turbine 4	Actual	3.60E-07	1.10E-06	6.35E-09	9.83E-08
	Potential	4.29E-03	1.47E-02	8.31E-05	1.29E-03
	Optimized	5.28E+00	2.75E-01	5.32E-02	6.71E-02
Lee IC Turbine 5	Actual	3.92E-07	1.40E-06	7.81E-09	1.26E-07
	Potential	7.28E-03	2.50E-02	1.41E-04	2.18E-03
	Optimized	8.95E+00	4.68E-01	9.02E-02	1.13E-02
Lee IC Turbine 6	Actual	3.92E-07	1.40E-06	7.81E-09	1.26E-07
	Potential	7.28E-03	2.50E-02	1.41E-04	2.18E-03
	Optimized	8.95E+00	4.68E-01	9.02E-02	1.13E-02
Lee IC Turbine 7	Actual	3.92E-07	1.40E-06	7.81E-09	1.26E-07
	Potential	7.28E-03	2.50E-02	1.41E-04	2.18E-03
	Optimized	8.95+00	4.68E-01	9.02E-02	1.13E-02
Lee IC Turbine 10 and 11 (fuel oil)	Actual	1.49E-06/ 7.17E-07	5.15E-06/ 2.49E-06	2.77E-08/ 1.32E-08	4.51E-07/ 2.17E-07
	Potential	7.03E-03	2.42E-02	1.36E-04	2.11E-03
	Optimized	8.65E+00	4.53E-01	8.72E-02	1.10E-01
Lee IC Turbine 10 and 11(natural gas)	Actual	7.94E-08/ 3.15E-08	2.06E-06/ 8.78E-07	—	—
	Potential	1.89E-04	5.27E-03	—	—
	Optimized	2.32E-01	9.86E-02	—	—

Table 4-9. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs (Continued, Page 2 of 3)

Source	Emission Rates	1,3-Butadiene	Benzene	Beryllium	Cadmium
Lee IC Turbine 12 and 13 (fuel oil)	Actual	7.55E-07/ 8.92E-07	2.59E-06/ 3.07E-06	1.87E-08/ 2.20E-08	2.27E-07/ 2.68E-07
	Potential	6.65E-03	2.28E-02	1.29E-04	1.99E-03
	Optimized	8.17E+00	4.27E-01	8.24E-02	1.04E-01
Lee IC Turbine 12 and 13 (natural gas)	Actual	5.47E-08/ 5.90E-08	1.53E-06/ 1.64E-06	—	—
	Potential	1.79E-04	4.98E-03	—	—
	Optimized	2.20E-01	9.31E-02	—	—
Lee IC Turbine 14 (fuel oil)	Actual	7.42E-03	2.55E-02	1.44E-04	2.23E-03
	Potential	7.42E-03	2.55E-02	1.44E-04	2.23E-03
	Optimized	9.13E+00	4.78E-01	9.21E-02	1.16E-01
Lee IC Turbine 14 (natural gas)	Actual	1.90E-04	5.32E-03	—	—
	Potential	1.90E-04	5.32E-03	—	—
	Optimized	2.34E-01	9.95E-02	—	—
Black start engine generator	Actual	3.67E-06	8.75E-05	—	—
	Potential	3.67E-06	8.75E-05	—	—
	Optimized	4.51E-03	1.64E-03	—	—
Firewater pump	Actual	4.48E-06	1.07E-04	—	—
	Potential	4.48E-06	1.07E-04	—	—
	Optimized	5.51E-03	2.00E-03	—	—
Coal handling activities*	Actual	—	—	1.83E-06	1.58E-06
	Potential	—	—	1.83E-06	1.58E-06
	Optimized	—	—	1.83E-06	1.58E-06
Gasoline storage tank	Actual	—	1.27E-03	—	—
	Potential	—	1.27E-03	—	—
	Optimized	—	2.37E-02	—	—

Table 4-9. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Annual TAPs (Continued, Page 3 of 3)

Source	Emission Rates	1,3-Butadiene	Benzene	Beryllium	Cadmium
Proposed combined-cycle firing natural gas	Actual	9.67E-04	2.79E-02	5.33E-06	4.89E-04
	Potential	9.67E-04	2.79E-02	5.33E-06	4.89E-04
	Optimized	1.19E+00	5.22E-01	3.41E-03	2.54E-02
Proposed combined-cycle firing fuel oil	Actual	3.44E-02	1.18E-01	6.67E-04	1.03E-02
	Potential	3.44E-02	1.18E-01	6.67E-04	1.03E-02
	Optimized	4.23E+01	2.21E+00	4.27E-01	5.36E-01
Proposed simple-cycle firing natural gas	Actual	9.56E-04	2.67E-02	—	—
	Potential	9.56E-04	2.67E-02	—	—
	Optimized	1.18E+00	4.99E-01	—	—
Proposed simple-cycle firing fuel oil	Actual	3.44E-02	1.18E-01	6.67E-04	1.03E-02
	Potential	3.44E-02	1.18E-01	6.67E-04	1.03E-02
	Optimized	4.23E+01	2.21E+00	4.27E-01	5.36E-01
Proposed auxiliary boiler	Actual	—	1.75E-04	1.00E-06	9.17E-05
	Potential	—	1.75E-04	1.00E-06	9.17E-05
	Optimized	—	3.27E-03	6.40E-04	4.77E-03
Proposed dew point heater	Actual	—	2.47E-05	1.41E-07	1.29E-05
	Potential	—	2.47E-05	1.41E-07	1.29E-05
	Optimized	—	4.62E-04	9.02E-05	6.71E-04
Proposed firewater pump	Actual	9.48E-06	2.26E-04	—	—
	Potential	9.48E-06	2.26E-04	—	—
	Optimized	1.17E-02	4.23E-03	—	—

*Emissions for the existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion.

Source: ECT, 2011.

Table 4-13. Worst-Case Emission Rates (Actual, Potential, and Optimized) for Existing and Proposed Equipment at the Lee Facility for Arsenic

Source	Emission Rates	Scenario 1 (lb/hr)	Scenario 2 (lb/hr)
Coal-fired Boiler 1 and 2*	Actual	2.61E-06	—
	Potential	3.25E-02	—
	Optimized	3.25E-02	—
Coal-fired Boiler 3*	Actual	3.22E-06	—
	Potential	3.52E-02	—
	Optimized	3.52E-02	—
Lee IC Turbine 4	Actual	2.02E-07	2.02E-07
	Potential	2.95E-03	6.73E-04
	Optimized	2.95E-03	1.08E-03
Lee IC Turbine 5	Actual	2.66E-07	2.66E-07
	Potential	5.01E-03	1.14E-03
	Optimized	1.82E-03	1.82E-03
Lee IC Turbine 6	Actual	2.66E-07	2.66E-07
	Potential	5.01E-03	5.01E-03
	Optimized	1.82E-03	1.82E-03
Lee IC Turbine 7	Actual	2.96E-07	2.96E-07
	Potential	5.01E-03	5.01E-03
	Optimized	1.82E-03	1.82E-03
Lee IC Turbine 10 and 11 (fuel oil)	Actual	1.04E-06/ 5.00E-07	1.04E-06/ 5.00E-07
	Potential	4.84E-03	4.84E-03
	Optimized	4.84E-03	4.84E-03
Lee IC Turbine 10 and 11(natural gas)	Actual	—	—
	Potential	—	—
	Optimized	—	—

Table 4-13. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Arsenic (Continued, Page 2 of 3)

Source	Emission Rates	Scenario 1 (lb/hr)	Scenario 2 (lb/hr)
Lee IC Turbine 12 and 13 (fuel oil)	Actual	5.19E-07/ 6.13E-07	5.19E-07/ 6.13E-07
	Potential	4.57E-03	4.57E-03
	Optimized	4.57E-03	4.57E-03
Lee IC Turbine 12 and 13 (natural gas)	Actual	—	—
	Potential	—	—
	Optimized	—	—
Lee IC Turbine 14 (fuel oil)	Actual	5.10E-03	5.10E-03
	Potential	5.10E-03	5.10E-03
	Optimized	5.10E-03	5.10E-03
Lee IC Turbine 14 (natural gas)	Actual	—	—
	Potential	—	—
	Optimized	—	—
Black start engine generator	Actual	—	—
	Potential	—	—
	Optimized	—	—
Firewater pump	Actual	—	—
	Potential	—	—
	Optimized	—	—
Coal handling activities*	Actual	8.86E-06	—
	Potential	8.86E-06	—
	Optimized	8.86E-06	—
Gasoline storage tank	Actual	—	—
	Potential	—	—
	Optimized	—	—

Table 4-13. Worst-Case Emission Rates (Potential and Optimized) for Existing and Proposed Equipment at the Lee Facility for Arsenic (Continued, Page 3 of 3)

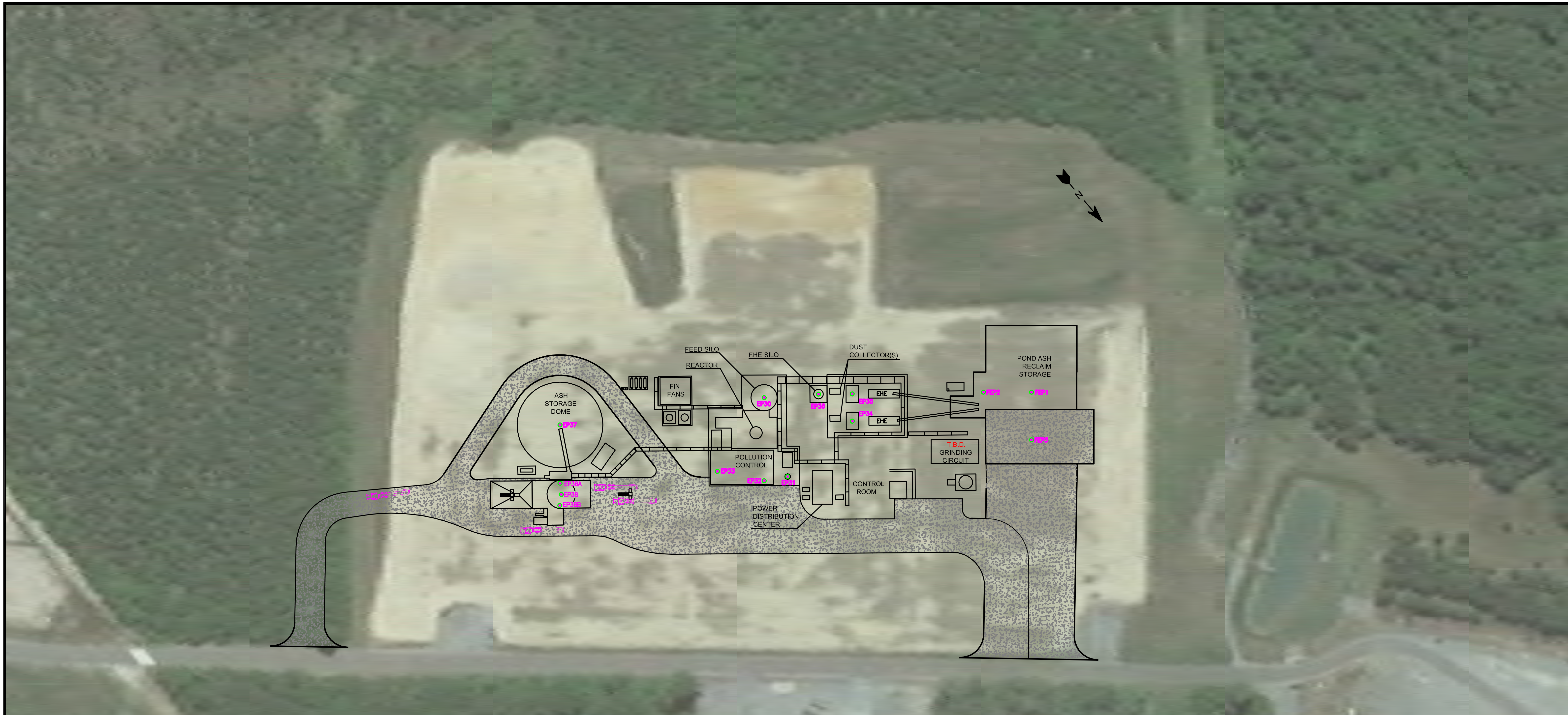
Source	Emission Rates	Scenario 1 (lb/hr)	Scenario 2 (lb/hr)
Proposed combined-cycle firing natural gas	Actual	8.88E-05	8.88E-05
	Potential	8.88E-05	8.88E-05
	Optimized	1.42E-04	1.42E-04
Proposed combined-cycle firing fuel oil	Actual	1.89E-02	2.37E-02
	Potential	1.89E-02	2.37E-02
	Optimized	4.32E-03	4.32E-03
Proposed simple-cycle firing natural gas	Actual	—	—
	Potential	—	—
	Optimized	—	—
Proposed simple-cycle firing fuel oil	Actual	1.89E-02	2.37E-02
	Potential	1.89E-02	2.37E-02
	Optimized	4.32E-03	4.32E-03
Proposed auxiliary boiler	Actual	1.67E-05	1.67E-05
	Potential	1.67E-05	1.67E-05
	Optimized	1.65E-05	1.65E-05
Proposed dew point heater	Actual	2.35E-06	2.35E-06
	Potential	2.35E-06	2.35E-06
	Optimized	8.16E-07	8.16E-07
Proposed firewater pump	Actual	—	—
	Potential	—	—
	Optimized	—	—

*Emissions for the existing coal-fired boilers and associated coal handling activities were not optimized.
†Emissions represent the fuel oil combustion.

Source: ECT, 2011.

APPENDIX D

FACILITY DRAWINGS



FUGITIVE EMISSIONS/EMISSIONS POINT LOCATIONS

LOCATION #	DESCRIPTION	APPROX. DIMENSIONS	BASE ELEVATION	HEIGHT	COORDINATES (UTM ZONE 17)
FEP1	WET ASH RECEIVING - TRANSFER TO SHED	133'-0" X 121'-0"	100'-0"	5'-0"	763602.00 m E, 3918135.00 m N
FEP2	WET ASH RECEIVING - TRANSFER TO HOPPER	36'-0" X 70'-0"	100'-0"	10'-0"	763612.40m E, 3918127.49 m N
FEP3	UNLOADING PILE	13'-0" x 45'-0"	100'-0"	4'-0"	763614.14 m E, 3918149.15 m N
EP30	FEED SILO (1500 TON)	40'-0" Ø	96'-0"	111'-0"	763692.00 m E, 3918059.00 m N
EP31	STAR REACTOR (EXHAUST STACK)	10'-0" Ø	97'-0"	110"-0"	763708.58 m E, 3918096.09 m N
EP32	FGD BYPRODUCT SILO	N/A	97'-0"	65'-0"	763723.30 m E, 3918081.52 m N
EP33	FGD ABSORBENT SILO	37'-0" X 42'-0"	96'-0"	100'-0"	763734.05 m E, 3918073.42 m N
EP34	EHE 1 (DUST COLLECTOR)	17'-0" x 30'-0"	98'-0"	65'-0"	763670.00 m E, 3918093.00 m N
EP35	EHE 2 (DUST COLLECTOR)	17'-0" x 30'-0"	98'-0"	65'-0"	763662.00 m E, 3918083.00 m N
EP36	TRANSFER SILO (300 TON)	14'-0" Ø	97'-0"	100'-0"	763674.00 m E, 3918075.00 m N
EP37	STORAGE DOME (ASH)	120'-0" Ø	95'-0"	125'-0"	763774.00 m E, 3918011.00 m N
EP38	LOADOUT SILO (1500 TON)	40'-0" Ø	96'-0"	111'-0"	763792.00 m E, 3918037.00 m N
EP38A	LOAD OUT SILO CHUTE 1A	77'-0" X 84'-0" (COMBINED)	96'-0"	111'-0"	763789.00 m E, 3918033.00 m N
EP38B	LOADOUT SILO CHUTE 1B	77'-0" X 84'-0" (COMBINED)	96'-0"	111'-0"	763795.00 m E, 3918041.00 m N
	FIN FANS	75'-0" X 30'-0"	0'-0"	45'-0"	
	BAG HOUSE	15'-0" X 32'-0"	0'-0"	60'-0"	
	CONTROL	80'-0" X 100'-0"	0'-0"	20'-0"	
	PROPANE STATION	30'-0" X 30'-0"	0'-0"	N/A	

NOTES:
- BASE ELEVATION IS TAKEN FROM SEA LEVEL AND TO BE CONSIDERED PRELIMINARY.
- HEIGHTS ARE FROM BASE ELEVATION AND CONSIDERED APPROXIMATE.
- COORDINATES ARE TO BE CONSIDERED APPROXIMATE.

GRAPHIC SCALE
50 0 25 50 100

PRELIMINARY

REV.	DESCRIPTION	CHK.	DATE	APP.	DATE

THE SEFA GROUP
ENGINEERING & CONSTRUCTION

DUKE ENERGY
HF LEE STEAM STATION AREA 5
STAR II – EMISSIONS POINTS

DESIGNED BY	ACM	8–25–17		–	
DRAWN BY	ACM	8–25–17	REV. BY	ACM	9–22–17

SCALE	DRAWING NUMBER	REV.
NTS	LAB–17027–00–C–003	C

CONNECTGIS WEB HOSTING — WAYNECOUNTY

Wayne
Printed July 21, 2017
See Below for Disclaimer

APPENDIX E

AIR DISPERSION MODELING


AIR DISPERSION MODELING
Duke Energy Progress, LLC
H.F. Lee STAR® Plant
Wayne County,
North Carolina
October
2017
Modeling Input/
Output Files
ECT Environmental Consulting
& Technology of
North Carolina, PLLC
Raleigh, North Carolina
ECT No.170324-0100

APPENDIX F

NHSM DETERMINATION

NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

June 10, 2015

Mr. Jim Clayton
The SEFA Group
217 Cedar Road
Lexington, SC 29073

SUBJECT: Applicability Determination No. 2501
The SEFA Group
Lexington, SC

Dear Mr. Clayton:

The North Carolina Division of Air Quality (DAQ) received your letter dated September 5, 2014, requesting the DAQ's concurrence with its determination of regulatory status of certain coal combustion residues, when used in its Staged Turbulent Air Reactor (STAR Reactor), in accordance with 40 CFR 241 "Solid Wastes Used As Fuels or Ingredients in Combustion Units" ("Solid Waste Definition Rule" or "Rule" hereinafter).

Specifically, SEFA Group (SEFA) requests the confirmation that coal ash obtained from the following specific sources meets the requirements in §241: flyash received directly from coal-fired power plant's particulate collection infrastructure (i.e., electrostatic precipitator or baghouse), and processed flyash received from landfills and ash ponds.

Unless exempt, combustion of "non-hazardous secondary material (NHSM), as defined in §241.2 would subject the emissions unit (such as STAR reactor) to requirements in 40 CFR 60 Subpart CCCC "Standards of Performance for Commercial and Industrial Solid Waste Incineration Units" or, Subpart DDDD "Emissions Guidelines and Compliance Times for Commercial and Industrial Solid Waste Incineration Units". These regulations are commonly known as CISWI ("Commercial and Industrial Solid Waste Incineration").

The DAQ has determined that the coal ash received directly from the coal-fired power plant's particulate collection infrastructure (i.e., electrostatic precipitator or baghouse) is a NHSM and an "ingredient", as defined in §241.2. DAQ has further determined that this flyash meets the legitimacy criteria included in §241.3(d)(2) and thus, concludes that it is not a solid waste. Therefore, the STAR Reactor is not subject to the requirements in CISWI.

Moreover, the processed flyash received from landfills or ash ponds is a NHSM and an ingredient, and DAQ has determined that this flyash also meets the legitimacy criteria included in §241.3(d)(2), and thus, concludes that it is not a solid waste. Therefore, the STAR Reactor is not subject to the requirements in CISWI.

The following includes discussion on STAR Reactor, and technical and regulatory analysis supporting these conclusions for each of the above types of flyash:

STAR Reactor

The STAR Reactor is a patented technology developed by SEFA for thermal beneficiation / processing of either a low or high-Btu value fine particulate matter, such as the above described flyash [hereinafter "feedstock"], along with other ingredient materials (gas, solids, and liquids) into a variety of commercial products. These products are used not only for application as a partial cement replacement but for many other commercial and industrial applications. There are several products which SEFA is currently capable of producing because of the flexibility embodied in this reactor. For example, STAR® RP, Ultrix®, Spherix®, Fortimix®, and Permanix™.

The STAR Reactor process is inherently flexible in that operating parameters can be varied and different ingredients can be added to produce a desired product. The primary component of the STAR Reactor is a cylindrical refractory-lined vessel in which the majority of the process reactions take place. These reactions can include a range of both chemical and physical reactions. Air is required for pneumatic uplift of the solids and for the process reactions enters through the floor of the STAR Reactor as well as through the walls at multiple locations. The raw feedstock and any other ingredients are introduced through the walls of the STAR Reactor. All of the solids and gases exit together at the top of the reactor. The gas/solids mixture enters a hot cyclone where the majority of solids are separated from the gas and recycled back to the STAR Reactor. The very high rate of hot recycle solids increases the operating flexibility of the process. The process reactions can occur through this reactor/hot cyclone loop. Due to the high gas velocity, the multiple injection points, and the recycle solids, there is a significant amount of turbulence created which enhances the mixing of the ingredients and optimizes the reactions. The gas and remaining solids not collected by the hot cyclone are passed over a heat exchanger which can be designed to preheat the process air, used in heat recovery, or to simply cool the gas/solids mixture. Once cooled, the solids are separated from the gas in a fabric filter recovery device. Solids can also exit the STAR Reactor at the bottom or from the recycle loop. These solids can be combined with the solids/gas stream before the heat recovery equipment or, since they have different characteristics as compared to the solids exiting the hot cyclone, they can be processed separately for a particular application. By design the STAR Reactor operates under a wide range of process parameters.

Technical and Regulatory Analysis

Flyash Received Directly from Coal-fired Power Plant's Particulate Collection Infrastructure (i.e., Electrostatic precipitator or Baghouse)

As described above, the STAR Reactor is capable of utilizing flyash, received directly from coal-fired power plant's particulate emissions controls, as its primary ingredient along with other select ingredients in order to produce a variety of products for markets.

§241.2(b)(3) of the rule defines NHSM as "a secondary material that, when discarded, would not be identified as a hazardous waste under Part 261 of this chapter". Further the same section defines secondary material as "any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial chemical products or manufacturing chemical intermediates, post-industrial material, and scrap."

It is indisputable that flyash generated from combustion of coal is not a "primary product of a manufacturing" facility (such as electric generating facility) and this product can be deemed as "post-industrial material". Moreover, coal flyash is not regulated as a hazardous waste as per Part 261 of 40 CFR "Identification and Listing of Hazardous Waste". In fact, EPA has promulgated a rule on April 17, 2015 (80 FR 21302) to regulate disposal of coal combustion residues (fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers) [CCR] as solid waste under Subtitle D "State or Regional Solid Waste Plans" of the Resource Conservation Act (RCRA) [administrative regulations included in 40 CFR 257) and not under the Subtitle C of the RCRA "Hazardous Waste Management" [administrative regulations included in 40 CFR 261]. In addition, the beneficial uses (e.g., use of flyash in concrete manufacturing replacing traditional product cement) of CCR is exempt from this regulation.

Based, on the above discussion, it is concluded that the flyash generated from the coal combustion and received directly from coal-fired power plant's particulate emissions control devices, is a NHSM.

§241.3(b)(3) of the Solid Waste Definition Rule provides that NHSMs are not solid waste when "used as an ingredient in a combustion unit that meet the legitimacy criteria specified in paragraph (d)(2) of this section." §241.2 of the Solid Waste Definition Rule defines "ingredient" as "a non-hazardous secondary material that is a component in a compound, process or product." The feedstock is merely one component among a number of variables which are introduced to the STAR Reactor to produce many different products. Therefore, feedstock processed in the STAR Reactor is an ingredient under the Solid Waste Definition Rule.

Legitimacy Criteria

For a non-hazardous secondary material used as an ingredient to be excluded from the definition of solid waste under §241.3 of the Solid Waste Definition Rule, the material must satisfy the following legitimacy criteria under Subsection (d)(2):

(i) The non-hazardous secondary material must be managed as a valuable commodity;

(ii) The non-hazardous secondary material must provide a useful contribution to the production or manufacturing process.

(iii) The non-hazardous secondary material must be used to produce a valuable product or intermediate.

(iv) The non-hazardous secondary material must result in products that contain contaminants at levels that are comparable in concentration to or lower than those found in traditional products that are manufactured without the non-hazardous secondary material.

Managed as a Valuable Commodity - §241.3(d)(2)(i)

SEFA stores its feedstock in silos and or covered shelters prior to using it as an ingredient in the STAR Reactor and conveys the material to the process equipment pneumatically. As per §241.3(d)(2)(i), the Solid Waste Definition Rule identifies the following three factors to be considered in determining whether a material is managed as a valuable commodity:

(A) The storage of the non-hazardous secondary material prior to use must not exceed reasonable time frames;

(B) Where there is an analogous ingredient, the non-hazardous secondary material must be managed in a manner consistent with the analogous ingredient or otherwise be adequately contained to prevent releases to the environment;

(C) If there is no analogous ingredient, the non-hazardous secondary material must be adequately contained to prevent releases to the environment;

As per SEFA, in a previously permitted design, the storage capacity of the silos and partially enclosed storage bins for incoming feedstock ranges from 800-2000 tons and could accommodate approximately three to ten days of production when the STAR Reactor is operating on SEFA's normal production schedule. As such, under normal operations, the incoming feedstock is typically stored no more than three days prior to introduction into the STAR Reactor process. However, during shutdown of the STAR Reactor or when off-specification feedstock is received from a supplier, the feedstock may be stored for longer periods of time, but usually no more than sixty days. In the past, as per SEFA, shutdown of the STAR Reactor has generally not exceeded twenty days. With respect to the management of off-specification feedstock, SEFA has indicated that if this off-specification material can be blended with other feedstock at ratios which ensure that processing in the STAR Reactor produces an end product which meets SEFA's quality control standards, it will attempt to do so. Depending on the nature and amount of the material's deviation from SEFA's feedstock specifications, if it cannot be blended, the off-specification feedstock will have to be rejected and returned to the supplier. If it is capable of being blended, the blending process may require storage of the off-specification feedstock for as long as 60 days depending upon the quantity involved. Accordingly, even outside of the normal three-day processing scheduling for incoming feedstock, SEFA's storage of incoming feedstock does not exceed a reasonable time frame.

Additionally, SEFA manages the incoming feedstock as a valuable commodity and takes measures to prevent loss of material during off-loading and storage. In the preamble to the rule, EPA explains that "If on the other hand, a company does not manage the non-hazardous secondary material as it would traditional ingredients, that behavior may indicate that the non-hazardous secondary material is being discarded." Refer to 76 FR 15543. The material must be "stored in a manner that both adequately prevents releases or other hazards to human health and the environment, considering the nature and toxicity of the non-hazardous secondary material." *Id.* In most cases, this requirement is satisfied if the material is in some manner "contained." *Id.* As noted, SEFA stores its feedstock in enclosed silos or covered and partially enclosed storage bins and therefore meets this criterion. Additionally, at all times prior to processing, SEFA handles the material in a manner consistent with this criterion. Feedstock is transferred from its suppliers (typically, coal-fired power plants) to SEFA either (i) directly by pneumatic conveyor into the silos or (ii) by truck to the SEFA facility. All bin vents within the pneumatic conveyer system are equipped with fabric filter recovery devices to minimize loss of this valuable material. Thus, SEFA believes that it unquestionably manages its feedstock as a valuable commodity.

Useful Contribution to the Production or Manufacturing Process - §241.3(d)(2)(ii)

SEFA believes that there is no question that the feedstock processed in the STAR Reactor provides a useful contribution to its production of the various end products marketed by SEFA. In the preamble to the Solid Waste Definition Rule, at 76 FR 15543, EPA explains the rationale behind this criterion for legitimacy:

> A non-hazardous secondary material used as an ingredient in combustion systems provides a useful contribution if it contributes valuable ingredients to the production/manufacturing process or to the product or intermediate of the production/manufacturing process. This criterion is an essential component in the determination of legitimacy because legitimate use is not occurring if the non-hazardous secondary material doesn't add anything to the process, such that the non-hazardous secondary material is basically being disposed of or discarded. This criterion is intended to prevent the practice of "sham" recycling by adding non-hazardous secondary materials to a manufacturing operation simply as a means of disposing of them.

SEFA states that the feedstock processed in the STAR Reactor is clearly not added to dispose of that material and the processing of the feedstock in the STAR Reactor can in no manner be characterized as "sham" recycling. Additionally, the fact that some of the constituents of the feedstock are not needed or desirable for the STAR Process does not affect the status of the "useful contribution" of the feedstock:

> For purposes of satisfying this criterion, not every constituent or component of the non-hazardous secondary material has to make a contribution to the production/manufacturing activity. **For example, non-hazardous secondary materials used as ingredients may contain some constituents that are needed in the manufacturing process, such as, for example, zinc in non-hazardous secondary materials that are used to produce zinc-containing micronutrient fertilizers, while other constituents in the non-hazardous secondary material, such as lead, do not provide a useful contribution.** Provided the zinc is at levels that provides a useful contribution, we believe the non-hazardous

> secondary material would satisfy this criterion, although we would note that the constituents not directly contributing to the manufacturing process could still result in the non-hazardous secondary material not meeting the contaminant part of the legitimacy criteria. The Agency is not quantitatively defining how much of the non-hazardous secondary material needs to provide a useful contribution for this criterion to be met, since we believe that defining such a level would be difficult and is likely to be different, depending on the non-hazardous secondary material. The Agency recognizes that this could be an issue if persons argue that a non-hazardous secondary material is being legitimately used as an ingredient, but in fact, only a small amount or percentage of the non-hazardous secondary material is used.
>
> 76 FR 15543-44 (emphasis added).

The fact that reactions in the STAR Reactor eliminate certain undesirable constituents of the feedstock material does not preclude a determination that the feedstock meets the legitimacy criteria as an ingredient. As described above, the STAR Reactor has the capability to control the chemical and physical reactions in the process to produce marketable materials with a broad range of characteristics. The constituents and characteristics of each STAR Reactor product are tailored to the intended market and vary depending on the needs of that market. The elimination of certain constituents does not affect the determination that the feedstock is an ingredient which makes a useful contribution to the products produced in the STAR Reactor.

Produces a Valuable Product or Intermediate - §241.3(d)(2)(iii)

As per SEFA, it is undisputed that feedstock material is used in the STAR Reactor to make valuable products. "The product or intermediate is valuable if it is (i) sold to a third party or (ii) used as an effective substitute for a commercial product or as an ingredient or intermediate in an industrial process." Refer to 76 FR 15544. Also, as discussed above, the STAR Reactor has the capability to process its fly ash and other materials to produce a broad range of products. All of the products currently produced in the STAR Reactor are sold to third parties. Additionally, the various products produced in the STAR Reactor have application as both substitutes for commercial products and as ingredients in an industrial process. Ultrix® and STAR RP® are sold for use as partial replacement for Portland cement. Fortimix® is sold for use as an additive for rubber compounds. Permanix™ is designed for use as a broad-spectrum UV blocker. Accordingly, in all respects, SEFA's feedstock processed in the STAR Reactor satisfies this criterion for legitimacy as an ingredient.

Comparable Contaminants Concentration of End Product - § 241.3(d)(2)(iv)

Again, as discussed above, the STAR Reactor has the capability to process its feedstock to reduce or eliminate some undesirable constituents and to alter the chemical and physical characteristics of others in its various end products. The Solid Waste Definition Rules provides as follows:

> The non-hazardous secondary material must result in products that contain contaminants at levels that are comparable in concentration to or lower than those found in traditional products that are manufactured without the non-hazardous secondary material.
>
> Refer to §241.3(d)(2)(iv).
>
> The preamble to the Rule includes the following:
>
> The assessment of whether the products produced from the use of nonhazardous secondary materials that have contaminants that are comparable to (or lower) in concentration can be made by a comparison of contaminant levels in the ingredients themselves to the traditional ingredients they are replacing, or by comparing the contaminant levels in the product itself with and without the use of the nonhazardous secondary material.
>
> Refer to 76 FR 15544.

As applied to the use of the feedstock as an ingredient in the STAR Reactor, the relevant comparison is a comparison of the various STAR Reactor end products to comparable products in the industries in which each is used. For example, Ultrix® and STAR RP® are both used as supplementary cementitious materials in concrete, but, due to the unique processing regime of the STAR Reactor, neither has varying quantities of adsorptive unburned carbon, which characterize by-product fly ashes typically used in the marketplace. In fact, the air-entraining characteristics of Ultrix® and STAR RP® are tailored by STAR Reactor to exactly match the air-entraining characteristics of plain cement concrete.

The preamble to the proposed rule for the Solid Waste Definition Rule explains the rationale for and purpose of the comparison of contaminants in the legitimacy criteria for use of a non-hazardous secondary material as an ingredient:

> The Agency recognizes that there may be instances where the contaminant levels in the products manufactured from non-hazardous secondary material ingredients may be somewhat higher than found in the traditional products that are manufactured without the non-hazardous secondary material, but the resulting concentrations would not be an indication of discard and would not pose a risk to human health and the environment.
>
> Refer to 75 FR 31844, 31885 (Jun. 4, 2010).

In addition, EPA has recognized that contaminant levels in the products made from NHSM can have contaminant levels within a "small acceptable range" at 76 FR 15523 (March 21, 2011).

The above discussion clearly provides that it may be allowable under §241.3(d)(2)(iv) for certain contaminants in the end product made with non-hazardous secondary materials ingredients to be "somewhat higher" or within a "small acceptable range" than those in traditional products. Thus, SEFA's fly ash feedstock satisfies the legitimacy criterion in §241.3(d)(2)(iv) despite the slightly higher concentrations of arsenic and beryllium in the STAR RP® as compared to Portland Cement, as included in Attachment A to the SEFA's September 2014 letter. Also, using additional analytical data received from SEFA[1], it can be said that the contaminant levels in the SEFA product are within the range of contaminants levels or within a "small acceptable range" for Portland Cement (traditional product).

Additionally, as stated in the preamble to the proposed rule above, the purpose of the contaminant comparison criterion is to demonstrate that the use of the non-hazardous secondary material ingredient is not indicative of discard and does not pose a risk to human health and the environment. Expanding of the "indication of discard" aspect of this component of the legitimacy criteria, EPA further explains:

> Based on our assessment of all of the comments, we believe it appropriate to include contaminant levels as a legitimacy criterion. Thus, we do not agree with those commenters that assert that contaminant comparisons are not appropriate to require as part of the legitimacy criteria. The Agency believes the criterion is necessary because non-hazardous secondary materials that contain contaminants that are not comparable in concentration to those contained in traditional fuel products or ingredients **would suggest that these contaminants are being combusted as a means of discarding them**, and thus the non-hazardous secondary material should be classified as a solid waste. **In some cases, this can also be an indicator of sham recycling.**
>
> Refer to 75 FR 31871-72 (emphasis added).

As such, the primary purpose of the comparison on contaminants in an end product using the non-hazardous secondary material ingredient to that of traditional products made without the non-hazardous secondary material ingredient is to demonstrate that such use is not a means of discarding the non-hazardous secondary material or indicative of sham recycling.

With respect to the additional industrial uses for products produced by using fly ash feedstock as an ingredient in the STAR Reactor, a direct comparison of SEFA's end product to a traditional product which is manufactured without fly ash feedstock is not feasible for many of the end products produced in the STAR Reactor. However, based on the detailed comparison of the STAR® RP to Portland Cement and the various markets for SEFA's other STAR Reactor products as included in the above referenced submittal, it is clear that SEFA is not processing the fly ash feedstock as a means of discarding the fly ash or any of its constituents.

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[1] Email dated 5/12/2015 from Thomas Pritcher, Environmental Consulting &Technology, Inc., to Rahul Thaker, NCDAQ.

To the extent that the purpose of the contaminant comparison is to demonstrate that these products do not pose a risk to human health and the environment, SEFA has provided additional information as well as copies of the material safety data sheets for these products to demonstrate that no such risk is posed in the various industrial uses of STAR Reactor end products. For example, the material safety data sheets for Spherix® and Fortimix® included in Attachment B to the SEFA's September 2014 letter. As per SEFA, in many cases, the STAR® Reactor end products provide a safe alternative to traditional products which may pose a potential risk to human health and the environment.

Flyash Received from Landfill or Ash Pond

§241.3(b)(4) of the rule provides that NHSMs are not solid waste when "fuel or ingredient products that are used in a combustion unit, and that are produced from the processing of discarded non-hazardous secondary materials and that meet the legitimacy criteria specified in paragraph (d)(1) of this section, with respect to fuels, and paragraph (d)(2) of this section, with respect to ingredients."

As discussed above, the coal flyash disposed off in a landfill or an ash pond can be deemed as a NHSM. Prior to being used as an acceptable ingredient (feedstock) in the STAR Reactor, any flyash received from landfills or ash ponds must be "processed," as that term is defined in the rule. As discussed below, any commercial agreement between a supplier and SEFA will specify the acceptable criteria (i.e., specifications) for a feedstock that can be used in the STAR Reactor as a condition for supplying processed flyash to SEFA.

Pursuant to §241.2, "processing" means any operations that transform discarded non-hazardous secondary material into a non-waste fuel or non-waste ingredient product. Processing includes, but is not limited to, operations necessary to: remove or destroy contaminants; significantly improve fuel characteristics of the material, *e.g.* sizing or drying the material in combination with other operations; or chemically improve the as-fired energy content. Minimal operations that result only in modifying the size of the material by shredding do not constitute processing for purposes of this definition. Under the same section of the Rule, "Secondary material" is defined as any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial chemical products or manufacturing chemical intermediates, post-industrial material, and scrap.

While it is recognized that coal flyash which was initially placed into a landfill may be considered to have been "previously discarded" by custom and practice, coal-fired utilities also collect this coal ash in permitted wastewater treatment ponds. This coal ash has not historically been considered "discarded" as it was merely solids settling within a permitted wastewater unit. SEFA believes that the processing of these materials as required to satisfy SEFA's specifications for its feedstock would meet the requirements for processing of "previously discarded" materials under the Solid Waste Definition Rule as applied to CISWI. As such, the requisite processing of materials to be used as feedstock in the STAR Reactor would be sufficient to transform them to an ingredient.

The Solid Waste Definition Rule provides that a previously discarded material may be processed to transform the waste to a non-waste ingredient. Specifically, §241.3(b)(4) of the Solid Waste Definition Rule provides as follows:

> Fuel or ingredient products that are used in a combustion unit, and are produced from the processing of discarded non-hazardous secondary materials and that meet the legitimacy criteria specified in paragraph (d)(1) of this section, with respect to fuels, and paragraph (d)(2) of this section, with respect to ingredients. The legitimacy criteria apply after the non-hazardous secondary material is processed to produce a fuel or ingredient product. Until the discarded nonhazardous secondary material is processed to produce a non-waste fuel or ingredient, the discarded non-hazardous secondary material is considered a solid waste and would be subject to all appropriate federal, state, and local requirements.

As per SEFA, any processing of materials from landfills or from ash ponds to meet SEFA's feedstock specifications will be undertaken under the control of the supplier prior to being received by SEFA for use an ingredient in its STAR Reactor. Accordingly, this feedstock when received by SEFA or used in the STAR Reactor would meet the legitimacy criteria for direct use as an ingredient and therefore would not be a solid waste under the Solid Waste Definition Rule. All feedstock shipped to SEFA for use as an ingredient in the STAR Reactor will first be required to undergo processing by the supplier to be:

A. Free of all, but minimal contaminants (e.g., organic debris, slag);
B. Finely-divided and free-flowing,
C. Have consistent moisture content of $\leq 25\%$; and
D. Have a consistent chemical composition, including organic content as measured by loss on ignition.

The above are SEFA specifications for acceptance of any coal flyash (discarded in landfills or ash ponds).

As per SEFA, the specific processing steps that may be needed to meet the SEFA specifications (as described above) and produce a suitable feedstock for the STAR Reactor will vary depend upon the specific characteristics of each source of coal flyash. Generally speaking, one or more of the following four processing steps will be necessary to produce a suitable feedstock for the STAR Reactor:

1) Dewatering,
2) Screening/Separation,
3) Milling, and
4) Blending.

For use as a feedstock in the STAR Reactor, coal ash from an ash pond having higher moisture content will likely need to be processed using most, if not all, of these steps. Coal ash from a landfill may not require every step. For example, it may be unnecessary to dewater coal ash from landfills if the material has consistent and acceptable moisture content.

Depending on the source of the ash, the general steps described above can require sub processes. For example, feedstock appropriate for the STAR Reactor, it may be necessary to remove larger particles or other materials found with the ash. In addition, to meet SEFA's specifications, some coal ash may require further processing through a separate loop that includes equipment (e.g., roll crusher) needed to produce a more finely-divided, free-flowing feedstock. For others, it may be necessary to utilize a magnetic separator to remove metal constituents. Also, materials such as coal, pyrites, or other more coarse materials may need to be screened. The Screening/Separation step will occur routinely to produce a free-flowing, finely-divided feedstock suitable for the STAR Reactor. Depending on the source of coal ash, milling may not be necessary to achieve a finely-divided and free-flowing material.

As emphasized by SEFA, the specific processing steps and the specific processing equipment cited above are typical examples for how these materials might be processed to produce a suitable feedstock. Those performing the actual work (i.e., suppliers) will elect to use different techniques and/or equipment. SEFA states that as long as the processed coal ash conforms to SEFA's general specifications outlined above, the coal flyash received from landfills or ash ponds will have been sufficiently "processed" and will be a suitable feedstock as an ingredient in the STAR Reactor.

It needs to be noted here that the EPA has recognized similar processing steps (similar to SEFA suggested processing steps as above to meet the SEFA specifications) are "likely to meet our definition of processing, as it appears that these processes in fact remove contaminants and improve the ingredient characteristics of these recovered CCRs **(i.e., ash from ponds and landfills)**". Refer to 76 FR 15518, March 21, 2011 (emphasis added).

With respect to the requirement for meeting the legitimacy criteria in §241.3(d)(2), pursuant to §241.3(b)(4), for flyash received from landfill or ash pond, SEFA emphasizes that after completion of "processing", it will become similar to the flyash received directly from coal-fired plant's particulate collection infrastructure (i.e., Electrostatic precipitator or Baghouse), and thus, will meet all legitimacy criteria as discussed above for it.

Finally, with respect to the particular criterion for comparable contaminants concentration of end product (traditional products) in §241.3(d)(2)(iv), SEFA analyzed each of these materials for semi-volatile organic compounds, organo-chlorine pesticides, PCBs, chlorides, metals and sulfur content, during engineering studies to assess the suitability of coal ash previously placed in water treatment ponds (pond ash) or previously placed in landfills (landfill ash). A comparison of the constituents in dry source feedstock, pond ash and landfill ash from SCE&G's[2] Wateree facility is provided in Attachment C to the SEFA's September 2014 submittal. In comparison to the dry collection feedstock, the landfill ash is comparable with slightly higher results for a few constituents. The sampling results on pond ash indicate that all constituents detected were lower

[2] www.sceg.com

than those for the dry collection feedstock and the landfill ash. Despite certain variables in the manner in which coal ash were previously placed in ponds or landfills, as per SEFA, these sampling results are sufficient to demonstrate that contaminants in coal flyash previously placed in ponds and landfills are comparable to or lower than those in dry collection coal flyash processed as feedstock (that is, flyash received directly from the coal-fired power plant's particulate emissions control) for the STAR Reactor. Furthermore, the metals and sulfur levels of the landfill ash are comparable to those of the dry collection feedstock, and the metals and sulfur levels of the pond ash are significantly lower than those of the dry collection feedstock. Finally, more recent sampling data (March-April 2015) for dry ash and pond ash, provided by SEFA, indicates that the contaminants in pond ash as are lower than the dry ash received directly from electric utility plant.[3] Therefore, SEFA concludes that there will be no increase in emissions as a result of the use of pond ash and landfill ash as a feedstock for the STAR Reactor.

Conclusions

In summary, the DAQ has determined that the fly ash received directly from the coal-fired power plant's particulate collection infrastructure (i.e., electrostatic precipitator or baghouse) is a NHSM and an "ingredient", as defined in §241.2. DAQ has further determined that this flyash meets the legitimacy criteria included in §241.3(d)(2). Thus, it concludes that it is not a solid waste and therefore, STAR Reactor is not subject to the requirements in CISWI.

Moreover, the processed flyash received from ash landfills or ash ponds meets the definition of "processing" in §241.2, and is also a NHSM and an ingredient. DAQ has further determined that this flyash also meets the legitimacy criteria included in §241.3(d)(2). Thus, it concludes that it is not a solid waste and therefore, STAR Reactor is not subject to the requirements in CISWI.

It needs to be emphasized here that this letter includes only the "non-waste" determination, which is specific to the materials discussed herein. Further, the determination does not give any permission to SEFA to burn or process flyash in the STAR Reactor. SEFA will need to evaluate and submit a permit application for an air permit, as needed, for burning / processing flyash, as discussed herein, in the STAR Reactor at any location in NC.

If you have any questions regarding this determination, please contact Rahul P. Thaker, P.E., QEP, at (919) 707-8470.

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[3] Email dated 5/12/2015 from Thomas Pritcher, Environmental Consulting &Technology, Inc., to Rahul Thaker, NCDAQ.

Sincerely,

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDENR

c: Central Files

APPENDIX G

CAM PLAN

COMPLIANCE ASSURANCE MONITORING PLAN

for

Sulfur Dioxide (SO_2) Emissions from STAR® Unit

Duke Energy Progress, LLC – H. F. Lee Steam Electric Plant

Goldsboro, Wayne County, North Carolina

I. Background

A. Emissions Unit and Control Device

EU ID:	ES-31
Description:	STAR® (Staged Turbulent Air Reactor) system with a 140 million Btu/hour total heat rate input that processes feed-stock (fly ash and other ingredient materials) into a variety of commercial products
Control Device	Dry Flue Gas Desulfurization (FGD) scrubber and bagfilter for SO_2 emissions control

B. Applicable Emissions Limits and Monitoring Practices

Emissions Limits:

SO_2 :	2.3 pounds of sulfur dioxide per million BTU input per 15A NCAC 02D .0516 *Sulfur Dioxide Emission From Combustion*

Compliance Demonstration Requirements:

SO_2	Initial performance tests will be conducted.
Lime-to-Sulfur Ratio	XXX establish compliance demonstration procedures for parametric monitoring systems.
Baghouse ΔP	XXX establish compliance demonstration procedures for parametric monitoring systems.

Periodic Monitoring Requirements:

SO_2	TBD
Lime-to-Sulfur Ratio	TBD
Baghouse ΔP	TBD

C. Control Technology

Dry FGD scrubber and bagfilter for SO_2 emissions control

D. Potential Emission Rates

Pre-control SO_2:   XXX tons/year

Post-control SO_2: XXX tons/year (assumes 95% control)

II. Monitoring Approach

A. Background

For emissions of sulfur dioxide (SO_2) from the STAR® system, Duke Energy is subject to Compliance Assurance Monitoring (CAM) requirements for the state SO_2 standard, i.e., 2.3 lb/MMBtu per 15A NCAC 02D .0516.

Duke Energy selected Lime-to-Sulfur Ratio and Pressure drop across the baghouse (Baghouse ΔP) as indicators for the CAM Plan for SO_2 emissions from the STAR® system. Duke Energy conducted testing for SO_2 emissions to derive a relationship between the Lime-to-Sulfur Ratio and SO_2 emissions of the STAR® system. This relationship was then used to determine a Lime-to-Sulfur Ratio value for the applicable SO_2 limit, such that as long as the Lime-to-Sulfur Ratio is at or above the value during normal operation, there is a reasonable assurance that the STAR® system will also comply with the respective applicable SO_2 emission limit. This relationship was used to determine appropriate Lime-to-Sulfur Ratio value for the state standard of 2.3 lb/mmBtu. In addition, Duke Energy established an appropriate Baghouse ΔP range based on manufacturer's specifications and recommendations. It is assumed as long as the Baghouse ΔP is within the established range during normal operation, there is a reasonable assurance that the dry FGD baghouse is operating as designed and the STAR® system will also comply with the respective applicable SO_2 emission limit.

B. CAM SO_2 Testing

SO_2 testing was conducted to derive a relationship between the Lime-to-Sulfur Ratio and SO_2 emissions of the STAR® system. The SO_2 testing was conducted for operating conditions of the dry FGD system resulting in High-Ash Sulfur Content, Mid- Ash Sulfur Content and Low- Ash Sulfur Content.

The table below provides a summary of the test results for CAM testing completed on XXXX. Each test consisted of at least three runs using USEPA Test Method XXX for XXX. For the operating conditions tested, all SO_2 emission test results were less than XX percent of the applicable state SO_2 emission limitation (2.3 lb/mmBtu).

Insert Table of Results

Baghouse ΔP was monitored and recorded during the testing to verify that the operating range of …… is appropriate for the baghouse

C. CAM Averaging Period

The CAM Rule does not provide specific averaging periods to be used in the development of monitoring approaches. However, 40 CFR 64.3(d)(3)(i) implies that the appropriate averaging period is the averaging period of the underlying emissions standard. Since emissions testing for SO_2 includes at least three test runs, each nominally one-hour in duration, this indicates that a three-hour averaging period is an appropriate averaging time for purposes of CAM for the state rule.

D. CAM Excursion

During "normal operation", (i.e., periods other than startup, shutdown or malfunction), an excursion is a rolling three-hour period Lime-to-Sulfur Ratio is less than the establish value during testing. Each excursion must be investigated by the source to determine the monitoring status and operating conditions responsible for the excursion.

E. CAM Excursion Corrective Action

Upon detecting an excursion, Duke Energy will implement corrective action to restore the indicator to the appropriate indicator range. Corrective action should begin with an evaluation of the monitoring system to determine if the excursion is related to the monitoring system or the control device. Individual unit process and control device operating parameters will be reviewed to determine the cause of the excursion. To the extent possible, any corrective action should reduce the potential of similar excursions from recurring.

F. CAM Reporting Requirements

All excursions must be reported in the facility's semi-annual report. As required by the CAM Rule, the Permittee shall include summary information on the number, duration and cause of excursions and the corrective actions taken. It is not necessary to report SO_2 control equipment malfunctions that do not cause an excursion. Duke Energy will also include summary information on the number, duration, and cause of monitor downtime incidents.

G. Summary of Proposed CAM for SO_2

Continuous monitoring of Lime-to-Sulfur Ratio is required. If the Lime-to-Sulfur Ratio does not fall below the level established during initial compliance testing and the Baghouse ΔP is within the established range provided by manufacturer's specifications and recommendations, then compliance will be reasonably assured. The minimum Lime-to-Sulfur Ratio will not apply during periods of startup, shutdown, or malfunction. A summary of the CAM plan is provided in Table 1.

Table 1 SO_2 CAM Plan Summary – H. F. Lee Steam Electric Plant

STAR® Unit (ES-31)

A. Indicator	Lime-to-Sulfur Ratio and Baghouse ΔP
Measurement Approach	XXXX
B. Indicator Range	An excursion is defined as ….. The Lime-to-Sulfur Ratio to be determined during the initial performance testing will provide reasonable assurance of compliance with limits to be contained in the Title V air permit. Excursions will trigger an inspection of the Lime injection system to determine the cause and necessary corrective action. If the Lime-to-Sulfur Ratio falls below acceptable levels (e.g. an excursion) for more than XX consecutive unit operating hours, a test will be performed to re-establish the SO_2 emission rate and lime injection correlation for the ash sulfur content range. Baghouse ΔP …..
C. Performance Criteria	
1. Data Representativeness	TBD
2. Verification of Operational Status	TBD
3. QA/QC Practices and Criteria	TBD
4. Monitoring Frequency	TBD
5. Data Averaging Period	TBD
6. Data Collection	Automated data acquisition system (DAHS)

III. Monitoring Approach Justification

A. Explanation of Applicability

Justification will be added based on final vendor design data

B. Rationale for Selection of Indicator Ranges

To be determined…

NC DEQ will be provided copies of test results from all required tests.

C. Rationale for Selection of Corrective Actions

To be determined…

APPENDIX H

ZONING COMMISSION DOCUMENTATION

H.F. Lee Steam Electric Plant
1199 Black Jack Church Rd
Goldsboro, NC 27530

October 27, 2017

SENT VIA EMAIL

Mr. Chip Crumpler
Director of Planning
Wayne County
224 E. Walnut Street
Goldsboro, NC 27530

Dear Mr. Crumpler,

On behalf of Duke Energy, I am writing to inform you that we intend to construct and an ash beneficiation plant at 1199 Black Jack Church Road in Goldsboro and Wayne County. I hereby certify that to the best of my knowledge, Wayne County is the only local government having jurisdiction over any part of the land on which the facility and its appurtenances are to be located.

In accordance with § 143-215.108(f) of the North Carolina General Statutes, we hereby request that you issue a determination as to whether your municipality has in effect a zoning or subdivision ordinance that is applicable to the proposed facility. Additionally, please issue a determination as to whether the proposed use would be consistent with applicable zoning or subdivision ordinances. For your convenience, I have included a form with which you may remit your determination and a copy of the draft air permit application. As a means of demonstrating proof of transmittal, please sign, title, stamp, and date the enclosed form and mail to the facility mailing address, my address, listed on the form, and the checked air quality office at your earliest convenience.

Thank you for your prompt attention to this matter. If you have any questions regarding this request, please contact me at 919-546-5797

Sincerely,

Erin E. Wallace
Duke Energy Environmental Services

Attachments:
- Zoning Consistency Determination Form
- Draft Air Permit Application

Zoning Consistency Determination

Facility Name	Duke Energy Progress, LLC – HF Lee Steam Electric Plant
Facility Street Address	1199 Black Jack Church Road
Facility City	Goldsboro
Description of Process	Generation of electricity for sale
SIC/NAICS Code	4911
Facility Contact	Erin Wallace
Phone Number	919-546-5797
Mailing Address	410 S. Wilmington Street
Mailing City, State Zip	Raleigh, NC 27601

Based on the information given above:

- [x] I have received a copy of the air permit application (draft or final) AND...
- [ ] There are no applicable zoning ordinances for this facility at this time
- [x] The proposed operation IS consistent with applicable zoning ordinances
- [ ] The proposed operation IS NOT consistent with applicable zoning ordinances (please include a copy of the rules in the package sent to the air quality office)
- [ ] The determination is pending further information and can not be made at this time
- [ ] Other:

Agency	WAYNE COUNTY PLANNING
Name of Designated Official	CHIP CRUMPLER
Title of Designated Official	PLANNING DIRECTOR
Signature	[signature]
Date	10/30/2017

Please forward to the facility mailing address listed above and the air quality office at the appropriate address as checked on the back of this form.

All PSD and Title V Applications

☐ Attn: William Willets, PE
DAQ – Permitting Section
1641 Mail Service Center
Raleigh, NC 27699-1641

Local Programs

☐ Attn: David Brigman
Western NC Regional Air Quality Agency
49 Mount Carmel Road
Asheville, NC 28806
(828) 250-6777

☐ Attn: Leslie Rhodes
Mecklenburg County Air Quality
700 N. Tryon Street, Suite 205
Charlotte, NC 28202-2236
(704) 336-5430

☐ Attn: William Minor Barnette
Forsyth County Office of Environmental
Assistance and Protection
201 N. Chestnut Street
Winston-Salem, NC 27101-4120
(336) 703-2440

Division of Air Quality Regional Offices

☐ Attn: Paul Muller
Asheville Regional Office
2090 U.S. Highway 70
Swannanoa, NC 28778
(828) 296-4500

☐ Attn: Steven Vozzo
Fayetteville Regional Office
225 Green Street, Suite 714
Fayetteville, NC 28301
(910) 433-3300

☐ Attn: Ron Slack
Mooresville Regional Office
610 East Center Avenue, Suite 301
Mooresville, NC 28115
(704) 663-1699

☐ Attn: Patrick Butler, PE
Raleigh Regional Office
1628 Mail Service Center
Raleigh, NC 27699-1628
(919) 791-4200

☐ Attn: Robert Fisher
Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
(252) 946-6481

☐ Attn: Brad Newland
Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, NC 28405
(910) 796-7215

☐ Attn: Lisa Edwards, PE
Winston-Salem Regional Office
450 West Hanes Mill Road, Suite 300
Winston-Salem, NC 27105
(336) 776-9800