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Camden County Energy Recovery Associates
600 Morgan Blvd.
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July 7, 2022

Mr. Joel Leon
Section Chief, Operating Permits
Bureau of Air Quality
New Jersey Department of Environmental Protection
401 E. State Street, 2nd Floor, P.O. Box 420, Mail Code 401-02
Trenton, NJ 08625-0414

Re: **Camden County Energy Recovery Associates**
Camden County Energy Recovery Center
Program Interest Number: 51614
Permit Number: BOP200001
Minor Modification – Air Quality Control System Upgrade Project

Dear Mr. Leon :

Camden County Energy Recovery Associates, L.P. ("CCERA") hereby submits this application ("the Application") for a minor modification of the Operating Permit for the Camden County Energy Recovery Center ("the CCERC") to the New Jersey Department of Environmental Protection seeking approval to upgrade the air quality control systems ("AQCS") and to install a Liquid Direct Injection ("LDI") system at the CCERC. Proposed modifications of the AQCS include conversion of the existing spray dryer scrubber on each Municipal Waste Combustor ("MWC") to a circulating dry scrubber ("CDS") system, replacement of the electrostatic precipitator ("ESP") on each MWC with a fabric filter baghouse, and improvement of the selective noncatalytic reduction system on each MWC. The proposed CDS technology followed by a baghouse is effectively reducing the emissions of acid gases at Covanta facilities in Durham-York, Ontario, Canada and in Dublin, Ireland. Modifications associated with the replacement of the ESPs with baghouses include the installation of new, larger induced draft fans to accommodate the resultant increased pressure drop across the units. The design of the proposed baghouses incorporates advances in the art of air pollution control which include low air-to-cloth ratios, advanced filtration systems and the use of advanced bag cleaning technology. The LDI system will allow for the processing of nonhazardous liquid wastes in each of the three (3) MWCs. The CCERA anticipates that implementation of the proposed air quality control system upgrade project will reduce average emissions of filterable particulate matter, metal, acid gas and oxides of nitrogen emissions from historical average levels measured at the CCERC. No increase in the emissions of any pollutant is expected to occur because of the proposed project.

The Application includes a Radius air permit application and certification form, equipment descriptions, revised emission calculations, preliminary air quality modeling results, an air quality modeling, and a proposed compliance plan. Also included are revised general arrangement drawings and a construction schedule. Consistent with the proposed air quality system design, the CCERA is proposing to reduce existing permitted emission limits for filterable particulate matter, cadmium, lead, mercury, sulfur dioxide, hydrogen chloride, hydrogen fluoride, oxides of nitrogen,

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total dioxins and furans, and 2,3,7,8-TCDD. Also, a new emission limit for $PM_{2.5}$ is included in the proposal.

Thank you for your consideration of this matter. If you any questions concerning the Application or the proposed project, please contact Mr. Gary Pierce of Covanta Environmental at (518) 207-7149.

Sincerely,

Todd Frace
Facility Manager

cc: F. Steitz - NJDEP
V. Korolev- NJDEP
T.Chleboski – NJDEP
J. Bernardino – Covanta
M. Van Brunt - Covanta
T Gregan - Covanta
P. Earls - Covanta
J. Walsh - Covanta
G. Pierce - Covanta

AECOM

Technical Support Document for the Camden County Energy Recovery Center Air Quality Control System Upgrade Project

Project number: 60654787

July 2022

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Quality information

Prepared by	Reviewed by		
			
Ian Miller	Brian Stormwind		

Revision History

Revision	Revision date	Details	Authorized	Name	Position

Prepared for:

Camden County Energy Recovery Associates, L.P.
Camden, NJ

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List of Acronyms

A/C	air-to-cloth ratio (units of feet per minute)
acfm	actual cubic feet per minute
AQCS	air quality control system
BACT	Best Available Control Technology
BOL	Bill of Lading
Btu/lb	British thermal units per pound
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CCERA	Camden County Energy Recovery Associates, LP
CCERC	Camden County Energy Recovery Center
CCMUA	Camden County Municipal Utilities Authority
Cd	cadmium
CDD/CDF	Dioxin/Furans means tetra-through-octa chlorinated dibenzo-p-dioxins and dibenzofurans
CDS	Circulating dry scrubber
CEMS	continuous emissions monitoring system
CO	carbon monoxide
CO_2	carbon dioxide
COMS	Continuous Opacity Monitoring System
Cr	chromium
°F	degrees Fahrenheit
DCS	distributed control system
deg	degrees
dscfm7	dry standard cubic feet per minute, corrected to seven percent oxygen
ECRRF	Essex County Resource Recovery Facility
ECS	Eddy Current Separator
ESP	electrostatic precipitator
FEHIS	Final Environmental and Health Impact Statement
ft	feet
ft/min	feet per minute
ft/sec	feet per second
GAQM	Guideline on Air Quality Models
GHG	greenhouse gases
GPM	gallons per minute
H_2SO_4	sulfuric acid mist
HAP	hazardous air pollutant
HCl	hydrogen chloride
HHV	higher heating value
Hg	mercury
ID	induced draft
km	kilometer
lbs/hr	pounds per hour
LDI	liquid direct injection
LN	low NOx
m	meters

MACT	Maximum Achievable Control
MCR	maximum continuous rating
$\mu g/m^3$	micrograms per cubic meter
µg/dscm7	micrograms per dry standard cubic meter, corrected to seven percent oxygen
mg/dscm7	milligrams per dry standard cubic meter, corrected to seven percent oxygen
MSW	municipal solid waste
MWe	megawatt (electrical)
MWC	municipal waste combustor
NAAQS	National Ambient Air Quality Standards
NESHAP	national emission standards for hazardous air pollutants
ng/dscm7	nanograms per dry standard cubic meter, corrected to seven percent oxygen
NH_3	ammonia
Ni	nickel
NJAAQS	New Jersey Ambient Air Quality Standards
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NO_X	nitrogen oxides
NSPS	new source performance standard
NSR	New Source Review
O_2	oxygen
O&M	operations and maintenance
%	percent
PAC	powdered activated carbon
PAH	polycyclic aromatic hydrocarbons
P&ID	piping and instrumentation diagram
Pb	lead
PM	particulate matter
$PM_{2.5}$	particulate matter sized 2.5 microns and smaller
PM_{10}	particulate matter sized 10 microns and smaller
POM	polycyclic organic matter
POTW	Publicly Owned Treatment Works
PPS	polyphenylene sulfide
PSD	Prevention of Significant Deterioration
PTE	potential to emit
PTFE	polytetrafluoroethylene
RACT	Reasonably Available Control Technology
RM	Reference Method
SIA	significant impact area
SIL	significant impact level
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
SOTA	state-of-the-art
TCDD	tetrachlorodibenzo-p-dioxin
tons/day	tons per day
tons/yr	tons per year
TSD	Technical Support Document

TXS	toxic substances
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds
WTE	waste-to-energy

1. Introduction

1.1 Project Summary

Camden County Energy Recovery Associates, L.P., ("CCERA"), a wholly owned subsidiary of Covanta Energy LLC ("Covanta Energy"), operates the Camden County Energy Recovery Center ("CCERC" or "the Facility") under Program Interest Number 51614. As shown in **Figure 1-1**, the CCERC is located at 600 Morgan Boulevard in the City of Camden, New Jersey. The Facility site is bordered by Interstate 676 on the east, Newton Creek on the south and the southern part of the west property line, an active Conrail right-of-way on the balance of the west property line, and Morgan Boulevard on the north. The CCERA holds an air pollution control operating permit ("Title V Operating Permit" or "Operating Permit") which was issued on December 22, 2004, and most recently amended on June 23, 2020, by the New Jersey Department of Environmental Protection ("NJDEP"). The current Operating Permit expires December 21, 2019, and is in the process of being renewed. The current Operating Permit remains in effect pursuant to the permit shield provisions of New Jersey Administrative Code ("N.J.A.C.") 7:27-22, Operating Permits.

The CCERA hereby submits this permit application ("Application") to the NJDEP seeking approval of modifications (the "Project") of the Operating Permit for the CCERC which includes the proposed conversion of the existing spray dryer scrubber on each Municipal Waste Combustion unit ("MWC") to a circulating dry scrubber ("CDS") system and replacement of the electrostatic precipitator ("ESP") on each MWC with a fabric filter baghouse. The changes also include improvements to the selective noncatalytic reduction ("SNCR") control system on each MWC, a Liquid Direct Injection ("LDI") delivery system to allow for the processing of nonhazardous liquid wastes in each of the three (3) MWCs, and associated modifications of the Facility to accommodate the proposed air quality control systems. To facilitate the conversion from spray dryer scrubber to CDS, a new hydrated lime silo will be installed and one (1) of the existing pebble lime silos will be converted to a hydrated lime silo. At that point, the other existing pebble lime silo will be removed from service. The current project schedule includes commencement of construction of the upgrade of the first MWC in 2024 and commencement of operation of all three upgraded MWCs by September 2026, contingent upon the timely receipt of required environmental and construction approvals. If the proposed changes at the CCERC perform as effectively as they have at other Covanta waste-to-energy ("WTE") facilities, there will be a reduction in emissions of filterable particulate matter, metal emissions, acidic gas emissions, and the emissions of oxides of nitrogen ("NO_X") from historical average levels measured at the Facility.

This Application and the associated scope of the Project proposes a reduction in both short term and long-term emission limits with **Section 2.5 Project Emissions** providing the full scope of proposed reductions. CCERA is proposing a reduction in short term emission permit limits for filterable particulate matter ("PM"), lead ("Pb"), cadmium ("Cd"), mercury ("Hg"), sulfur dioxide ("SO_2"), hydrogen chloride ("HCl"), hydrogen fluoride ("HF"), dioxin/furans ("CDD/CDF"), and 2,3,7,8-tetrachlorodibenzo-p-dioxin ("TCDD"). The pollutants with reductions in long-term ton per year emission limits per unit include PM, Pb, Cd, Hg, NO_X, SO_2, HCl, 2,3,7,8-TCDD, and HF. A new long-term emission limit for CDD/CDF is proposed.

1.2 Summary of Regulatory Requirements

The MWCs at the Facility are subject to existing New Source Performance Standards ("NSPS") and N.J.A.C. regulations which impose emission limitations, work practice requirements, and emission monitoring and testing conditions. The proposed Project will be a minor modification to the current CCERA's permit under N.J.A.C. 7:27-22.23. A detailed discussion of regulatory requirements applicable to the proposed Project is contained in **Section 3** of this Technical Support Document ("TSD") to the Application.

1.3 The Applicant

The applicant for this Application is CCERA. The primary contact with overall responsibility for this Application is:

Name Todd Frace
Title Facility Manager
Address 600 Morgan Boulevard, Camden, NJ 07105
Phone 856-966-7174
E-mail tfrace@covanta.com

The primary technical contact at the CCERA for this Application is:

Name Gary Pierce
Title Environmental Manager
Address 221 Harborside Drive, Schenectady, NY 12305
Phone 518-207-7149
E-mail gpierce@covantaenergy.com

AECOM was retained by the CCERA to perform the necessary technical analysis to support the Application. The primary contact at AECOM responsible for the preparation of the Application is:

Name Brian Stormwind
Title Associate Vice President, Manager, Air Quality Services - East
Address 250 Apollo Drive, Chelmsford, MA 01824
Phone 978-905-2413
E-mail Brian.Stormwind@aecom.com

1.4 The Application

The Application, which is a proposed minor modification to CCERA's Title V Operating Permit (Program Interest Number 51614), has been prepared using the NJDEP's RADIUS software. This TSD presents the regulatory review and engineering related information that supports the RADIUS application for the proposed Project. This TSD contains six (6) sections and seven (7) Appendices.

Section 1 – Introduction provides introductory information about the Project, regulatory requirements, and facility contact information.

Section 2 – Project Description provides a detailed project and process description and a project emissions summary.

Section 3 – Regulatory Review identifies the federal and state regulations and standards applicable to the Project and summarizes the requirements of the applicable regulations.

Section 4 – Control Technology Analysis provides the State of the Art ("SOTA") control technology evaluation of the proposed emissions control systems.

Section 5 – Preliminary Dispersion Modeling Analysis provides the results of preliminary dispersion modeling conducted to evaluate the air quality impact of emissions from the CCERC upon implementation of the proposed Project. The preliminary modeling was conducted in accordance with the Air Quality Modeling Protocol submitted with this TSD as **Appendix F** for NJDEP's review and approval prior to completing the final modeling.

Section 6 – References.

Appendix A – RADIUS Air Permit Application
Appendix B – Emissions Data and Calculations
Appendix C – Project Drawings
Appendix D – Baghouse System

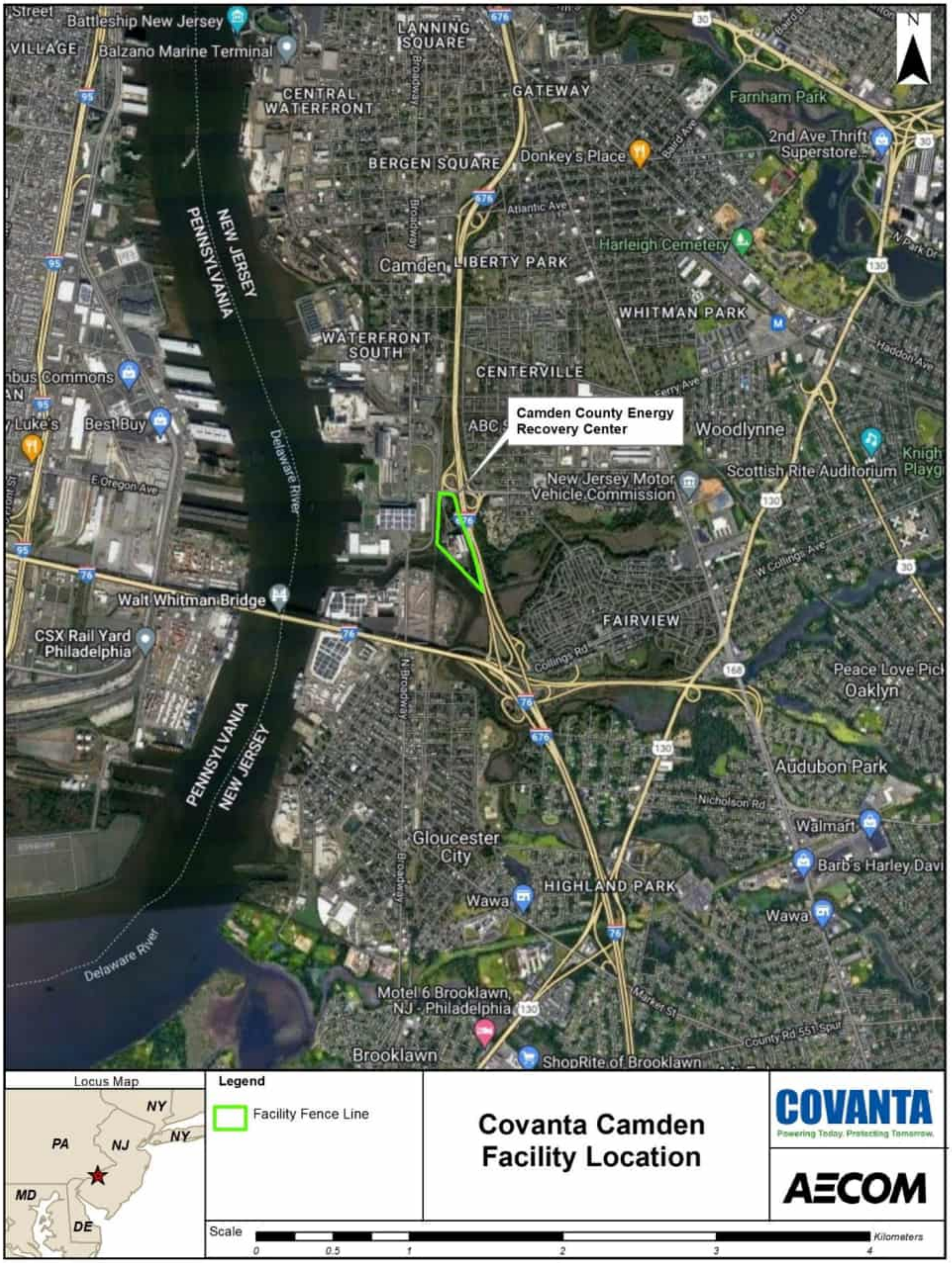


Figure 1-1. Location of Camden County Energy Recovery Center

2. Project Description

2.1 Project Overview

The proposed Project will be located at the existing CCERC (P.I. 51614) located at 600 Morgan Boulevard in Camden, NJ. The location of the Facility is shown above in **Figure 1-1**. The proposed Project at the Facility includes the same improvements to each of the three MWCs including the following scope: 1) convert the existing spray dryer scrubber to an evaporative cooler, 2) install a circulating dry scrubber reactor, 3) replace the existing ESP with a new fabric filter baghouse, 4) improve the existing SNCR control system, and 5) install an LDI system at the Facility. The CCERC is an existing major source subject to air permitting under N.J.A.C. 7:27-22, Operating Permits, as well as a major source of hazardous air pollutants ("HAPs"). As noted in **Section 1.1**, CCERC is proposing a reduction in both short term and long-term emission limits. The scope of reduction in emission limits from the current operating permit is summarized in **Table 2-1.**

Table 2-1. Summary of Project Emissions Reductions

Pollutant	Short Term Emission Limit	Annual Tons Per Year
PM	Yes	Yes
Pb	Yes	Yes
Cd	Yes	Yes
Hg	Yes	Yes
CDD/CDF	Yes	Yes*
2,3,7,8-TCDD	Yes	Yes
NO_X	No	Yes
SO_2	Yes (1-hr and 24-hour limits)	Yes
HCl	Yes	Yes
HF	Yes	Yes

* No existing permit limit.

2.2 Existing Facility Description

The CCERC is a WTE facility that produces high temperature, high pressure ("superheated") steam from the combustion of solid waste. The steam is utilized to generate electricity at the Facility for in-plant use and for sale to the electrical grid for distribution.

The Facility is currently permitted to accept and process the following waste types:

- ID 10 – Municipal Waste (household, commercial, and institutional);
- ID 13/13C - Bulky Waste (except for major motor vehicle parts, noncombustible construction material, and noncombustible demolition debris);
- ID 23- Vegetative Waste;
- ID 25- Animal and Food Processing Waste; and
- ID 27- Dry Industrial Waste (except for asbestos and Asbestos-containing wastes, dry non-hazardous pesticides, non-hazardous oil and chemical spill clean-up waste, dry non-hazardous chemical waste, and hazardous waste as defined in N.J.A.C. 7:260-1 et seq. and 40 CFR 261 which is generated by small quantity generators as defined in N.J.A.C. 7:260-1 et seq.).

The Facility is permitted to process up to 451,140 tons of solid waste per year. The rate at which the Facility can process waste is further limited by two (2) steam production rates: 1) a maximum steam production rate not to exceed 421,600 pounds per MWC (at a temperature of approximately 750 degrees ºF and a pressure of approximately 660 psig) over any discrete block - 4-hour period (i.e., 12-4 AM, 4-8 AM, 8 AM-12 PM, etc.), and 2) 110% of the steam rate monitored during the most recent, compliant CDD/CDF emission test in accordance with 40 CFR 60.51b. The more stringent of the two (2) would apply. Also, each MWC is limited to 8,256 operating hours per year.

The Facility operates twenty-four (24) hours per day, seven (7) days per week. Waste deliveries are made to the facility Monday through Friday, from 7:00 AM to 5:00 PM and on Saturday between 7:00 AM to 12:00 PM.

The Facility is equipped with three (3) identically sized and independent MWCs for the incineration of waste, the generation of steam, and the handling of process by-products. The Facility generates high temperature, high pressure (superheated) steam. The steam is passed through a turbine which drives a generator that produces electricity. Steam is condensed and returned to the boiler after it is passed through water conditioners, and where necessary, make-up water is added. The cooling water is passed inside the heat transfer tubes to greatly reduce the process steam temperature and pressure, which condenses the steam to liquid. The cooling water is then circulated over a cooling tower to reject the waste heat. Each of the turbine generators is rated at 17.5 electrical megawatts (“MWe”) for a facility total of 35 MWe.

Each of the three (3) MWCs includes the following combustion equipment: a charging hopper (which is loaded from the refuse pit by an overhead crane), a feed chute and charging throat, ram feeders (to push the waste onto a grate), and a reciprocating inclined grate which carries the burning waste through the combustion process. The combustion system also includes forced draft fans, steam-heated air pre-heaters, an over-fire air system, auxiliary burners, flues, and ducts. Each MWC unit also has its own steam generation equipment including: waterwall tubes (water-filled tubes which line the large combustion chamber), superheater, attemperator, boiler generating bank, steam drum, a natural (convection) circulation system, and economizers. Auxiliary burners are utilized (as necessary) to comply with the conditions of the Operating Permit.

Each MWC unit is currently equipped with an air quality control system that includes an automatic combustion control system for maintaining a steam setpoint while also maintaining low concentrations of carbon monoxide (“CO”), an SNCR system for controlling the NO_X emissions, an activated carbon injection system for the control of mercury and CDD/CDF emissions, a spray dryer scrubber system for the removal of acid gases (primarily SO_2 and HCl), and an ESP for the removal of particulate matter including metals. The combustion gas is cooled in the spray dryer scrubber system by evaporating a water slurry containing calcium hydroxide (a lime slurry). As the gas is cooled, the acidic compounds in the gas react with the alkaline reagent to form solid salts. The ESP removes PM by charging particulate for subsequent collection by collection plates (aka electrodes). The fly ash that is collected by the ESP is sent to a conditioning system, after which it is combined with bottom ash and disposed of at a licensed landfill.

The quenched bottom ash from the extractors is conveyed to a permanent drum magnetic separator that removes ferrous metals from the bottom ash residue. After ferrous metal recovery, the bottom ash is transferred to an Eddy Current Separator (“ECS”) where non-ferrous metal is recovered from the bottom ash for sale to the secondary market. The remaining bottom ash is combined with the fly ash collected by the air pollution control equipment, analyzed as per NJDEP requirements, and disposed of at a licensed landfill.

The Facility has a continuous emissions monitoring system (“CEMS”) that monitors the following parameters: oxygen (“O_2”), SO_2, CO, NO_X, and a Continuous Opacity Monitoring System (“COMS”) for opacity. An induced draft (“ID”) fan for each MWC unit draws the gases through the boiler passes and the air pollution control systems to the stack. The existing stack (365 feet high) contains four (4) flues, one (1) for each of the three (3) MWC units, and one (1) which is not currently in use. The flue which is currently not in use will be utilized during the control equipment changeover this change is discussed further in **Section 2.3.5** and shown in **Figure 2-4**.

2.3 Project Description

The proposed air quality control system ("AQCS") upgrade project for each MWC includes improvements to several existing facility components summarized in **Table 2-2**.

Table 2-2. Summary of AQCS Project Improvements

Existing	Improvement
SNCR system with semi-automatic controls	Advanced controls will provide automatic control of urea feed rate including feedback control from stack NO_X analyzer.
	Use of LDI in one (1) or both injector levels to assist in the reduction of NO_X formation while reducing or eliminating the need to use potable water.
Spray dryer scrubber evaporating lime slurry to control flue gas temperature and acid gases	Modify each spray dryer to be an evaporative tower where it is only evaporating water to maintain a flue gas temperature setpoint. Lime slurry will not be used with the dry recirculation system.
	Addition of circulating dry scrubber reactor where hydrated lime will be injected into the reactor. Residue with unreacted lime and carbon can be re-used for controlling emissions.
	Additional residue conveyors are included to enable the collection and controlled transfer of residue to either the CDS reactor or a disposal point where it would then be mixed with bottom ash.
Electrostatic precipitator for control of solid particulate	Replacement with a fabric filter baghouse where fly ash collected on the surface of the bags, inclusive of fresh and recirculated reagents, is available to provide improved control of filterable and gas phase emissions.
	A fabric filter baghouse control system to provide steady state operating conditions for filter cake management.

As noted above in the SNCR improvements, the Project also includes installation of an LDI system to provide the ability to process nonhazardous liquid wastes in each of the MWC units. The existing SNCR system has two (2) injection levels for urea blended with carrier water. Only the upper-level nozzles are currently being used for the operation of the SNCR system. Injection of LDI through the lower-level nozzles will facilitate NO_X reduction while injection of LDI as carrier liquid for urea in the upper level will maintain existing emission control with the benefit of elimination of the need to use potable water.

The flue gas from each MWC is discharged to the atmosphere through dedicated flues in the existing stack. No changes are proposed to the flues however the induced draft fan that manages flue gas flow from the furnace through the stack will be changed to accommodate the increased pressure drop attributable to the CDS and fabric filter.

2.3.1 SNCR Controls Upgrade

The semi-automatic SNCR control system for each MWC unit will be upgraded to an automated system to ensure compliance with short-term and long-term NO_X emissions and to reduce annual emissions of NOx from the Facility to below the levels emitted in 2020 and 2021. The key improvement will be the continuous modulation of urea injection using information from the NOx CEMS located at the boiler outlet to meet a NOx stack concentration set point. The existing 8,000-gallon urea storage tank will continue to be used. Each MWC will continue to have the two (2) existing levels of nozzles available for injection of urea mixed with carrier water and/or LDI water. The LDI system is discussed in **Section 2.4**.

2.3.2 Scrubbing System Modification

The existing spray dryer scrubber system on each MWC unit will be changed to a CDS system with fly ash reinjection. For optimum acid gas neutralization reactions to occur, the flue gas temperature must be maintained at a specific setpoint. The flue gas temperature at the outlet of the evaporative cooler will be maintained at the setpoint by modulating the injection rate of water into the flue gas in the existing spray dryer which will be converted into an evaporative cooler. The flue gas temperature at the spray dryer (evaporative cooler) is continuously monitored and will provide a feedback signal to the water control logic.

The existing lances and dual fluid nozzles and/or new and improved nozzles for the spray dryer system, will be used to atomize water into the flue gas stream. The dual fluid nozzles use compressed air to atomize water. The water used for reducing flue gas temperature is wastewater from the holding tank that includes boiler blow down, reverse osmosis reject water, and City water as required.

The existing ductwork that connects the existing spray dryer and ESP will be modified to transport flue gas to the new baghouse. Flue gas from the evaporator will initially go through the CDS reactor where both fresh reagents (powdered activated carbon ["PAC"] and hydrated lime) and recirculated residue will be injected. An additional device referenced as a crusher is an integral part of the CDS and is provided to break up any large particles that have fallen out of the flue gas stream. The small particles are collected through a rotary valve and conveyed via screw conveyor to the CDS reactor where they are re-entrained into the flue gas stream. The scope and detail of the final CDS design will be documented during the final design phase.

The locations of the proposed CDS and fabric filter baghouses are shown on **Drawing Camden Site Plot Plan, Proposed Baghouse Location** in **Appendix C**.

The injection rate of hydrated lime flow to each reactor is automatically adjusted based on feedback from the stack SO_2 analyzer. The quantity of lime metered is managed by a weigh feeder with each unit.

The injection rate of PAC is a constant rate that is established during the most recent compliance stack test. A dedicated PAC feeder system ensures that the minimum flow rate is maintained. PAC is presently injected at the economizer location however that may change to the CDS reactor.

Circulating dry scrubber technology is defined as Best Available Techniques by the European Union and is working very well at Covanta's Durham-York, Ontario, Canada and Dublin, Ireland facilities. The technology improves contact between acid gases, mercury and organic substances with lime and activated carbon to increase the residence time for the reagents to react with the contaminants in the system. These advantages along with the fly ash reinjection improve control efficiencies, optimize reagent usage, and reduce ash disposal volumes.

2.3.3 Baghouse

The baghouse provided to replace each ESP is a complete system that includes all necessary mechanical, structural and electrical components. The following is a general description with the final scope and design to be confirmed during the design phase of the Project. Additional information is also provided in **Section 4.1 State of the Art Analysis ("SOTA")** and **Appendix D**.

Flue gas exiting the CDS reactor then enters the baghouse for removal of filterable particulate matter and gas phase pollutants. Filterable particulate matter consisting of fly ash from the combustion process, fresh reagents, and recirculated residue is collected on the surface of filter bags to form a filter cake that helps to remove filterable and gas phase pollutants from the flue gas.

Flue gas from the CDS is managed by a system of manifolds to optimize distribution of flue gas and particulate to each module while also minimizing pressure drop. That system includes:

- An inlet manifold that is the length of the baghouse and distributes flue gas to all six (6) modules; three (3) on the left and three (3) on the right. Flue gas velocity is reduced in this manifold to reduce pressure drop and optimize distribution to each of the six (6) modules. A mechanical conveyor on the bottom of this inlet manifold collects and transports any large particulate that may drop out from the reduced velocity.

- Each of the six (6) modules is designed for a side inlet of flue gas instead of the conventional hopper inlet used at many existing baghouses. This design allows for improved distribution of flue gas and particulate along the entire length of the bags while promoting a more effective filter cake in all bags.
- One (1) common outlet manifold that is the length of the baghouse receives flue gas from each of the six (6) modules.
- Each module is provided with a manually operated inlet damper (butterfly type) and a pneumatically operated outlet damper (poppet type).

Each baghouse will be comprised of six (6) modules, each of which has its own bag cleaning system that uses an on-line pulse jet cleaning technology. The six (6) modules provide a nominal 2.3 gross air to cloth ratio at normal expected operating conditions. The filter bags for collecting fly ash will be fabricated of 260 - 550 g/m^2 (17 oz/yd^2) polyphenylene sulfide ("PPS") bags with a polytetrafluoroethylene ("PTFE") finish however alternative bags may be considered to recognize improvements in bag filter technology. Each filter bag is supported from within by a wire cage. The wire cages prevent the collapse of the filter bags during the filtering operation.

More information regarding the preliminary baghouse design is presented in **Appendix D**.

To keep system draft pressure drop at an acceptable level, the filter bags are periodically cleaned of some of the fly ash collected on the surface of the bags. The baghouse cleans the bags using a short pulse of compressed air directed into the clean interior of the bags from their top ends which are open. The compressed air pulse, opposite to the direction of gas flow, expands the bag which causes some of the collected fly ash (filter cake) on the outside of the bag to fall into the hopper below. Each module is equipped with a vibrator to help fluidize the collected fly ash for deposition into the fly ash collection and transport system. The scope and design of conveyors and associated equipment for collecting and managing the amount of fly ash directed to recirculation and disposal will be confirmed during the final design phase. Fly ash and bottom ash will continue to be combined to ensure that there is only one (1) residue from combustion that is disposed of at a landfill. Each module is also able to be isolated via a manual gate valve should it need to be taken out of service for any necessary maintenance.

2.3.4 Fly Ash Recirculation System

The fly ash recirculation system is a series of mechanical conveyors and other equipment that will be designed to re-inject a fraction of the total amount of fly ash from the baghouse and convey the balance to the fly ash conditioning system in the Residue Building. The following is a general description with the final scope and design to be confirmed during the design phase of the Project. All conveyors are self-contained and are interconnected to prevent the release of fly ash to the local environment.

There are several conveyors provided with each baghouse including: 1) A conveyor that collects the captured fly ash from the inlet chamber, 2) a conveyor that collects the captured fly ash from the three (3) modules on the east side of the baghouse, and 3) a conveyor that collects the captured fly ash from the three (3) modules on the west side of the baghouse. These conveyors can convey the fly ash to two (2) different destinations. In normal operating mode, the conveyors will drop the fly ash into the main collection screw that leads to the recirculation hopper. The conveyors may also be reversed and drop fly ash into the emergency collection conveyor that leads directly to the conveyors that transport the ash to the residue building. Each conveyor transition chute is equipped with a manual knife gate valve to isolate the conveyor for maintenance.

The main collection screw conveyor drops the fly ash through a rotary valve into the recirculation hopper. From the recirculation hopper, the fly ash is either metered back into the flue gas stream or skimmed off to the Residue Building for conditioning and disposal. The skimming screw skims excess fly ash from the recirculation hopper and transports it to the fly ash transfer conveying system that leads to the Residue Building. The skimming screw drops the ash through a rotary valve into the connecting conveyor.

The recirculation hopper has a bifurcated chute equipped with manual knife gate valves for isolation purposes. Fly ash is metered back into the flue gas stream via adjustable speed rotary valves and below the hopper. These valves meter the ash into two (2) double shaft mixers. These mixers condition the ash with wastewater from the wastewater holding tank. Wastewater is controlled using a series of valves at different locations in the mixers. This additional moisture content improves the reaction efficiency of the hydrated lime in the fly ash and reduces the flue gas temperature within the reactor. After mixing, the recycled ash is injected into the reactor chamber and flows back into the baghouse.

2.3.5 Baghouse Outlet Duct, ID Fan and Stack

The outlet duct of each baghouse directs scrubbed flue gas to the ID fan for each boiler and ultimately to its flue in the stack for discharge to the atmosphere. For maintenance purposes, the ID fan outlet duct on each boiler can be isolated with a manual guillotine damper located just before the junction of the three (3) flue gas ducts.

The existing ID fans are not capable of supporting the increased pressure drop across the entire MWC unit resulting from the new fabric filters and CDS equipment. Therefore, it will be necessary to increase the size and capacity of the ID fans and motors. Since the new ID fans will be capable of greater draft, it is anticipated that some structural reinforcing of the boilers, flue gas path equipment and ductwork may be needed.

The proposed baghouse for each combustion unit will be located downstream of its recirculating dry scrubber reactor. Cleaned exhaust gas will pass through from each unit to its individual flue in the stack. During construction, the fourth flue in the existing stack (see **Figure 2-4** below) will be used to assist in sequencing construction and operation of the upgrade project to minimize the amount of downtime to install and tie-in the baghouses. This flue has the same dimensions as the three (3) existing flues presently in use. The fourth flue will be utilized as the new Unit No. 3 flue. Then the former Unit No. 3 flue will be used as the new Unit No. 2 flue. The former Unit No. 2 flue will be used as the new Unit No. 1 flue. Finally, the former Unit No. 1 flue will be blanked off. This layout will optimize the alignment of the ID fans, ductwork, and the stack. CCERC proposes to relocate the CEMS, COMS and test ports from the stack to the respective flues.

2.3.6 Hydrated Lime Storage Silo

Two (2) hydrated lime silos will be used as the long-term system for ensuring adequate supply of lime reagent for all three (3) MWCs. One (1) of the hydrated lime silos will be new with the second silo being one (1) of the two (2) existing pebble lime silos that will be re-purposed for hydrated lime. Eventually one (1) of the two (2) existing pebble lime silos will be removed from the site.

The new field-erected hydrated lime storage silo will be approximately 13 feet in diameter and 43.75 feet straight-side storage height, which includes four (4) feet of freeboard. Hydrated lime will be delivered to the plant via pneumatic self-unloading truck trailers. The lime will be conveyed vertically from grade to the top of the lime silo through 4-inch diameter piping. The lime loading panel is located by the Powdered Activated Carbon Silo at the southeast corner of the Air Quality Control Building.

Conveying air is vented from the lime silo during lime unloading by the silo vent filter exhaust fan and passes through the lime bin vent filter before exhausting to atmosphere. The lime bin vent filter utilizes a fabric media to remove entrained lime from the vented air.

The lime storage bin has a capacity of 5300 ft^3 or approximately 92.75 tons @ a lime density of 35 lbs/ft^3. A double bifurcated chute discharge is located at the bottom of a 60-degree conical hopper. Three (3) of four (4) chutes are for delivery of the hydrated lime, one (1) dedicated to each unit's APC system. The fourth chute will serve as a manual backup to all three (3) unit's APC system. The bin will also be equipped with a vacuum/pressure relief valve to relieve excess pressure or vacuum that may occur within the bin.

Three (3) gravimetric feeders will be provided, one (1) per MWC, to weigh and distribute the specified quantity of lime into the APC lime transport conveyor or the stand-by lime/air eductor system. Feed rates are adjustable through a distributed control system. The lime feed conveyor receives lime from the lime weighing system and drops it into the reactor screw conveyor which leads to the reaction chamber where the lime is entrained in the flue gas. The lime feed screw conveyors are backed up by a pneumatic conveyance system based on eduction. The blower forces air through the educator which sucks (educts) lime into the air stream to convey it into the reaction chamber. The eductor is equipped with a compressed air purge valve to help avoid and clear clogs.

As the AQCS are changed over from spray dryer scrubbers to CDS systems, one (1) of the existing 3,500 ft^3 pebble lime silos (Emission Unit U5 or U6) will be converted into a hydrated lime silo. The lime bag breaker (Emission Unit U8) will no longer be used after the AQCS changes are completed for all three (3) units.

2.4 Liquid Direct Injection ("LDI") System

2.4.1 General Description of LDI System Including Waste Evaluation Procedure

The Project includes installation and operation of an LDI system similar to the system installed and operated at Covanta's former Warren County Facility in Oxford, New Jersey. Covanta Warren was approved for and used LDI from 2015 until plant operations were suspended in 2019. LDI is a proven, environmentally sound method for the disposal of non-hazardous industrial liquid waste streams (Type 72 wastes) as an alternative to disposal at Publicly Owned Treatment Works ("POTW"), land application, discharge to surface impoundments, etc. LDI is currently being successfully used to dispose of externally generated non-hazardous liquid waste streams at other Covanta WTE facilities including Covanta Niagara located in Niagara Falls, New York, and Covanta Indianapolis, located in Indianapolis, Indiana.

The proposed LDI system for the CCERC will allow for unloading liquid waste tankers into two (2) 50,000-gallon storage tanks and injecting the non-hazardous liquids directly into the MWC furnace, through the existing urea injection system. Once injected, the water is instantly vaporized, and trace contaminants are either destroyed by the elevated furnace flue gas temperature and/or captured by the air pollution control equipment.

The location of the proposed LDI system is shown in **Drawing Camden Site Plot Plan, Proposed LDI Location** in **Appendix C**. A general overview of the proposed LDI system at the CCERC is shown in below in **Figure 2-1**. The LDI system will consist of a truck unloading containment area and one (1) pump station that will service all three (3) MWCs. The pump station includes two (2) unloading pumps and two (2) storage tanks located inside the southwest corner of the Waste Receiving Building and two (2) 100% transfer pumps that will be in the Boiler Building to transfer the Type 72 liquid waste from the two (2) storage tanks to any of the three (3) respective boiler injection nozzles. Type 72 waste will be injected to the furnace through either or both levels of existing nozzles associated with the SNCR system.

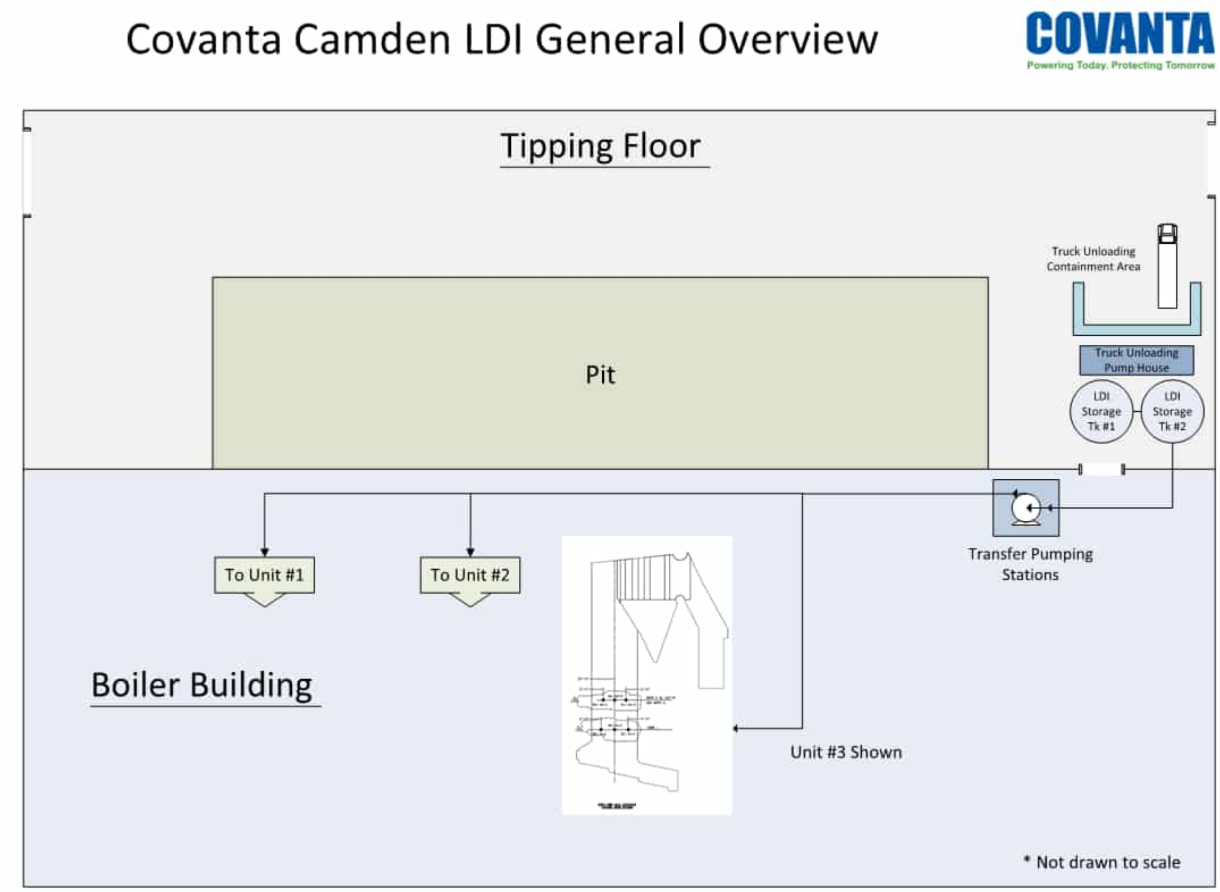


Figure 2-1. LDI System Overview

The scope of the LDI system includes: 1) screening of waste deliveries, 2) receipt after confirming that waste has been approved for delivery, 3) off-loading and temporary storage of Type 72 liquid waste prior to processing and, 4) transfer and processing of Type 72 liquid waste by direct injection into the boilers. Tanker trucks will enter the Facility via the scale house where the trucks will be weighed, and paperwork reviewed to ensure that only approved waste is accepted and that the contents of the delivery vehicle matches the paperwork. Paperwork will include the manifest, a certification that the material is non-hazardous, and pre-shipment notification/certificate of disposal.

After being weighed in, the trucks will then proceed to the unloading containment area located inside of the southwest corner of the tipping floor in the Waste Receiving Building. Once positioned for unloading, Facility personnel will check the bill of lading and other paperwork for contents and load size. Each load will be tested for pH and reactivity with the contents of tank designated for unloading. If the material does not meet the pH specification of 4-10 or is reactive, the load will be rejected.

The trucks will be offloaded via one (1) of two (2) truck unloading pumps sized to allow for unloading in 20 minutes. A piping and instrumentation diagram ("P&ID") of the truck unloading system is presented in **Drawing PIM 4740-P-001** in **Appendix C.** The trucks will be unloaded into one (1) of two (2) tanks located within the containment area inside the tipping hall. A strainer upstream of the pumps will protect the pumps from solids contained in the liquid waste streams. The liquid waste will be pumped to one (1) of the two (2) storage tanks located on the tipping floor. Each tank will be equipped with a carbon filter on the vent for odor control.

The LDI pump system includes one (1) common delivery line for all three (3) MWCS and a common return line to the LDI storage tank. Each of the two (2) transfer pumps are rated in excess of the total flow capacity into the three (3) MWCs to allow for additional flow for recirculation back into the storage tanks. A P&ID of the liquid waste transfer pumping system is presented in **Drawing PIM 4740-P-002** in **Appendix C.** The system will normally operate with only one (1) pump running at constant nominal 30 gallons per minute ("GPM") which includes the maximum amount of six (6) GPM per unit and an amount for recirculation (nominally 18 GPM). Shutoff valves to each boiler and a flow transmitter in the main vertical transfer line will provide feedback to the recycle valves back to the tank to ensure that maximum injection rates are not exceeded. A P&ID of the LDI boiler injection system is also presented in **Drawing PIM 4740-P-003** in **Appendix C.** Flow to each boiler will be totalized in the distributed control system ("DCS") from a flow measurement in the line to each boiler injection point and is controlled using a manual globe valve.

The LDI system is designed to receive and process Type 72 non-hazardous liquid waste by liquid direct injection. The specific non-hazardous liquid waste streams that will be accepted at the Facility are only those that are approved in accordance with the Covanta Review Process (See **Appendix E, Waste Approval Process Flow Chart**).

Type 72 Liquid Waste is defined in N.J.A.C. 7:26-2.13(h)(1)(i) as follows:

> *<u>Type 72 Non-hazardous liquid and semi-liquids</u>: Liquid or a mixture consisting of solid matter suspended in a liquid media which is contained within, or is discharged from, any one vessel, tank or other container which has the capacity of 20 gallons or more. Also included are non-hazardous pesticide liquids. Not included in this waste classification are septic tank clean-out wastes and liquid sewage sludge.*

Only waste streams meeting this definition and deemed acceptable in accordance with the Covanta's waste approval process will be accepted for processing at the Camden Facility. The waste approval process will be the same as was used for the LDI Program at the Covanta Warren Facility. Only Type 72 non-hazardous liquid waste streams that are approved through this process will be accepted at the CCERC. **Appendix E** provides the Waste Approval Process Flow Chart which will be used at the Facility. Each accepted waste stream will be re-evaluated every two (2) years, and the most recent date of approval recorded on the Facility's list of acceptable LDI waste streams. CCERA will notify the NJDEP's Bureau of Solid Waste Permitting, the Bureau of Solid Waste Compliance and Enforcement, and the Bureau of Air Permitting and Enforcement, by email when a new stream is accepted for disposal.

The CCERA will also continue to employ the sampling procedure utilized during the LDI Program at the Covanta Warren Facility for ensuring that incoming material is compliant with all approved paperwork, including conducting a pH test and reactivity test of each load as follows (a more specific operational procedure will be outlined in the updated O&M Manual for the Facility):

- Collect a sample of material;
- Measure the pH of the sample;
- Compare the pH of the material with the paperwork for the load;
- Reject the load if the pH is not consistent with pH listed on the waste manifest; and
- For the reactivity test, collect a sample from the delivery vehicle and a sample from the storage tank before any new liquid is added to the tank. Combine the samples and let the mixture stand for three (3) minutes. Reject the load if any reaction occurs that would affect transfer and destruction of the waste.

Table 2-3 below lists some examples of Type 72 liquid waste that were processed at the Covanta Warren Facility.

Table 2-3. Covanta Warren LDI Waste Steam Examples

Name/ID	Waste Description	Delivery Frequency
9014	LDI Liquids	Ongoing
9641	Triton X Grey Water	Ongoing
9705	Neutralized Water	Ongoing
9820	Bulk non-hazardous waters	Ongoing
10818	Reactor Waste Water Condensate	Ongoing
13175	Bulk Pharmaceutical Waste Water	Ongoing
13175	Bulk Pharmaceutical Waste Water	Ongoing
13726	Reactor Waste Water Condensate	Ongoing
13933	Rinse Water	Ongoing
13957	Latex Wash	Ongoing
13960	Boiler Wash – Cuprox Stage	Single Event
13961	Boiler Wash – Rinse Stage	Single Event
13962	Boiler Wash – ICOR Stage	Single Event
14017	Waste Scrubber Water	Ongoing
14065	Boiler Wash Rinse Stage	Single Event
14301	DMSO Wastewater	Ongoing
14383	Process Scrubber Water	Ongoing

The LDI system also can process internally generated process wastewater directly into the MWCs. This would minimize the quantity of process wastewater that is discharged to the Camden County Municipal Utilities Authority ("CCMUA") Sewage Treatment Plant. Process wastewater includes facility cooling tower blowdown and wash-down water.

2.4.2 System Processing Rate

The LDI system will be designed to process approximately 26,000 gallons per day of Type 72 waste at a nominal flow rate of six (6) GPM per boiler. This rate equates to processing approximately 182,000 gallons of Type 72 waste per week.

The system is designed with two (2) 100 GPM unloading pumps that can be used to simultaneously unload two (2) LDI trucks having a nominal capacity of 5,000 gallons. The Facility will manage deliveries weekly to ensure that accumulation beyond the storage volumes will not occur.

The unloading pumps are designed for tanker parking times of 60 minutes, including time for Bill of Lading ("BOL") review, sampling and hose connect and disconnect time.

2.4.3 Traffic

LDI shipments will be received during normal waste receiving hours and will follow the truck routes established in the Camden County District Solid Waste Management Plan. Up to eight (8) LDI delivery vehicles per day will deliver Type 72 liquid waste to the Facility during waste receiving hours. The flow of on-site traffic is shown on **Figure 2-2** below. LDI vehicles will be weighed-in at the Facility's scale house and directed to the LDI Unloading Area. When added to average daily two-way truck traffic associated with the Facility, traffic volumes will remain well below maximum traffic volumes evaluated in the Final Environmental and Health Impact Statement ("FEHIS") for the Facility. LDI tons will displace MSW tons depending upon the LDI processing rate because the weight of the LDI processed will count toward the Facility's total annual waste limit of 451,140 tons.

Figure 2-2. On-Site Traffic Pattern

2.4.4 Truck Unloading / Spills

Trucks will unload via a truck unloading system into one (1) of two (2) tanks located in the southwest corner of the tipping floor. The unloading area will be graded towards a curbed containment system that will collect any spillage during the unloading of material. This will prevent any potential spillage during the unloading process from traveling beyond the containment area. Unloading procedures will be in place to mitigate the potential for any discharges.

The unloading pumps will have a local control station with run/stop control. The storage tanks will have level transmitter and level indication, high-high, high, low, and low-low level alarms to the DCS. The high-high level alarm will be interlocked with the unloading pumps. The low-low level alarm will be interlocked with the transfer pumps.

A spill kit will also be maintained in the immediate area of the storage tanks in the unlikely event a spill should occur.

2.4.5 Air Emissions and LDI

Section 2.4.1 provided a general description of the LDI system. Key points relative to air emissions are:

- Each liquid waste from each generator is evaluated including an assessment of its chemical composition;
- The manifesting system at CCERC will verify that only approved liquids will be accepted for disposal;
- Liquids with known or suspected heavy metal content are not allowed for disposal;
- Liquids are injected in a high temperature area of the furnace where thermal destruction of organics would occur;
- LDI is a small fraction (approximately 8% by weight) of the permitted annual total amount of solid waste;
- Generally, more than 95% of LDI is water. The remaining constituents (5% or less) would be similar to those found in MSW; and
- Because of the high water content, the overall amount of combustible material will be lower relative to not processing LDI, as the water weight will count toward the Facility's total waste limitation.

A statistical analysis of similar LDI programs at two (2) other MWC facilities found no statistically significant increase in Facility emissions. **Table 2-4** presents results from the Covanta Warren MWC Facility and **Table 2-5** presents results from the Covanta Indianapolis MWC Facility. Both tables are organized to include average stack emissions with and without LDI. When reviewing these tables, it is important to note that:

- All average emission concentrations with and without LDI were well below the stack limit. This is important by itself, but also because the absolute values of emissions are at inherently low values relative to the permit limit, so any variation that appears to be large relative to a higher average stack value is small relative to the stack limit.
- Emissions concentrations vary for a variety of factors. Statistical analysis, using the Student's T-Test is used to determine if the processing of LDI results in significant changes in emissions that are outside of normal variation.
- The statistical comparison performed using the Student's T-Test comparing two samples, with and without LDI, found no statistically significant increase in emissions with LDI at a 95% confidence level. Several statistically significant decreases in emissions were found with LDI, particularly at the Indianapolis facility. However, statistical comparisons cannot assess causation, so the decrease cannot necessarily be attributed to LDI.

Table 2-4. LDI Emissions Data – Covanta Warren WTE

Parameter	Emission Limit	2013 - 2015 without LDI Average	2013 - 2015 without LDI % Below Limit	2016 - 2018 with LDI Average	2016 - 2018 with LDI % Below Limit	Statistical Comparison T-test p-value	Statistical Comparison Conclusion
Cadmium (µg/dscm)	35	1.0	97%	0.9	97%	0.897	No Change
HCl (ppm)	29	2.3	92%	1.8	94%	0.616	No Change
Lead (µg/dscm)	400	17.0	96%	24.4	94%	0.388	No Change
Mercury (µg/dscm)	50	4.2	92%	1.0	98%	0.331	No Change
PCDD/F Total (ng/dscm)	30	3.3	89%	5.5	82%	0.578	No Change
PM - Filterable (mg/dscm)	25	1.3	95%	2.9	88%	0.340	No Change
NO_X (ppm)	205	136.5	33%	128.0	38%	0.033	Decrease
SO_2 (ppm)	29	7.5	74%	4.3	85%	0.028	Decrease

Notes:
- All emissions and results are corrected to 7% Oxygen, as required by permit
- Statistical evaluation completed using the Student's t-test for comparing two samples, Significance evaluated at 95% confidence level (i.e. p-values less than 0.05 indicate a significant difference between the two (2) samples: LDI and without LDI).

Table 2-5. LDI Emissions Data – Covanta Indianapolis WTE

Parameter	Emission Limit	2008 - 2010 without LDI Average	2008 - 2010 without LDI % Below Limit	2012 - 2014 with LDI Average	2012 - 2014 with LDI % Below Limit	Statistical Comparison T-test p-value	Statistical Comparison Conclusion
Cadmium (µg/dscm)	35	0.8	98	0.3	99	0.0004	Decrease
HCl (ppm)	29	19.5	33	3.8	87	1.4E-12	Decrease
Lead (µg/dscm)	400	7.4	98	2.6	99	0.0001	Decrease
Mercury (µg/dscm)	50	7.6	85	1.1	97	2.0E-07	Decrease
PCDD/F Total (ng/dscm)	30	5.8	81	1.5	95	1.1E-05	Decrease
PM - Filterable (mg/dscm)	25	4.0	84	2.0	92	0.11	No change
NO_X (ppm)	205	169.4	17	159.9	22	0.275	No change
SO_2 (ppm)	29	11.6	60	8.4	71	0.04	Decrease

Notes:
- All emissions and results are corrected to 7% Oxygen, as required by permit
- Statistical evaluation completed using the Student's t-test for comparing two samples, Significance evaluated at 95% confidence level (i.e. p-values less than 0.05 indicate a significant difference between the two (2) samples: LDI and without LDI).

The data in **Tables 2-4** and **2-5** demonstrate that the injection of LDI at the Covanta Warren and Indianapolis MWCs did not contribute to a significant increase in emissions. The same result is expected for the CCERC. Stack compliance testing at the CCERC will be conducted with LDI in operation. The CEMS system for continuous monitoring of SO_2, NOx, and CO will also be on-line monitoring emissions during all periods of operation including periods with and without LDI.

2.4.6 Odor

Since the proposed LDI system is self-contained, odor issues are not anticipated. The storage tanks will be fitted with carbon filters to prevent odors during tank filling and operation. Also, the storage tanks will be located within the Waste Receiving Building which is maintained under negative pressure for odor control. Odor inspections will be conducted and recorded daily, and during each offload in accordance with the Operations and Maintenance Manual (“O&M Manual”). The O&M Manual contains actions required if odor is detected during an inspection.

- If odor is present during an inspection the facility supervisor will be contacted immediately;
- An immediate inspection of the LDI system will take place; and
- If the inspection does not reveal the source of the odor the LDI system will be paused until the odor is under control and the situation remediated.

2.4.7 Noise

No new equipment will be added outdoors. Equipment added within the confines of the tipping floor and boiler building include new tanks, pumps and unloading equipment. This equipment will not affect the overall noise levels at the facility, or at the site boundaries.

2.4.8 Benefits of LDI

The inclusion of the proposed LDI system in the AQCS Upgrade Project for the CCERC confers several benefits to the Facility and Project, including:

- No increase of air emissions;
- No increase in odor, truck traffic, or the permitted amount of MSW processed at the Facility. The LDI tons processed will displace tons of MSW processed because the LDI will count toward the existing permitted annual waste processing limit;
- An additional revenue stream to help pay for the upgraded AQCS equipment and its operation and contribute to the Community Benefit Agreements associated with implementation of the Project; and
- A more sustainable option for disposal of non-hazardous liquid streams that can help reduce impacts and load on locally owned public treatment works (“POTWs”) and divert liquid waste away from landfill solidification practices.

2.5 Project MWC Unit Emissions

Proposed Project emission limits are listed in **Table 2-6** along with maximum hourly mass emissions (pounds per hour or “lbs/hr”) on a per unit basis, and annual emissions (tons per year or “tons/yr”) on a per unit basis and from the three (3) units in total. Project emissions calculations are provided in **Appendix B**. Emissions estimates were developed from analysis of site data, other MWCs controlled by fabric filter baghouses, other MWCs controlled by advanced scrubber systems, and current state and federal regulations.

Table 2-6. Project Emissions for MSW Combustors

Pollutant	Proposed Emission Limits		Compliance Method (2)	Maximum Hourly Emissions per Unit (lbs/hr) (3)	Annual Emissions (total per unit) (tons/yr) (4)	Annual Emissions (total for 3 units) (tons/yr) (4)
	Value	Units (1)				
PM (filterable)	12	mg/dscm7	Stack Test	2.04	8.42	25.26
PM_{10}	7.02	lbs/hr	Stack Test	7.02	28.98	86.94
$PM_{2.5}$	7.02	lbs/hr	Stack Test	7.02	28.98	86.94
Lead	100	µg/dscm7	Stack Test	0.017	0.07	0.21
Cadmium	10	µg/dscm7	Stack Test	0.0017	0.007	0.021
Mercury	25	µg/dscm7	Stack Test	0.0043	0.0178	0.054
Arsenic	0.000525	lbs/hr	Stack Test	0.000525	0.0022	0.0066
Beryllium	0.0000131	lbs/hr	Stack Test	0.0000131	0.000054	0.00016
Chromium	0.0215	lbs/hr	Stack Test	0.0215	0.089	0.27
Nickel	0.018	lbs/hr	Stack Test	0.018	0.074	0.22
NO_X	48	lbs/hr	CEM	48	133.33(5)	400.00(5)
SO_2 (1-hr)	50	ppmdv7	CEM	22.63	(6)	(6)
SO_2 (24-hr)	24	ppmdv7	CEM	(6)	44.83	134.58
HCl	20	ppmdv7	Stack Test	5.16	21.30	63.96
H_2SO_4	2.60	lbs/hr	Stack Test	2.60	10.73	32.19
HF	0.035	lbs/hr	Stack Test	0.035	0.15	0.42
CDD/CDF	13	ng/dscm7	Stack Test	2.21E-06	9.10E-06	2.74E-05
2,3,7,8-TCDD	1.11E-07	lbs/hr	Stack Test	1.11E-07	4.58E-07	1.37E-06
Polycyclic Aromatic Hydrocarbons ("PAH")	0.0145	lbs/hr	Stack Test	0.0145	0.06	0.18

1) mg/dscm7 = milligrams per dry standard cubic meter, corrected to 7% oxygen
µg/dscm7 = micrograms per dry standard cubic meter, corrected to 7% oxygen
ng/dscm7 = nanograms per dry standard cubic meter, corrected to 7% oxygen
ppmdv7 = parts per million by volume, on a dry basis, corrected to 7% oxygen
2) Stack Test: Compliance with emission limit will be by United States Environmental Protection Agency ("USEPA") and/or NJDEP approved manual Reference Method (RM). CEM: Pollutants monitored by CEMS will report concentrations (as parts per million at 7% O2 and pound per hour, both in accordance with time weighted averages in the permit. The CEMS will convert concentration to mass emission rates using USEPA's Method 19 F-Factor procedures as shown in **Appendix G**.
3) Maximum per unit hourly emissions based on operating at the steam rate limit of 421,600 lbs/4-hour block period with waste having a heating value of 5,200 British thermal units per pound (Btu/lb).
4) Annual emissions based on the approved annual waste limit of 451,140 tons per year, 5,200 Btu/lb, and all three (3) units operating at an annual steam rate equivalent to operation at the existing steam limit of 421,600 lbs/4-hr block period and the existing availability limit of 8,256 hours/year.
5) NO_X annual emissions to replace existing limits of 153 tons/yr/unit limit and 459 tons/yr limit for all three (3) units combined.
6) SO_2 hourly emissions based on 1-hr concentration, annual emissions based on 24-hour concentration.

2.5.1 Emissions Calculations Using Facility Production Rates

The annual permitted waste processing rate of CCERC is 451,140 tons total for the Facility, which divided by 3 is approximately 150,380 tons/yr on a per unit level. Operating at the permit limit of 8,256 hrs/yr/unit, the average hourly waste processing rate per unit is 150,380 tons/8,256 hrs, or 18.21 tons/hr (36,420 lbs/hr). Application of a higher heating value (“HHV”) of 5,200 British thermal units per pound (“Btu/lb”), a value historically used at CCERC, yields a flue gas flow rate of 45,432 dry standard cubic feet at 7% O_2, dry gas basis, per minute (“dscfm7”) based on the USEPA F-Factor methodology from EPA Reference Method 19. Method 19 provides a set of calculation procedures for estimating flue gas flow rate from heat release. The heat release is from the MSW charging rate and the calorific value of MSW as Btu/lb. This methodology may be used for many fuels including municipal solid waste and is discussed in more detail in **Appendix G**.

CCERA is able to accurately track the steam production which is a result of the waste burned in the units because the facility must demonstrate compliance with the existing 4-hour block steam limit of 421,600 lbs (approximately 105,400 lbs/hr). The USEPA Method 19 calculated stack flow rate is consistent with observed stack flue gas flowrates and steam productions levels during compliance stack testing during the previous three years. An evaluation of stack flue gas rates during stack testing was performed and is summarized in **Table 2-7**. Compliance stack testing from each of the previous three (3) years was summarized with average lbs/hr steam production and dscfm7 flue gas flow rates. Each of the flue gas flow rates was scaled to match the pro-rated steam limit of 105,400 lbs/hr. The annual average pro-rated flue gas flow rates for 2019, 2020 and 2021 were within a narrow range (~5.5%). Therefore, the 3-year average of 45,432 dscf7/min based on the USEPA Method 19 calculation is considered a reliable value for converting short-term and long-term concentrations to mass emission rates for Prevention of Significant Deterioration (“PSD”) modeling of all pollutants.

Table 2-7. Flue Gas Flow Rates for MSW Combustors

Year	Number of test runs [(a)]	Average Steam Rate as lbs/hr [(b)]	Average flue gas rate as dscfm7	Prorated flue gas rate as dscfm7 at 105,400 lbs/hr steam [(c)]
2019	50	96,300	41,714	45,656
2020	50	96,100	40,215	44,107
2021	78	99,400	43,885	46,534
3-year average	--	--	--	45,432

(a) Includes results for USEPA stack test reference methods for metals, acid gases, particulate, and dioxins/furans.

(b) Steam rate measured during stack test with ASME certified meter.

(c) Pro-rated flue gas rate is the product of the ratio of maximum allowable steam rate (105,400 lbs/hr as 4-hour average) to actual steam measurement and flue gas rate from USEPA reference methods.

2.5.2 Description of Emission Calculation Procedures

Based on the above calculations, the CCERA will continue to use USEPA Method 19 with an HHV of 5,200 Btu/lb waste to calculate and report mass emission rates of the continuously monitored substances. The CEMS will continuously monitor NO_X, SO_2 and CO and report 1-hour average values as ppmdv7 and pounds per hour that will be building blocks for developing emission factors for different averaging periods including annual ton per year factors reported in the CCERC emissions inventory. The specific methodology will follow USEPA procedures described in USEPA Method 19.

Filterable particulate emission rates in **Table 2-6** are based on the lowest permitted similarly controlled MWC that is currently operating. The proposed PM emission concentration of 12 milligrams per dry standard cubic meter, corrected to 7% O_2 (“mg/dscm7”) is based on Covanta’s Hillsborough Unit 4 located in Florida and Covanta’s Essex County Resource Recovery Facility (“ECRRF”) located in Newark, NJ. The proposed 12 ng/dscm7 limit is significantly more stringent than federal NSPS applicable to MWC facilities.

The fine particulate (PM_{10} and $PM_{2.5}$) emission limits are set in part based on the proposed filterable PM emission rate limit of 2.04 lbs/hr, a rate which includes the filterable PM_{10} and $PM_{2.5}$ fractions. Filterable PM_{10} and filterable $PM_{2.5}$ emissions are assumed to be equal for this Application. A condensable fraction based on stack tests that have been performed at the CCERC was added to determine the total (filterable plus condensable) maximum hourly emission limits of 7.02 lbs/hr for both PM_{10} and $PM_{2.5}$. The condensable portion includes a compliance margin to ensure that the limit is protective of actual emissions.

Lead emissions are based on the lead concentration permit limit for the ECRRF as well as emission test data from other Covanta MWC units with similar fabric filter baghouses. The proposed lead concentration limit of 100 micrograms per dry standard cubic meter at 7% O_2 ("µg/dscm7") is more stringent than the current NSPS limit that applies to older MWC units (such as those at the CCERC) for which construction commenced on or before December 20, 1989. Such MWCs are required to meet a limit of 400 µg/dscm7 pursuant to Subpart Cb [§60.33b(a)(4)]. The proposed limit of 100 µg/dscm7 is even more stringent than the NSPS limit that applies to new MWC units (i.e., those built after September 20, 1994) which are required to meet a concentration limit of 140 µg/dscm7 pursuant to Subpart Eb [§60.52b(a)(4)(ii)].

The proposed cadmium emission limit of 10 µg/dscm7 is less than the NSPS Subpart Cb concentration limit of 35 µg/dscm7. This proposed cadmium limit is based on the cadmium concentration permit limit for the ECRRF and is equivalent to the cadmium limit contained in NSPS Subpart Eb §60.52b(a)(3)(ii) for new MWC units, even though the existing MWC units at the CCERC are not subject to Subpart Eb.

The CCERA is proposing to maintain both the existing hourly NO_X emission rate limit of 48 lbs/hr and the existing 24-hour daily average NO_X concentration limit of 150 ppmdv7. Based on the proposed enhancements to the SNCR system discussed in **Section 2.3.1** of this Application, a new annual NO_X emission rate limits of 400 tons is proposed. The present annual NO_X emission limit for the Facility is 459 tons per year and the average annual NO_X emissions from the facility over the previous two years was 416 tons/yr. Achieving the proposed limit of 400 tons per year limit will ensure that annual NO_X emissions are reduced from current emission rate levels upon completion of the Project.

The hourly SO_2 mass emission rate in **Table 2-6** reflects a proposed maximum hourly SO_2 concentration limit of 50 ppmdv7. The annual SO_2 emission rate of 134.69 tons is based on a proposed reduction in the 24-hour SO_2 limit (24-hour geometric mean basis) from 29 ppmdv7 to 24 ppmdv7. Both the proposed hourly and 24-hour reductions reflect the enhanced acid gas control efficiency to be provided by the CDS system. The CDS system will also provide for reductions in the emissions of HCl and HF. The proposed hourly and annual emission rate limits of HCl in **Table 2-6** reflect a reduction in the HCl stack concentration limit from the NSPS limit of 29 ppmdv7 down to 20 ppmdv7. Similarly, the proposed HF hourly and annual emission rates are based on achieving approximately 90% lower emissions compared to current permit limits.

The CCERA is proposing to reduce the current Hg concentration limit of 28 µg/dscm7 or 95% removal to 25 µg/dscm7 or 95% removal. The proposed limit is more stringent than the mercury limits contained in N.J.A.C. 7:27-27.4(a) or applicable federal standards and reflects the enhanced contact of the flue gas stream with activated carbon provided by the CDS technology. No change is proposed in the hourly As, Be, Cr, or Ni emission limits, although the installation of CDS systems and replacement of the ESPs with state-of-the-art fabric filters are likely to result in a reduction in filterable PM which may result in reductions of the actual hourly and annual emission rates of these pollutants.

The newly proposed emission concentration limit for CDD/CDF of 13 nanograms per dry standard cubic meter, corrected to 7% O_2 ("ng/dscm7") is consistent with the Subpart Eb limit for new MWCs and is more stringent than the existing permit limit of 35 ng/dscm7 contained in Subpart Cb for ESP-controlled MWC units and the ECRRF limit of 30 ng/dscm7. A reduction in the hourly emission rate limit for 2,3,7,8-TCDD from the present limit of 9.37E-07 lbs/hr to 1.11E-07 lbs/hr is consistent with the proposed reduction in the CDD/CDF concentration limit and stack test data.

In summary, the emission limits for several pollutants will decrease from the currently permitted allowable emission limits due to the Project. **Table 2-8** shows a comparison of the current permit limits and the proposed Project emission limits for those pollutants for which a change is proposed. Emissions calculations are provided in **Appendix B**.

2.6 Steam Rate

The original PSD permit filed in 1986 considered the impacts of 4 MWCs processing a total of 481,600 tons/yr of MSW over 33,024 hours of operation with a total steam generation rate of 421,600 lbs/hour. The current permit is more stringent for each of those three (3) conditions with the current operating permits limiting MSW to 451,140 tons/yr of MSW, 24,768 operating hours and 316,200 lbs/hour of steam.

CCERC is proposing that the existing numerical limits of two (2) of the parameters remain unchanged; 1) total tons/yr of MSW (which includes LDI), and 2) steam generation rate. In place of a total hours of operation limit, we are proposing an equivalent 12-month rolling total steam limit to provide additional operational flexibility without having any impact on annualized emissions or throughput. The 12-month rolling average steam limit would be based on operating at the existing average hourly steam limit of 105,400 lbs/hr for the existing availability limit of 8,256 hours. Under the proposal, each MWC would remain limited to producing 870,182 klbs/yr of steam, but the proposal would allow that annual steam limit to be achieved by operating at an average hourly steam rate less than the 105,400 lbs/hr for greater than 8,256 hours. The 4-hour average steam limits discussed in **Section 2.2** would remain in effect. This proposed approach recognizes that WTE facilities are capable of operating at higher availability than when the CCERC was permitted in the late-1980s. The proposal would not be associated with an increase in any emission limit, with the tons/yr reductions described in **Section 2.5** applying to the calendar year. It is also important to note that the preliminary dispersion impact analysis presented in **Section 5** considered all three (3) MWCs operating at full load so that the proposed change in calculation is inherently addressed by the preliminary modeling results presented herein.

2.7 Hydrated Lime Silo Emissions

As described in **Section 2.3** of this Application, the Project includes the installation of a new hydrated lime silo, the conversion of one (1) of the two (2) existing pebble lime silos to a hydrated lime silo, and removal from service of the other existing pebble lime silo. Each hydrated lime silo will be equipped with a fabric filter designed to control PM emissions during filling of the silos. The new silo will be designed after the vendor of the air quality control upgrade equipment has been selected.

Based on Covanta’s operating experience at the Durham-York facility, a preliminary emissions estimate has been developed for inclusion in the air quality modeling analysis. The following factors were used for the purpose of calculating hourly and annual emissions of PM, PM_{10} and $PM_{2.5}$ from each silo:

- Fills Per Year – 90;
- Length of Each Fill – 4 hours;
- Discharge Flow Rate – 750 scfm;
- PM Emission Concentration – 0.015 gr/scf;
- Discharge Height – 75 feet; and
- Discharge Temperature – Ambient.

Based on these parameters, the calculated hourly and annual particulate matter emission rates are 0.096 lbs/hr and 34.7 lbs/yr, respectively. All PM is assumed to be PM_{10} and $PM_{2.5}$.

2.8 Project Schedule

The proposed upgrades of the MWCs will be installed in accordance with a phased construction schedule as indicated in the preliminary Project Schedule provided as **Figure 2-3**. This preliminary schedule indicates that CCERA will have a detailed design completed in January 2024 after NJDEP issues a modification to the Title V permit for the CCERC Project in late-2023. Permit issuance in this timeframe will allow for construction of the first AQCS upgrade to be completed in January 2025 and all three (3) MWCs to be installed and operational on or about September 2026.

Since the baghouses will be built in the same location presently occupied by the ESPs, the baghouses will need to be offset from their respective MWC combustion unit to minimize the amount of downtime during their construction and tie-ins. Thus, as shown on **Figure 2-4**, the Unit No. 3 baghouse will be constructed adjacent to the existing Unit No. 3 ESP. Upon completion of construction of the Unit No. 3 baghouse, it will be tied into service during a Combustor No. 3 outage. This tie-in will then allow ESP No. 3 to be demolished, thereby providing space for the construction of the Unit No. 2 baghouse. Once the Unit No. 2 baghouse is constructed and tied in, the Unit No. 2 ESP will be demolished which will provide space for the construction of the Unit No. 1 baghouse. In accordance with the preliminary schedule, Project completion of all three (3) baghouses is anticipated to occur on or about September 2026. The phased construction approach will effectively minimize the disruption of service provided by the CCERC.

Table 2-8. Comparison of Proposed to Current Permit Allowable Limits for MSW Combustors

Pollutant	Concentration (1) (mg/dscm7 for PM, PM_{10}, $PM_{2.5}$ µg/dscm7 for Pb, Cd, Hg, ng/dscm7 for total Dioxins/Furans) ppmdv7 for SO_2, HCl, NO_x			Maximum Hourly Mass Emissions, Per Unit (lbs/hr/unit)			Annual Mass Emissions, Per Unit (tons/yr/unit)			Annual Mass Emissions, 3 Units (tons/yr)		
	Current Permit Limit (3)	Proposed Permit Limit	Difference	Current Permit Limit	Proposed Permit Limit (2)	Difference	Current Permit Limit	Proposed Permit Limit (2)	Difference	Current Permit Limit	Proposed Permit Limit (3)	Difference
PM	25	12	- 13	3.59	2.04	- 1.55	14.8	8.41	- 6.39		(4)	
PM_{10}		(4)		7.02	7.02	No Change		(4)		86.9	86.9	No Change
$PM_{2.5}$		(4)		(4)	7.02	N/A		(4)		(4)	86.9	N/A
Lead	400	100	- 300	0.08	0.017	- 0.063	0.33	0.07	- 0.26		(4)	
Cadmium	35	10	- 25	0.0035	0.0017	- 0.0018	0.0144	0.007	- 0.0074		(4)	
Mercury	28 or 95% control	25 or 95% control	- 3	0.08	0.0043	- 0.0757	0.0203	0.0178	- 0.0025		(4)	
CDD/CDF	35	13	- 18		(4)			(4)			(4)	
2,3,7,8-TCDD		(4)		9.37E-07	1.11E-07	- 8.26E-07	3.7E-6	4.57E-7	- 3.243E-6		(4)	
NO_x	150	150	No Change	48	48	No Change	153	133.33	- 19.67	459	400	- 59
SO_2 (1-hr)		(4)		34.40	22.65	- 11.75	N/A	N/A	N/A	N/A	N/A	N/A
SO_2 (24-hr)	29 or 75% control	24 or 75% control	- 5		(4)		N/A	N/A	N/A	N/A	N/A	N/A
SO_2 (annual average)	N/A	N/A	N/A	N/A	N/A	N/A	71	44.83	- 24.17		(4)	
HCl	29 or 95% control	20 or 95% control	- 9		(4)		40.5	21.32	- 19.18		(4)	
HF		(4)		0.380	0.035	- 0.377	1.57	0.15	- 1.42		(4)	
H_2SO_4		(4)		2.6	2.6	No Change	10.7	10.7	No Change		(4)	
Arsenic		(4)		0.000525	0.000525	No Change	0.0022	0.0022	No Change		(4)	

Pollutant	Concentration (1) (mg/dscm7 for PM, PM_{10}, $PM_{2.5}$ µg/dscm7 for Pb, Cd, Hg, ng/dscm7 for total Dioxins/Furans) ppmdv7 for SO_2, HCl, NO_X			Maximum Hourly Mass Emissions, Per Unit (lbs/hr/unit)			Annual Mass Emissions, Per Unit (tons/yr/unit)			Annual Mass Emissions, 3 Units (tons/yr)		
	Current Permit Limit (3)	Proposed Permit Limit	Difference	Current Permit Limit	Proposed Permit Limit (2)	Difference	Current Permit Limit	Proposed Permit Limit (2)	Difference	Current Permit Limit	Proposed Permit Limit (3)	Difference
PAH	(4)			0.0145	0.0145	No Change	0.06	0.06	No Change	(4)		
Nickel	(4)			0.018	0.018	No Change	(4)			(4)		
Chromium	(4)			0.0215	0.0215	No Change	(4)			(4)		
Beryllium	(4)			0.0000131	0.0000131	No Change	(4)			(4)		

(1) mg/dscm7 = milligrams per dry standard cubic meter, corrected to 7% oxygen; µg/dscm7 = micrograms per dry standard cubic meter, corrected to 7% oxygen; ng/dscm7 = nanograms per dry standard cubic meter, corrected to 7% oxygen.
(2) Maximum per unit hourly emissions based on a flow rate of 45,432 dscfm7 corrected to 7% oxygen (dscfm7) at the steam rate limit of 421,600 lbs/4-hour block period and 5,200 Btu/lb of waste.
(3) Annual emissions based on 45,432 dscfm7 and 5,200 Btu/lb of waste with all three (3) units operating at an annual steam rate equivalent to operation at the existing steam limit of 421,600 lbs/4-hr block period and the existing availability limit of 8,256 hours/year.
(4) No current permit limit exists for this pollutant and units.

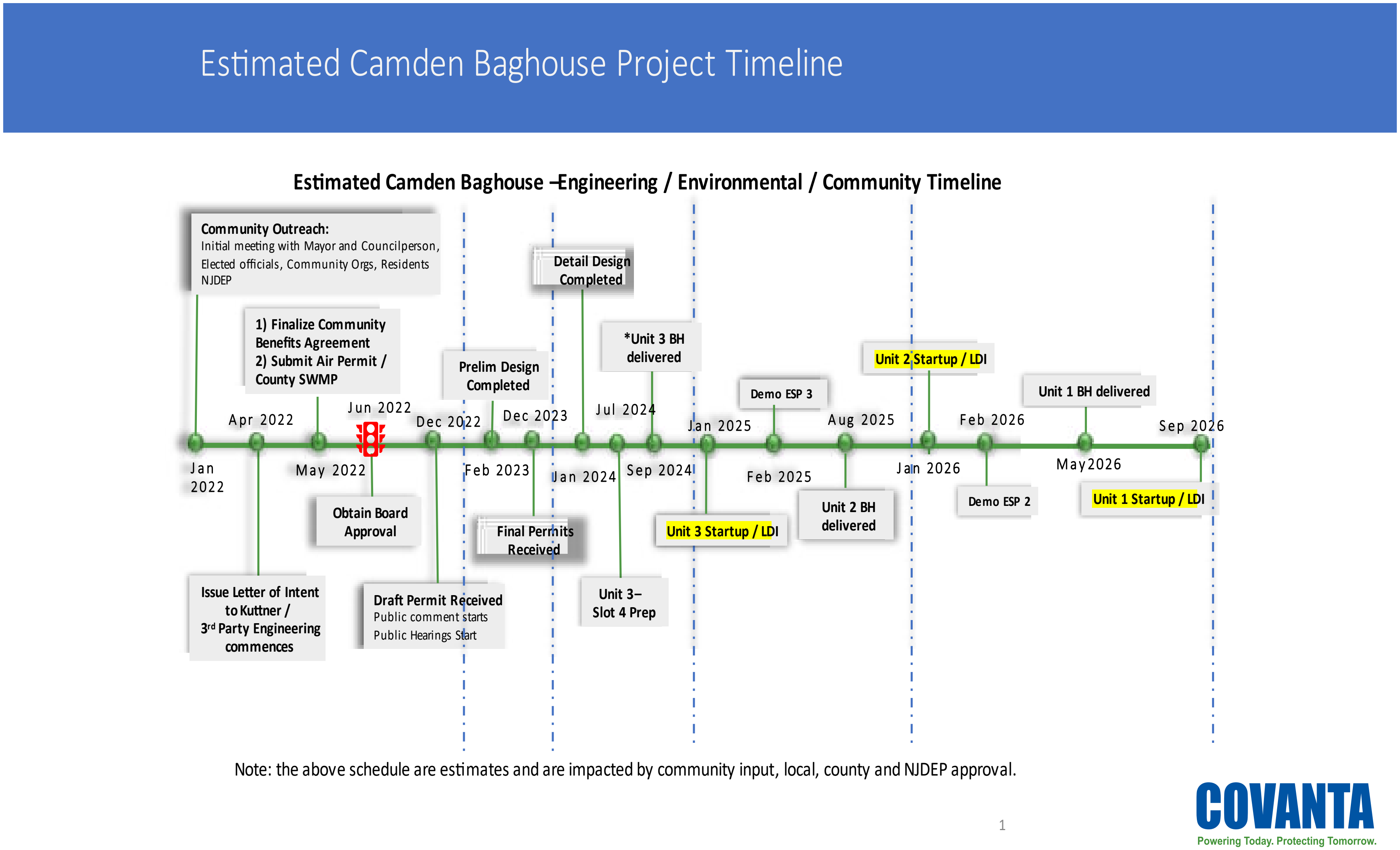


Figure 2-3. Preliminary Camden AQCS Upgrade Project Schedule

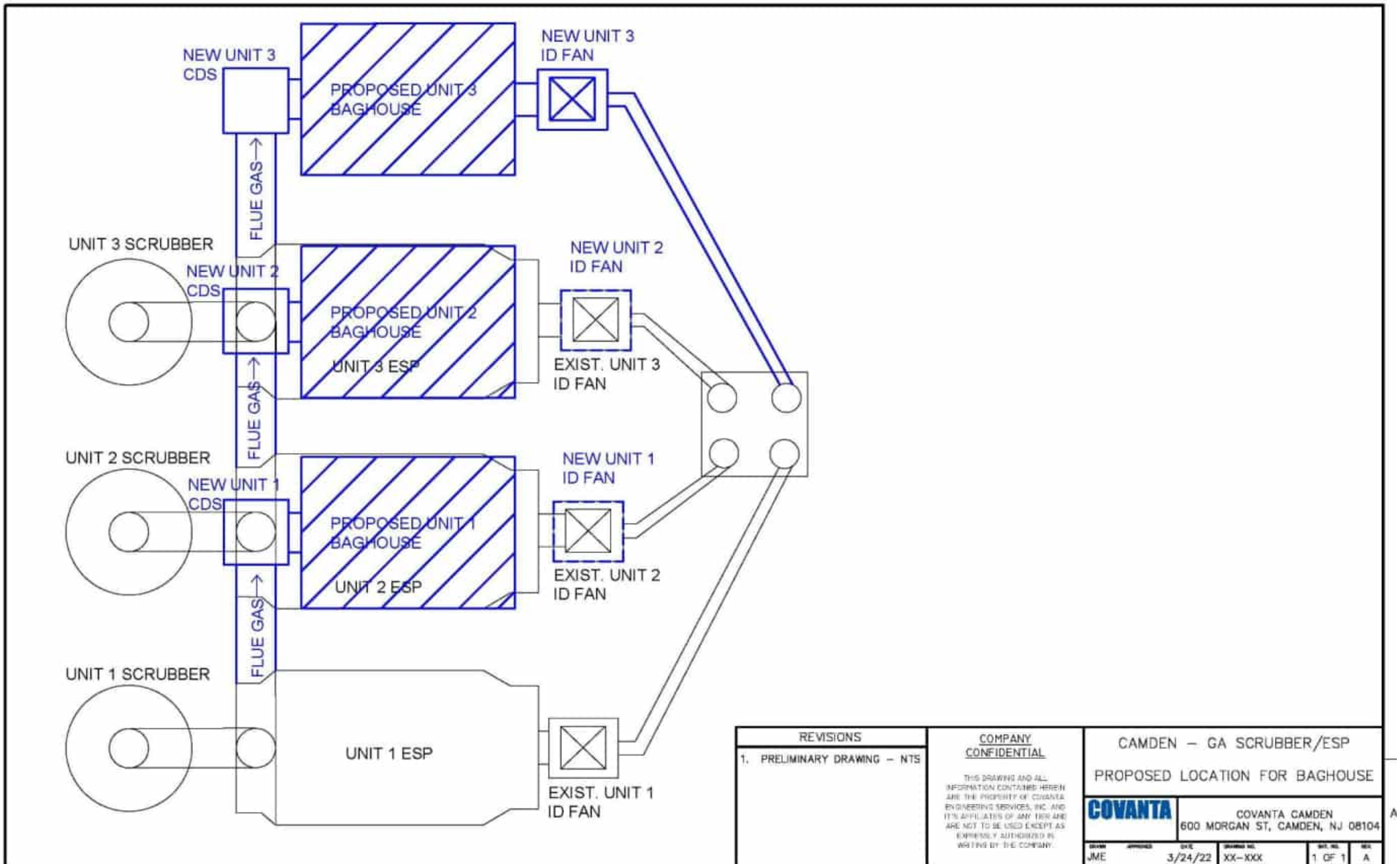


Figure 2-4. Covanta Camden AQCS Baghouse General Arrangement

3. Regulatory Review

Federal and state regulatory air pollution control and permitting requirements were reviewed to determine applicability and compliance with applicable regulations. Potentially applicable federal regulations evaluated include:

- Prevention of Significant Deterioration (“PSD”);
- New Source Performance Standards (“NSPS”);
- National Emissions Standards for Hazardous Air Pollutants (“NESHAP”); and
- Compliance Assurance Monitoring (“CAM”).

New Jersey regulations evaluated include:

- Subchapter 3 (Control and Prohibition of Smoke from Combustion of Fuel);
- Subchapter 4 (Control and Prohibition of Particles from Combustion of Fuel);
- Subchapter 7 (Sulfur);
- Subchapter 9 (Sulfur in Fuels);
- Subchapter 10 (Sulfur in Solid Fuels);
- Subchapter 11 (Incinerators);
- Subchapter 16 (Control and Prohibition of Air Pollution by Volatile Organic Compounds);
- Subchapter 17 (Control and Prohibition of Air Pollution by Toxic Substances);
- Subchapter 18 (Control and Prohibition of Air Pollution from New or Altered Sources Affecting Air Quality in Nonattainment Areas – Emission Offset Rules);
- Subchapter 19 (Control and Prohibition of Air Pollution by Oxides of Nitrogen); and
- Subchapter 22 (Operating Permits).

3.1 Federal Regulations

3.1.1 Prevention of Significant Deterioration (“PSD”)

PSD review (40 CFR 52.21) is a federally mandated program that applies to new major sources of regulated pollutants and major modifications to existing sources. PSD review is a pollutant-specific review. It applies only to those pollutants for which a project is considered major, and the project area is designated as attainment or unclassified. Projects must install Best Available Control Technology (“BACT”) for those sources/pollutants subject to PSD review.

The proposed Project is not subject to PSD because there will be no significant increase in emissions of any PSD-regulated pollutant at the CCERA associated with the Project, as defined under NJDEP Subchapter 18 rules implementing PSD in the state. In fact, implementation of the Project will result in a decrease in permitted filterable PM, lead, cadmium, mercury, SO_2, HCl, HF, NOx, CDD/CDF, and 2,3,7,8-TCDD emissions.

3.1.2 New Source Performance Standards (“NSPS”)

The Facility is currently subject to NSPS Subpart Cb (Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994). Subpart Cb contains emission concentration limits for PM, cadmium, mercury, lead, and total CDD/CDF in addition to other compounds. The air quality control system upgrade does not constitute a modification or reconstruction of the MWC units as defined in 40

CFR §60.14 and §60.15, respectively. As such, the MWC units will not be subject to Subpart Eb (Large Municipal Waste Combustors for Which Modification or Reconstruction is Commenced After June 19, 1996).

3.1.3 National Emissions Standards for Hazardous Air Pollutants ("NESHAP")

Pursuant Section 305 (Solid Waste Combustion) of Title III (Hazardous Air Pollutants) of the 1990 Clean Air Act Amendments, new Section 129 was added to the Clean Air Act ("CAA"). This new section required the USEPA to establish performance standards and other requirements for MWC units under Section 111 of the CAA (NSPS) as opposed to Section 112 of the CAA (NESHAP). Per Section 129(a)(2) of the CAA, these emission standards were to be developed using the same approach that was used to develop Maximum Achievable Control Technology ("MACT") based standards. Furthermore, USEPA has incorporated more stringent emission limits into NSPS Subpart Cb and made those limits apply after April 28, 2009, without regards to whether a modification or reconstruction has occurred.

3.1.4 Compliance Assurance Monitoring ("CAM")

A potentially applicable federal regulation is the compliance assurance monitoring provisions of 40 CFR Part 64. This regulation was developed to ensure that pollution controls operate in a manner which assures that the stated emissions reductions are achieved. CAM is applicable to individual emission units which meet the following three (3) applicability criteria:

1. The units must be subject to an emission limitation or standard for the regulated air compound or a surrogate of that compound,
2. The unit must use an active control device to achieve compliance with an emission limitation or standard, and
3. The unit must have potential pre-control device emissions in the number of tons per year required to classify that unit as a major source under Part 70.

3.1.4.1 CAM for Pollutants Controlled by Baghouse

The current permit contains applicable emission limitations for particulates (PM and PM_{10}) and for several HAP metals which are listed in **Table 2-6**. No applicable emission limit currently exists for $PM_{2.5}$. The fabric filter baghouse that is a part of this minor modification will be an active control device for filterable particulates (PM, PM_{10} filterable portion, and $PM_{2.5}$ filterable portion) as well as the HAP metals. Pre-control emissions for a single unit's fabric filter baghouse are expected to be greater than the major source threshold for PM, PM_{10}, $PM_{2.5}$, and lead.

An exemption from CAM applicability includes emissions limitations that are proposed after November 15, 1990, pursuant to Section 111 (NSPS) or Section 112 (NESHAP) of the Clean Air Act. This exemption applies to PM, cadmium, mercury, and lead which are subject to NSPS Subpart Cb which was initially proposed September 20, 1994, and subsequently amended in 1997 and 2006.

$PM_{10}/PM_{2.5}$ is comprised of two components: filterable PM less than or equal to 10 microns / 2.5 microns in diameter, respectively, and condensable PM (it is presumed that all condensable PM are less than 10 microns). $PM_{10}/PM_{2.5}$ condensables form downstream of the fabric filter baghouse and, therefore, are not controlled by the fabric filter baghouse. Since there is no control device for the condensable portion of PM_{10}, this component of $PM_{10}/PM_{2.5}$ is exempt from CAM. The filterable (non-condensable) component of the PM_{10} emission limit is the same as the proposed PM emission limit. As shown in **Table 2-6**, the proposed filterable PM emission limit is lower than both the Subpart Cb and Subpart Eb emission limits. Since filterable PM is exempt from CAM for the reason stated above, the filterable portion of $PM_{10}/PM_{2.5}$ is also exempt. Therefore, a CAM plan does not have to be developed for $PM_{10}/PM_{2.5}$.

3.1.4.2 CAM for Pollutants Controlled by Scrubber

The current permit contains applicable emission limitations for acid gases (SO_2, HCl, HF, H_2SO_4) which are listed in **Table 2-6**. The CDS system that is a part of this minor modification will be an active control device for each of the listed acid gases. Pre-control emissions for a single unit's CDS are expected to be greater than the major source threshold for SO_2 and HCl. HF and H_2SO_4 are not expected to have uncontrolled emissions greater than the major source thresholds.

Similarly, PM, SO_2 and HCl are subject to NSPS Subpart Cb emission limits which meets the CAM exemption for an NSPS which was promulgated after November 15, 1990.

3.2 State Regulations

This section is intended as a general overview of applicable regulations, and the focus is on emission limitations and permitting requirements rather than details such as monitoring and recordkeeping requirements.

3.2.1 Subchapter 3 (Control and Prohibition of Smoke from Combustion of Fuel)

N.J.A.C. 7:27-3.5 limits smoke the shade or appearance of which is darker than number 1 on the Ringelmann smoke chart or greater than 20 percent opacity, exclusive of visible condensed water vapor, to be emitted into the outdoor air from the combustion of fuel in indirect heat exchangers (boilers) greater than 300 MMBtu/hr. This regulation does not apply to the MWC units because N.J.A.C.7:27-11.3(b)1. expressly states that the provisions of Subchapter 3 are superseded by the provisions of Subchapter 11 for incinerators.

3.2.2 Subchapter 4 (Control and Prohibition of Particles from Combustion of Fuel)

N.J.A.C. 7:27-4.2 limits PM emissions (filterable component only) from the combustion of fuel based on the unit heat input rate. The currently allowable PM emission rate of 3.59 lbs/hr from each MWC unit is in compliance with this regulation. Thus, CCERA will continue to comply with Subchapter 4.

3.2.3 Subchapter 7 (Sulfur)

N.J.A.C. 7:27-7.2 regulates sulfur dioxide, sulfur trioxide, and sulfuric acid emissions from chimneys which discharge sulfur dioxide. The Project is not proposing to increase any SO_2 or H_2SO_4 emission limit from a control device. Emission limits under Subchapter 7 are currently present in the Title V permit. CCERA will continue to comply with this regulation.

3.2.4 Subchapter 9 (Sulfur in Fuels)

N.J.A.C. 7:27-9.2(b) limits the fuel sulfur content of liquid petroleum products. The Number 2 fuel oil which can be used as an alternative fuel in the startup of the MSW combustors is currently subject to this regulation and the current permit contains the required limitations for fuel storage. CCERA will continue to comply with the regulation.

3.2.5 Subchapter 10 (Sulfur in Solid Fuels)

N.J.A.C. 7:27-10.2 and 10.3 limit the sulfur dioxide emissions from solid fuels. The Project is not proposing to increase any SO_2 emission limit from a control device. Emission limits under Subchapter 10 are currently present in the Title V permit. CCERC will continue to comply with this regulation.

3.2.6 Subchapter 11 (Incinerators)

N.J.A.C. 7:27-11.3(a)4. limits particulate emissions from special incinerators to less than 0.1 grains per dry cubic foot, corrected to 12% carbon dioxide ("CO_2"). The current permit contains this limitation along with appropriate stack testing requirements under 11.3(e)(1) and (2).

N.J.A.C. 7:27-11.3(b) limits smoke emissions from incinerators and sets conditions under which alternate limitations may apply. The current permit contains these conditions.

N.J.A.C. 7:27-11.3(c) and (d) regulate visible particulates and odors from incinerators. The current permit contains these conditions.

N.J.A.C. 7:27-11.5(c) contains operational requirements for modified incinerators and associated control equipment. The current permit contains this condition.
CCERA will continue to comply with each of these regulations in the Title V operating permit. No new permit condition will be triggered from this Subchapter.

3.2.7 Subchapter 16 (Control and Prohibition of Air Pollution by Volatile Organic Compounds)

N.J.A.C 7:27-16 is for limiting volatile organic materials ("VOC") from processes and VOC and CO from combustion. The proposed Project does not change any currently permitted VOC or CO emission limitation.

3.2.8 Subchapter 17 (Control and Prohibition of Air Pollution by Toxic Substances)

Subchapter 17 includes provisions intended to limit emissions and/or enhance atmospheric dispersion of toxic substances ("TXS") from source operations. Subchapter 17 also includes reporting thresholds and SOTA thresholds for hazardous air pollutants and toxic substances. SOTA is addressed under Subchapter 22 and in **Section 4** of this application.

3.2.9 Subchapter 18 (Control and Prohibition of Air Pollution from New or Altered Sources Affecting Air Quality – Emission Offset Rule)

N.J.A.C. 7:27-18 incorporates PSD and nonattainment new source review ("NSR") provisions into the New Jersey regulations. As was shown in **Table 2-8**, there will only be potential emissions decreases and no emissions increases associated with the proposed Project. Subchapter 18 is not applicable to the proposed Project per 7:27-18.2(d) since there will be no emissions increases because of the proposed Project.

3.2.10 Subchapter 19 (Control and Prohibition of Air Pollution by Oxides of Nitrogen)

Subchapter 19 includes provisions to limit emissions of NO_X from a variety of combustion unit source types. This regulation implements Reasonable Available Control Technology ("RACT") in New Jersey. The current permit incorporates the most recent RACT standard of 150 ppmdv7 for MSW incinerators from 7:27-19-12(a)2. The facility will continue to meet this emission limitation.

3.2.11 Subchapter 22 (Operating Permits)

The permitting of major stationary sources (i.e., Title V sources) in New Jersey is regulated under Subchapter 22, Operating Permits. The CCERC is currently a Title V facility, and the AQCS upgrade project is a minor modification of the existing Title V permit.

Minor modification applications must address SOTA air pollution controls for all minor operating permit modifications. N.J.A.C. 7:27-22.3(ee) prohibits an owner or operator from making a change determined to be a minor or significant modification unless the changes source meets 7:27-22.35. N.J.A.C. 7:27-22.35(a) states that the "*Newly constructed, reconstructed, or modified equipment and control apparatus that constitutes a significant source operation shall incorporate advances in the art of air pollution control as developed for the kind and amount of air contaminant emitted by the applicant's equipment and control apparatus as provided in this section.*"

The SOTA thresholds are 5.0 tons/yr for any individual criteria pollutant and species-specific thresholds for individual HAPs. SOTA thresholds of 5.0 tons/yr have also been established for hazardous air pollutants regulated under Section 112(r) of the Clean Air Act, other toxic substances, and NJHAPs.

The applicable SOTA thresholds are listed in **Table 4-1** for the pollutants that are affected by the proposed Project. A SOTA analysis is required for newly constructed, reconstructed, or modified source operations or control equipment if the SOTA thresholds are exceeded, even if a modification reduces the potential to emit ("PTE"). In accordance with N.J.A.C. 7:27-8.12(d), the SOTA thresholds are applicable on a per-unit basis. As discussed in **Section 4**, a SOTA analysis is required for PM, PM_{10}, $PM_{2.5}$, Pb, SO_2, HCl, HF, Hg, CDD/CDF, and PAH.

4. Control Technology Review

4.1 State of the Art ("SOTA") Applicability

The CCERC is an existing major source with a current Title V operating permit. The proposed upgrade of the AQCS of each of the three (3) MWC units will result in reductions in the emissions of particulate and metals, acid gases, certain organics, and oxides of nitrogen. The upgrade of the scrubber system from a spray dryer to a CDS and change from an ESP to a fabric filter baghouse are both Minor Modifications to the Title V Operating permit subject to Subchapter 22 requirements. The upgrade to the SNCR control system does not constitute a modification as defined in Subchapter 22. As stated in **Sections 2** and **3** of this Application, the proposed Project is not subject to PSD or nonattainment NSR requirements.

Table 4-1 presents a comparison of potential emissions from each upgraded MWC unit with the SOTA thresholds found in N.J.A.C. 7:27-8 Appendix 1, Tables A and B and N.J.A.C. 7:27-17-Table 2. Ten (10) pollutants (PM, PM_{10}, $PM_{2.5}$, Pb, Hg, SO_2, HCl, HF, CDD/CDF, and PAH) require a SOTA analysis based on exceeding the respective SOTA thresholds. The new hydrated lime silo emissions will be less than 5 tons/yr of particulates.

Table 4-1. SOTA Applicability Analysis MSW Combustors

Pollutant	Annual Potential Emissions per Unit		SOTA Threshold		SOTA Threshold Exceeded?
	tons/yr	lbs/yr	tons/yr	lbs/yr	
PM	8.4	N/A	5.0	N/A	Yes
PM_{10}	29.0	N/A	5.0	N/A	Yes
$PM_{2.5}$	29.0	N/A	5.0	N/A	Yes
Pb	N/A	140	N/A	20	Yes
Hg	N/A	35.6	N/A	20	Yes
SO_2	44.8	N/A	5.0	N/A	Yes
HCl	N/A	42,600	N/A	10,000	Yes
HF	N/A	300	N/A	200	Yes
CDD/CDF	N/A	0.018	N/A	0.0012	Yes
PAH	N/A	120	N/A	20 [1]	Yes
As	N/A	4.3	N/A	10	No
Be	N/A	0.11	N/A	16	No
Cd	N/A	14	N/A	20	No
Cr	N/A	178	N/A	10,000	No
Ni	N/A	149	N/A	2,000	No
2,3,7,8-TCDD	N/A	0.00092	N/A	0.0012	No

(1) The SOTA threshold is for polycyclic organic matter (POM); PAH is a subset of POM.

4.2 Particulate Emission Control Analysis

Since metal emissions are a portion of particulate emissions, the discussion of control technology will be inclusive of all associated pollutants. Consistent with the proposed SOTA baghouse design, CCERA is proposing to reduce the existing permitted emission limits for filterable PM and lead. According to the SOTA Manual for Boilers (issued 7/1997, revised 2/22/2004), the control technology for other solid fuel fired boilers is a baghouse for particulate emissions.

The proposed fabric filter baghouse design for the CCERC incorporates advances in the art of air pollution control which reasonably minimize emissions of particles consistent with N.J.A.C. 7:27-22.35. State-of-the-art features incorporated into the design of the baghouses for the CCERC include a low air-to-cloth ratio, advanced filtration system, and the use of advanced bag cleaning technology. Each of these design elements is discussed in the following subsections.

As noted in **Section 2.3.3**, CCERA will not select the fabric filter vendor for the Project until after the NJDEP has approved the design. Although the bid specifications will reflect the state-of–the–art design features discussed in this section, individual fabric filter suppliers may design their equipment with nominal variations to certain design criteria. These variations will not result in reduced environmental performance of the equipment.

4.2.1 Air-to-Cloth Ratio

The CCERA proposes to replace the existing ESPs on the three (3) MWC units with pulse-jet baghouses, the type used at many of Covanta's other facilities. Each of the three (3) baghouses will consist of six (6) compartments. Each baghouse will have a gross air-to-cloth ("A/C") ratio of approximately 2.3 feet per minute ("ft/min") at the gas flow rate associated with operation at the permitted steam limit of the MWC unit. The proposed 2.3 ft/min A/C ratio is conservatively low compared to baghouses in operation at other similar facilities and, in combination with the proposed filtration systems and bag cleaning technology, will provide for enhanced control of filterable particulate and metal emissions from the MWC units at the CCERC. Additional design details of the baghouses are provided in the Baghouse System Description included in **Appendix D**.

4.2.2 Advanced Filtration System

Each baghouse will use an advanced filtration system that is designed to accommodate the dust loading associated with the recirculated residue. The advanced features include the filtration media and the way the flue gas is distributed into the baghouse compartments.

Each baghouse will be equipped with six (6) compartments containing PPS (generic 'Ryton') bags and a surface treatment such as PTFE (generic 'Gore-Tex') laminate coating or equivalent to facilitate release of filter cake during the bag cleaning process. PPS felt bags are more robust than traditionally used fiberglass bags and are a more effective filtration media. Surface treatment and PTFE laminate provides improved filtration for all particle sizes and facilitates cleaning of the filter bags.

A second advanced filtration feature of the proposed baghouse design is the use of side inlet manifolds to introduce the flue gas into the baghouse compartments. The dust laden gas enters the baghouse modules through a side inlet manifold, slows down, changes direction, and passes through the filter bags from the outside to the inside of the bag. Inlet of the gas stream at the side of the modules rather than beneath the bags provides for better distribution of the flue gas and reagent including both fresh hydrated lime and activated carbon and recirculated residue along the entire length of the filter bags, thus providing more effective utilization of the bag filter area. This results in a more uniform filter cake which promotes more effective abatement of emissions. The mechanics of turning and slowing the gas results in some of the dust falling directly into the hopper with less potential for re-entrainment.

Advanced baghouse cleaning technology is also proposed as part of the baghouse design for the CCERC. The filter bags are periodically cleaned of some of the collected material to keep system draft pressure drop at an acceptable level. The baghouse cleans the bags using a low volume, high pressure pulse of compressed air directed into the clean interior of the bags from the open top ends. The compressed air pulse, opposite to the direction of gas flow, expands the bag which causes some of the collected filter cake on the outside of the bag to fall into the hopper below. The high volume medium pressure pulse provides uniform cleaning along the entire length of the bags.

All six (6) modules are cleaned on-line in the normal mode of operation. On-line cleaning provides for a more stable ID fan operation and subsequent stable combustion than cleaning by removing entire modules from service for cleaning (off-line cleaning). It also provides for a more consistent filter cake and thus improved filtration. On-line cleaning is also advantageous when one (1) module has been taken out of service for maintenance or repairs. In this condition, taking a second module off-line for cleaning will result in a higher, though still acceptable, differential pressure.

The baghouses will be designed so that offline cleaning may also be accomplished if necessary. The off-line cleaning mode allows a module being cleaned to be isolated from the flue gas flow. The offline cleaning feature is particularly useful when a compartment needs to be cleaned prior to performing maintenance and/or repairs on it. During offline cleaning, the outlet damper of the compartment to be cleaned is closed and then each row of bags within the compartment is sequentially cleaned by pulsing. After all the rows have been pulsed, a null period allows the ash which has been cleaned from the bags to settle into the hopper from where it is removed. The outlet damper is reopened at the time the compartment is to be returned to service.

4.2.3 Proposed SOTA for PM Emissions

The proposed SOTA limit for filterable PM of 12 mg/dscm7 is a significant reduction relative to the present limit of 25 mg/dscm7 based on NSPS Subpart Cb. The associated hourly and annual emission limit is accordingly reduced from 3.59 lbs/hr /unit to 2.04 lbs/hr/unit and from 14.8 tons/yr /unit to 8.42 tons/yr/unit. The proposed PM concentration limit is consistent with the lowest permitted filterable PM emissions limit for a large MWC which applies at the Palm Beach Renewable Energy Park-2, the ECRRF, and Unit 4 at the Hillsborough Resource Recovery Facility.

4.2.4 Proposed SOTA for PM_{10} and $PM_{2.5}$ Emissions

The proposed PM_{10} and $PM_{2.5}$ emission limits are set in part based on the proposed PM limit of 2.04 lbs/hr, which represents the filterable particulate fraction. As stated in **Section 2.5**, this is the lowest filterable particulate emission limit from a comparable MWC unit that is permitted and currently operating. A condensable fraction which is based on stack tests that have been performed at the CCERC was then added to obtain the total PM_{10} and $PM_{2.5}$ maximum hourly emission limits of 7.02 lbs/hr. The condensable portion added to obtain the total PM_{10} and $PM_{2.5}$ emission rates includes a compliance margin to ensure that actual emissions and associated air quality impacts will be less than modeled values.

4.2.5 Proposed SOTA for Lead Emissions

The proposed SOTA limit for lead of 100 µg/dscm7 is a significant reduction relative to the present limit of 400 µg/dscm7 (0.4 mg/dscm7) based on NSPS Subpart Cb. The associated hourly and annual emission limit is accordingly reduced from 0.08 lbs/hr /unit to 0.017 lbs/hr/unit and from 0.33 tons/yr /unit to 0.21 tons/yr/unit. The proposed lead emission concentration limit rate is equal to the limit which applies to the MWCs at the ECRRF and is more stringent than the limits that apply at other more recently permitted MSW combustors such as the Palm Beach Renewable Energy Park-2.

4.3 Acid Gas Control Technology Analysis

The proposed CDS system followed by a fabric filter baghouse which incorporates SOTA design features, as discussed in **Section 4.2**, is proposed as SOTA for the reduction of acid gas emissions from each of the three (3) MWC units. The proposed technology is defined as Best Available Techniques by the European Union and is effectively reducing the emissions of acid gases including HF, HCl, SO_2, and H_2SO_4 at Covanta facilities in Durham-York, Ontario Canada and in Dublin, Ireland. The technology has not been installed and operated at an MWC unit in the United States but has been proposed for a new MWC unit to be constructed at the Pasco County, Florida, WTE facility operated by Covanta.

The CDS technology is based on the introduction of fresh hydrated lime and activated carbon and separately, injection of recirculated residue from the fabric filter baghouse into a reactor to mix with the MWC flue gas. The recirculation of residue from fabric filter baghouse into the reactor provides the opportunity for reuse of any unreacted lime and activated carbon in the recirculated material to the contaminants in the flue gas. There are several benefits to the recirculation process including 1) an increase in the total available amount of lime and carbon for mitigating emissions, 2) increased contact in the ductwork which serves as a transport reactor, and 3) increased contact in the filter cake on the filter bags. These are significant improvements over once-through spray drying scrubber technology used at most MWC facilities. Optimization of reagent usage may also result in reduced ash disposal volumes.

4.3.1 Proposed SOTA for Sulfur Dioxide

The proposed SOTA limits for SO_2 are 50 ppmdv7 on a 1-hour basis and 24 ppmdv7 on a 24-hour basis, or 75% control for either concentration. The proposed 1-hour limit is reduced from the existing 3-hour limit of 50 ppmdv7 to be in line with the updated 1-hr SO_2 National Ambient Air Quality Standards ("NAAQS"). The 24-hour concentration is the same as the 24-hr average value from the Palm Beach Renewable Energy Park-2 Facility. The associated current permit limits will be adjusted accordingly from 34.4 lbs/hr/unit to 22.63 lbs/hr/unit and from 71 tons/yr/unit to 44.83 tons/yr/unit. The proposed reductions are attributable to the improvements inherent with circulating dry scrubbing technology.

4.3.2 Proposed SOTA for Hydrogen Chloride

The proposed SOTA limit for HCl of 20 ppmvd7 or 95% control is a significant reduction relative to the existing permit limit of 29 ppmdv7 or 95% control which is based on NSPS Subpart Cb. The associated annual emission limit is accordingly reduced from 40.5 tons/yr/unit to 21.30 tons/yr/unit. The proposed reduction is attributable to the improvements inherent with circulating dry scrubbing technology. The HCl concentration limit is the same as the lowest permitted HCl emissions at Palm Beach Renewable Energy Park-2 Facility.

4.3.3 Proposed SOTA for Hydrogen Fluoride

The proposed SOTA limit for HF of 0.035 lbs/hr is a significant reduction relative to the existing permit limit of 0.38 lbs/hr. The proposed reduction is attributable to the inherent improvements with the circulating dry scrubbing technology. The proposed 0.035 lbs/hr limit is equivalent to approximately 0.25 ppmdv7, which is lower than 3.5 ppmdv7 limit at the H-Power Mass Burn Facility in Hawaii operated by Covanta and the 2.9 ppmdv7 limit at the ECRRF.

4.4 Pollutants Controlled by Multiple Control Systems

Mercury, CDD/CDF, and PAH can exist in both filterable particulate and vapor forms. These pollutants are controlled by the existing semi dry scrubber system including the PAC injection system however the proposed CDS and baghouse will provide better control. The multiple systems that provide control of mercury, CDD/CDF, and PAH are as follows:

1. The evaporative tower (previously known as the spray dryer) will evaporate water to maintain flue gas temperature at a desired setpoint.
2. The PAC system will be operated to maintain a continuous injection of fresh PAC.
3. The hydrated lime injection rate will have a minimum setpoint, with the actual rate at or above that minimum as required by stack SO_2 feedback control.
4. The baghouse will maintain a filter cake that will include fresh PAC and fresh hydrated lime with recirculated residue providing additional PAC and hydrated lime.
5. The recirculation equipment will maintain recirculation of residue from the baghouse to the CDS reactor to provide an elevated amount of PAC and hydrated lime relative to the fresh PAC and hydrated lime injection rates.
6. Ductwork and the CDS reactor will function as a transport reactor where there will be a large amount of entrained residue that provides a large amount of surface area for adsorbing gas phase mercury and dioxins/furans.
7. The baghouse will provide effective control of fine particulate, where gas phase mercury and dioxins/furans are most likely to condense.

4.4.1 Proposed SOTA for Mercury

The proposed SOTA limit for mercury is 25 ug/dscm7 or 95% control. This proposed emission limit is more stringent than the level of control based on N.J.A.C. 7:27-27 for MSW incinerators and is equivalent to the permitted mercury emission limit for the West Palm Beach Renewable Energy Park-2 Facility operated by Covanta in Palm Beach County, Florida. The hourly emission limit from the current permit will be lowered from 0.08 lbs/hr/unit to 0.0043 lbs/hr/unit to be in line with the reduction in the concentration limit.

4.4.2 Proposed SOTA for Dioxins/Furans

The proposed SOTA limit for CDD/CDF of 13 ng/dscm7 is the emission limit in NSPS Subpart Eb and is a significant reduction relative to the current 35 ng/dscm7 permit limit which was based on NSPS Subpart Cb for facilities with ESP control. The proposed limit is more stringent than the 30 ng/dscm limit which applies to the MWCs at the ECRFF. Hourly and annual CDD/CDF mass emission rate limits are proposed consistent with the reduced concentration limit.

4.4.3 Proposed SOTA for PAH

The proposed SOTA limits for PAH of 0.0145 lbs/hr and 0.06 ton/yr/unit. No other recently issued MWC permit contained emission limits for PAH from MWC units. ECRRF has established permit limits for POM (PAH is a subset of POM), but at much higher limits 0.29 lbs/hr/unit and 3.81 tons/yr from all units combined.

4.5 Overall Emission Limit and Control Technology Summary

Table 4-2 presents the proposed emission rates and the basis for those rates for regulated emissions affected by this proposed Project in addition to the pollutants subject to a SOTA determination. The technological basis for all the pollutants is a circulating dry scrubber system followed by a 6-compartment pulse jet fabric filter baghouse with 1) an approximately 2.3 gross A/C ratio at the permitted steam limit, 2) side inlet of combustion gases, and 3) on-line cleaning equipped with PPS bags with a PTFE laminate coating. The existing activated carbon injection technology provides adsorption of mercury and CDD/CDF. Enhancements of the existing SNCR system will reduce annual NO_X emissions.

Table 4-2. Overall MWC Unit Emission Limits

Pollutant	Proposed Permit Emission Limits			Comments
	Concentration	lbs/hr (Per Unit)	tons/yr (3 Units)	
PM	12 mg/dscm7	2.04	25.26	Proposed SOTA limit, lower than NSPS Eb
PM_{10}	N/A	7.02	86.94	Proposed SOTA limit
$PM_{2.5}$	N/A	7.02	86.94	Proposed SOTA limit, same limit as PM_{10}
Pb	100 µg/dscm7	0.017	0.21	Proposed SOTA limit, lower than NSPS Eb
Cd	10 µg/dscm7	0.0017	0.021	Non-SOTA, complies with NSPS Eb
Hg	25 µg/dscm7 or 95% removal	0.0043	0.054	Complies with N.J.A.C. Subpart 27 emission limit
NO_X	N/A	48	400	Reduces permitted annual rate from 459 tons/yr for all 3 units combined
SO_2	50 ppmdv7 (1-hr) 24 ppmdv7 (24-hr) or 75% removal	22.64	134.5	Proposed SOTA limit
HCl	20 ppmdv7 or 95% removal	5.16	63.96	Proposed SOTA limit
HF	N/A	0.035	0.42	Proposed SOTA limit
PAH	N/A	0.0145	0.18	None
H_2SO_4	N/A	2.60	32.19	None
As	N/A	0.000525	0.0065	None
Be	N/A	0.0000131	0.00016	None
Cr	N/A	0.0215	0.27	None
Ni	N/A	0.018	0.22	None
CDD/CDF	13 ng/dscm7	2.21E-06	2.73E-05	Total CDD/CDF; complies with NSPS Eb emission limit
2,3,7,8-TCDD	N/A	1.11E-07	1.37E-06	None

5. Preliminary Dispersion Modeling Analysis

Preliminary modeling results for the criteria pollutant emissions are presented below for informational purposes. The modeling has been conducted in accordance with the Air Quality Modeling Protocol ("Modeling Protocol") that is included in **Appendix F** of this application which details the proposed modeling methodology, and the methods used to conduct the preliminary modeling. The preliminary modeling was conducted with USEPA's AERMOD dispersion model (version 21112) and in accordance with the NJDEP air quality modeling guidance provided in Technical Manual 1002 (NJDEP, 2021) and the USEPA Guideline on Air Quality Models ("GAQM"; USEPA, 2017).

As shown below, the preliminary criteria pollutant modeling results indicate that only the Project modeled 1-hour NO_2 concentrations are greater than the USEPA Significant Impact Levels ("SILs"), which triggers a multisource analysis including nearby background sources and an ambient background concentration component for comparison to the NAAQS/ New Jersey Ambient Air Quality Standards (NJAAQS). As required by NJDEP, after approval of the Modeling Protocol and completion of the Project SIL modeling, a Multi-source Modeling Protocol will be submitted to the Department with the background source inventory for approval.

Table 5-1 compares the preliminary maximum AERMOD modeled concentrations to the USEPA's SILs. Note that preliminary modeling was based on 2013-2017 meteorological data, however final modeling will be based on the most recent data set available from NJDEP at the time the modeling protocol approval is received.

The preliminary modeling was based on the maximum load assuming three (3) MWCs are operating (the preliminary modeling confirmed this was the worst-case load scenario). The modeling for $PM_{2.5}$ and PM_{10} also includes the new hydrated lime silo and the existing silo that currently stores pebble lime that will be used to store hydrated lime following construction of the Project. For those pollutants and averaging periods where modeling results are less than their respective SILs (all but 1-hour NO_2), compliance with the NAAQS would be demonstrated and additional analysis would not be required. Because the maximum 1-hour NO_2 concentration from the preliminary modeling is greater than the SIL, a multisource modeling analysis would be required to demonstrate NAAQS compliance, as discussed below. The preliminary Significant Impact Area ("SIA") for 1-hour NO_2 is approximately 1.5 km.

Table 5-1. Preliminary Significant Impact Analysis

Pollutant	Averaging Period	Rank	AERMOD Modeled Concentrations (µg/m³) 2013	2014	2015	2016	2017	Maximum AERMOD Concentration (µg/m³)	USEPA SIL (µg/m³)
NO_2	1-hr(1)	H1H			10.86			10.86	7.5
	Annual	H1H	0.36	0.27	0.32	0.30	0.31	0.36	1
PM_{10}	24-hr	H1H	0.57	0.58	0.56	0.59	0.56	0.59	5
	Annual	H1H	0.08	0.06	0.07	0.07	0.07	0.08	1
$PM_{2.5}$	24-hr(1)	H1H			0.53			0.53	1.2
	Annual(1)	H1H			0.07			0.07	0.2
SO_2	1-hr(1)	H1H			5.66			5.66	7.9
	3-hr	H1H	5.24	5.40	5.22	5.10	4.89	5.40	25
	24-hr	H1H	0.85	0.86	0.84	0.90	0.85	0.90	5
	Annual	H1H	0.12	0.09	0.11	0.10	0.10	0.12	1
CO	1-hr	H1H	15.69	15.15	15.58	15.79	16.00	16.00	2000
	8-hr	H1H	10.85	11.48	11.02	12.06	10.47	12.06	500

(1) H1H = high-1st-high. Significance is determined by averaging the high-1st-high at each receptor over the 5 years and comparing to the SIL. All other pollutants/averaging periods determined by comparing the maximum high-1st-high to the SIL.

6. References

NJDEP 2021. Technical Manual 1002. Guidance on Preparing an Air Quality Modeling Protocol. New Jersey Department of Environmental Protection. Division of Air Quality. May.

USEPA 2017. Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter. Federal Register, Vol. 82, No. 10. January 17, 2017. Available at: https://www.epa.gov/sites/production/files/2020-09/documents/appw_17.pdf

Appendix A

RADIUS Air Permit Application

Camden Cnty Energy Recovery Assoc LP (51614) Date: 7/7/2022

New Jersey Department of Environmental Protection
Reason for Application

Permit Being Modified

Permit Class: BOP **Number:** 200001

Description of Modifications: The CCERA hereby submits this permit application ("Application") to the NJDEP seeking approval of modifications (the "Project") of the Operating Permit for the CCERC which include the proposed conversion of the existing spray dryer scrubber on each Municipal Waste Combustion unit ("MWC") to a circulating dry scrubber ("CDS") system and replacement of the electrostatic precipitator ("ESP") on each MWC with a baghouse. The changes also include improvements to the selective noncatalytic reduction ("SNCR") control system on each MWC, the installation of a Liquid Direct Injection ("LDI") system at the Facility to allow for the disposal of nonhazardous liquid wastes in each of the three MWCs, and associated modifications of the Facility to accommodate the proposed air quality control systems. To facilitate the conversion from spray dryer scrubber to CDS, a new hydrated lime silo will be installed and one of the existing pebble lime silos will be converted to a hydrated lime silo. At that point the other existing pebble lime silo and the lime bag breaker will be removed from service. The current project schedule includes commencement of construction of the upgrade of the first MWC in 2024 and commencement of operation of all three upgraded MWCs on or about September 2026.

New Jersey Department of Environmental Protection
Facility Profile (General)

Facility Name (AIMS): Camden Cnty Energy Recovery Assoc LP

Facility ID (AIMS): 51614

Street Address: 600 MORGAN BLVD
CAMDEN, NJ 08104

Mailing Address: 600 MORGAN BLVD
CAMDEN, NJ 08104

State Plane Coordinates:

X-Coordinate:

Y-Coordinate:

Units:

Datum:

Source Org.:

Source Type:

County: Camden

Location Description: Municipal waste combustion using mass-burn waterwall furnances and boilers that generate electricity

Industry:

Primary SIC:

Secondary SIC:

NAICS:

New Jersey Department of Environmental Protection
Facility Profile (General)

New Jersey Department of Environmental Protection
Facility Profile (Permitting)

1. Is this facility classified as a small business by the USEPA?	No
2. Is this facility subject to N.J.A.C. 7:27-22?	Yes
3. Are you voluntarily subjecting this facility to the requirements of Subchapter 22?	No
4. Has a copy of this application been sent to the USEPA?	No
5. If not, has the EPA waived the requirement?	No
6. Are you claiming any portion of this application to be confidential?	No
7. Is the facility an existing major facility?	Yes
8. Have you submitted a netting analysis?	No
9. Are emissions of any pollutant above the SOTA threshold?	Yes
10. Have you submitted a SOTA analysis?	Yes
11. If you answered "Yes" to Question 9 and "No" to Question 10, explain why a SOTA analysis was not required	
12. Have you provided, or are you planning to provide air contaminant modeling?	Yes

New Jersey Department of Environmental Protection
Equipment Inventory

Equip. NJID	Facility's Designation	Equipment Description	Equipment Type	Certificate Number	Install Date	Grand-Fathered	Last Mod. (Since 1968)	Equip. Set ID
E1	SG-201A	MSW Boiler A	Boiler	114915	3/11/1991	No	3/1/1991	
E2	SG-201B	MSW Boiler B	Boiler	116471	3/1/1991	No	3/1/1991	
E3	SG-201C	MSW Boiler C	Boiler	116472	3/1/1991	No	3/1/1991	
E5	BN-201A	Lime Storage Silo A	Storage Vessel	085834	3/1/1991	No	3/1/1991	
E20	BN-201C	Lime Storage Silo C	Storage Vessel					

000000 E20 (Storage Vessel)
Print Date: 7/7/2022

What type of contents is this storage vessel equipped to contain by design?	Solids Only
Storage Vessel Type:	Silo
Design Capacity:	5,300
Units:	ft^3
Ground Location:	Above Ground
Is the Shell of the Equipment Exposed to Sunlight?	
Shell Color:	
Description (if other):	
Shell Condition:	
Paint Condition:	
Shell Construction:	Welded
Is the Shell Insulated?	
Type of Insulation:	
Insulation Thickess (in):	
Thermal Conductivity of Insulation [(BTU)(in)(hr)(ft2)(deg F)]:	
Shape of Storage Vessel:	Cylindrical
Shell Height (From Ground to Roof Bottom) (ft):	43.75
Length (ft):	
Width (ft):	
Diameter (ft):	13.00
Other Dimension	
Description:	
Value:	
Units:	
Fill Method:	Top Pipe
Description (if other):	
Maximum Design Fill Rate:	750.00
Units:	ft^3/min
Does the storage vessel have a roof or an open top?	Roof
Roof Type:	Vertical fixed roof tank
Roof Height (From Roof Bottom to Roof Top) (ft):	
Roof Construction:	
Primary Seal Type:	
Secondary Seal Type:	
Total Number of Seals:	
Roof Support:	
Does the storage vessel have a Vapor Return Loop?	

Does the storage vessel

Does the storage vessel have a Conservation Vent?	
Have you attached a diagram showing the location and/or the configuration of this equipment?	No
Have you attached any manuf.'s data or specifications to aid the Dept. in its review of this application?	Yes
Comments:	Pneumatic conveyance of hydrated lime

New Jersey Department of Environmental Protection
Control Device Inventory

CD NJID	Facility's Designation	Description	CD Type	Install Date	Grand-Fathered	Last Mod. (Since 1968)	CD Set ID
CD7	Lime Silo A	A600	Particulate Filter (Baghouse)	3/1/1991	No	3/1/1991	
CD11	Carb Injec A	A300	Adsorber	12/1/1995	No	12/1/1995	
CD12	Carb Injec B	A300	Adsorber	12/1/1995	No	12/1/1995	
CD13	Carb Injec C	A300	Adsorber	12/1/1995	No	12/1/1995	
CD15	SNCR A	SNCR A	Selective Non-Catalytic Reduction	9/1/2010	No	9/1/2010	
CD16	SNCR B	SNCR B	Selective Non-Catalytic Reduction	9/1/2010	No	9/1/2010	
CD17	SNCR C	SNCR C	Selective Non-Catalytic Reduction	9/1/2010	No	9/1/2010	
CD18	Lime Silo C	A600	Particulate Filter (Baghouse)				
CD21	Baghouse A	Baghouse A	Particulate Filter (Baghouse)				
CD22	Baghouse B	Baghouse B	Particulate Filter (Baghouse)				
CD23	Baghouse C	Baghouse C	Particulate Filter (Baghouse)				
CD24	DryScrubberA	DryScrubberA	Scrubber (Other)				
CD25	DryScrubberB	DryScrubberB	Scrubber (Other)				
CD26	DryScrubberC	DryScrubberC	Scrubber (Other)				

000000 CD18 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Number of Bags:	
Size of Bags (ft²):	
Total Bag Area (ft²):	
Bag Fabric:	
Fabric Weight (oz/ft²):	
Fabric Weave:	
Fabric Finish:	
Maximum Design Temperature Capability (°F):	
Maximum Design Air Flow Rate (acfm):	
Draft Type:	
Maximum Air Flow Rate to Cloth Area Ratio:	
Minimum Operating Pressure Drop (in. H2O):	
Maximum Operating Pressure Drop (in. H2O):	
Method of Monitoring Pressure Drop:	
Maximum Inlet Temperature (°F):	
Minimum Inlet Temperature (°F):	
Dew Point of Gas Stream Maximum Inlet Temperature (°F):	
Maximum Operating Exhuast Gas Flow Rate (acfm):	800.0
Maximum Inlet Gas Stream Moisture Content (%):	
Method for Determining When Bag Replacement is Required:	
Method for Determining When Cleaning is Required:	
Method of Bag Cleaning:	
Description:	
Is Bag Cleaning Conducted On-Line?	○ Yes ● No
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	
Have you attached a Particle Size Distribution Analysis?	○ Yes ● No

000000 CD18 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Have you attached data from recent performance testing?	○ Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Number of bags, size of bags, total bag area and fabric weight will be provided upon vendor selection and completion of design.

000000 CD21 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Number of Bags:	
Size of Bags (ft^2):	
Total Bag Area (ft^2):	
Bag Fabric:	PPS
Fabric Weight (oz/ft^2):	17.00
Fabric Weave:	Felt
Fabric Finish:	PTFE
Maximum Design Temperature Capability (°F):	375.0
Maximum Design Air Flow Rate (acfm):	
Draft Type:	Balanced
Maximum Air Flow Rate to Cloth Area Ratio:	2.56
Minimum Operating Pressure Drop (in. H2O):	
Maximum Operating Pressure Drop (in. H2O):	
Method of Monitoring Pressure Drop:	Pressure drop transmitter
Maximum Inlet Temperature (°F):	375.0
Minimum Inlet Temperature (°F):	
Dew Point of Gas Stream Maximum Inlet Temperature (°F):	
Maximum Operating Exhuast Gas Flow Rate (acfm):	
Maximum Inlet Gas Stream Moisture Content (%):	
Method for Determining When Bag Replacement is Required:	A change in opacity level signifies that bag replacement is required.
Method for Determining When Cleaning is Required:	Cleaning cycle is initiated based upon differential pressure across the baghouse and operating time.
Method of Bag Cleaning:	Pulse Jet
Description:	
Is Bag Cleaning Conducted On-Line?	● Yes ○ No
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	Continuous opacity monitoring and annual emissions testing are used to demonstrate that the control device is functioning properly.
Have you attached a Particle Size Distribution Analysis?	○ Yes ● No

000000 CD21 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Have you attached data from recent performance testing?	○ Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Number of bags, size of bags, total bag area and fabric weight will be provided upon vendor selection and completion of design.

000000 CD22 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Number of Bags:	
Size of Bags (ft²):	
Total Bag Area (ft²):	
Bag Fabric:	PPS
Fabric Weight (oz/ft²):	17.00
Fabric Weave:	Felt
Fabric Finish:	PTFE
Maximum Design Temperature Capability (°F):	375.0
Maximum Design Air Flow Rate (acfm):	
Draft Type:	Balanced
Maximum Air Flow Rate to Cloth Area Ratio:	2.56
Minimum Operating Pressure Drop (in. H2O):	
Maximum Operating Pressure Drop (in. H2O):	
Method of Monitoring Pressure Drop:	Pressure drop transmitter
Maximum Inlet Temperature (°F):	375.0
Minimum Inlet Temperature (°F):	
Dew Point of Gas Stream Maximum Inlet Temperature (°F):	
Maximum Operating Exhuast Gas Flow Rate (acfm):	
Maximum Inlet Gas Stream Moisture Content (%):	
Method for Determining When Bag Replacement is Required:	A change in opacity level signifies that bag replacement is required.
Method for Determining When Cleaning is Required:	Cleaning cycle is initiated based upon differential pressure across the baghouse and operating time.
Method of Bag Cleaning:	Pulse Jet
Description:	
Is Bag Cleaning Conducted On-Line?	● Yes ○ No
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	Continuous opacity monitoring and annual emissions testing are used to demonstrate that the control device is functioning properly.
Have you attached a Particle Size Distribution Analysis?	○ Yes ● No

000000 CD22 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Have you attached data from recent performance testing?	○ Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Number of bags, size of bags, total bag area and fabric weight will be provided upon vendor selection and completion of design.

000000 CD23 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Number of Bags:	
Size of Bags (ft²):	
Total Bag Area (ft²):	
Bag Fabric:	PPS
Fabric Weight (oz/ft²):	17.00
Fabric Weave:	Felt
Fabric Finish:	PTFE
Maximum Design Temperature Capability (°F):	375.0
Maximum Design Air Flow Rate (acfm):	
Draft Type:	Balanced
Maximum Air Flow Rate to Cloth Area Ratio:	2.56
Minimum Operating Pressure Drop (in. H2O):	
Maximum Operating Pressure Drop (in. H2O):	
Method of Monitoring Pressure Drop:	Pressure drop transmitter
Maximum Inlet Temperature (°F):	375.0
Minimum Inlet Temperature (°F):	
Dew Point of Gas Stream Maximum Inlet Temperature (°F):	
Maximum Operating Exhuast Gas Flow Rate (acfm):	
Maximum Inlet Gas Stream Moisture Content (%):	
Method for Determining When Bag Replacement is Required:	A change in opacity level signifies that bag replacement is required.
Method for Determining When Cleaning is Required:	Cleaning cycle is initiated based upon differential pressure across the baghouse and operating time.
Method of Bag Cleaning:	Pulse Jet
Description:	
Is Bag Cleaning Conducted On-Line?	● Yes ○ No
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	Continuous opacity monitoring and annual emissions testing are used to demonstrate that the control device is functioning properly.
Have you attached a Particle Size Distribution Analysis?	○ Yes ● No

000000 CD23 (Particulate Filter (Baghouse))
Print Date: 7/7/2022

Have you attached data from recent performance testing?	○ Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Number of bags, size of bags, total bag area and fabric weight will be provided upon vendor selection and completion of design.

000000 CD24 (Scrubber (Other))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Scrubber Type:	O4
Description:	Circulating Dry Scrubber
Is the Scrubber Used for Particulate Control?	Yes ● No
Is the Scrubber Used for Gas Control?	Yes ● No
Is the Scrubber Equipped with a Mist Eliminator?	Yes ● No
Minimum Pump Discharge Pressure (in. H20):	
Maximum Pump Discharge Pressure (in. H20):	
Method of Monitoring Pump Discharge Pressure:	
Minimum Pump Current (amps):	
Maximum Pump Current (amps):	
Method of Monitoring Pump Current:	
Minimum Scrubber Medium Inlet Pressure (in. H20):	
Minimum Operating Liquid Flow Rate (gpm):	
Maximum Operating Liquid Flow Rate (gpm):	
Method of Monitoring Liquid Flow Rate:	
Minimum Operating Gas Flow Rate (acfm):	
Maximum Operating Gas Flow Rate (acfm):	
Method of Monitoring Gas Flow Rate:	
Minimum Operating Pressure Drop (in. H20):	
Maximum Operating Pressure Drop (in. H20):	
Method of Monitoring Pressure Drop:	
Relative Direction of the Gas-Liquid Flow:	
Description:	
Number of Plates:	
Type of Plates:	
Spacing between Plates (in.):	
Maximum Inlet Gas Temperature (°F):	
Maximum Outlet Gas Temperature (°F):	
Inlet Particle Grain Loading (gr/dscf):	
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	
Have you attached data from recent performance testing?	Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	Yes ● No

	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Scrubber design details will be provided upon vendor selection and completion of design.

000000 CD25 (Scrubber (Other))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Scrubber Type:	O4
Description:	Circulating Dry Scrubber
Is the Scrubber Used for Particulate Control?	Yes / No (selected: No)
Is the Scrubber Used for Gas Control?	Yes / No (selected: No)
Is the Scrubber Equipped with a Mist Eliminator?	Yes / No (selected: No)
Minimum Pump Discharge Pressure (in. H20):	
Maximum Pump Discharge Pressure (in. H20):	
Method of Monitoring Pump Discharge Pressure:	
Minimum Pump Current (amps):	
Maximum Pump Current (amps):	
Method of Monitoring Pump Current:	
Minimum Scrubber Medium Inlet Pressure (in. H20):	
Minimum Operating Liquid Flow Rate (gpm):	
Maximum Operating Liquid Flow Rate (gpm):	
Method of Monitoring Liquid Flow Rate:	
Minimum Operating Gas Flow Rate (acfm):	
Maximum Operating Gas Flow Rate (acfm):	
Method of Monitoring Gas Flow Rate:	
Minimum Operating Pressure Drop (in. H20):	
Maximum Operating Pressure Drop (in. H20):	
Method of Monitoring Pressure Drop:	
Relative Direction of the Gas-Liquid Flow:	
Description:	
Number of Plates:	
Type of Plates:	
Spacing between Plates (in.):	
Maximum Inlet Gas Temperature (°F):	
Maximum Outlet Gas Temperature (°F):	
Inlet Particle Grain Loading (gr/dscf):	
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	
Have you attached data from recent performance testing?	Yes / No (selected: No)
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	Yes / No (selected: No)

○ Yes ● No

Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Scrubber design details will be provided upon vendor selection and completion of design.

000000 CD26 (Scrubber (Other))
Print Date: 7/7/2022

Make:	TBD
Manufacturer:	TBD
Model:	TBD
Scrubber Type:	O4
Description:	Circulating Dry Scrubber
Is the Scrubber Used for Particulate Control?	○ Yes ● No
Is the Scrubber Used for Gas Control?	○ Yes ● No
Is the Scrubber Equipped with a Mist Eliminator?	○ Yes ● No
Minimum Pump Discharge Pressure (in. H20):	
Maximum Pump Discharge Pressure (in. H20):	
Method of Monitoring Pump Discharge Pressure:	
Minimum Pump Current (amps):	
Maximum Pump Current (amps):	
Method of Monitoring Pump Current:	
Minimum Scrubber Medium Inlet Pressure (in. H20):	
Minimum Operating Liquid Flow Rate (gpm):	
Maximum Operating Liquid Flow Rate (gpm):	
Method of Monitoring Liquid Flow Rate:	
Minimum Operating Gas Flow Rate (acfm):	
Maximum Operating Gas Flow Rate (acfm):	
Method of Monitoring Gas Flow Rate:	
Minimum Operating Pressure Drop (in. H20):	
Maximum Operating Pressure Drop (in. H20):	
Method of Monitoring Pressure Drop:	
Relative Direction of the Gas-Liquid Flow:	
Description:	
Number of Plates:	
Type of Plates:	
Spacing between Plates (in.):	
Maximum Inlet Gas Temperature (°F):	
Maximum Outlet Gas Temperature (°F):	
Inlet Particle Grain Loading (gr/dscf):	
Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):	1
Alternative Method to Demonstrate Control Apparatus is Operating Properly:	
Have you attached data from recent performance testing?	○ Yes ● No
Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus?	○ Yes ● No

	○ Yes ● No
Have you attached a diagram showing the location and/or configuration of this control apparatus?	● Yes ○ No
Comments:	Scrubber design details will be provided upon vendor selection and completion of design.

Camden Cnty Energy Recovery Assoc LP (51614)

Date: 7/7/2022

New Jersey Department of Environmental Protection
Emission Points Inventory

PT NJID	Facility's Designation	Description	Config.	Equiv. Diam. (in.)	Height (ft.)	Dist. to Prop. Line (ft)	Exhaust Temp. (deg. F)			Exhaust Vol. (acfm)			Discharge Direction	PT Set ID
							Avg.	Min.	Max.	Avg.	Min.	Max.		
PT1	Stack 1	MSW A	Round	72	365	158	300.0	275.0	350.0	100,000.0	85,000.0	105,000.0	Up	
PT2	Stack 2	MSW B	Round	72	365	158	300.0	275.0	350.0	100,000.0	85,000.0	105,000.0	Up	
PT3	Stack 3	MSW C	Round	72	365	158	300.0	275.0	350.0	100,000.0	85,000.0	105,000.0	Up	
PT5	Stack 5	Lime A	Round	8	75	158	70.0			750.0	700.0	800.0	Horizontal	
PT13	Stack 13	Lime C	Round	8	75	158	70.0			750.0	700.0	800.0	Horizontal	

New Jersey Department of Environmental Protection
Emission Unit/Batch Process Inventory

U 1 MSW A,B,C Three MSW Combustors with a steaming rate of 421,600 lb per distinct 4-hour block period subject to NSPS subparts Cb, Eb, and 40 CFR 62 Subpart FFF

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours Min.	Annual Oper. Hours Max.	VOC Range	Flow (acfm) Min.	Flow (acfm) Max.	Temp. (deg F) Min.	Temp. (deg F) Max.
OS7	Combustor A	Operation of MSC A with Baghouse	Normal - Steady State	E1	CD11 (P) CD15 (P) CD21 (P) CD24 (P)	PT1	5-03-001-12	0.0	8,256.0		85,000.0	105,000.0	275.0	350.0
OS8	Combustor B	Operation of MSC B with Baghouse	Normal - Steady State	E2	CD12 (P) CD16 (P) CD22 (P) CD25 (P)	PT2	5-03-001-12	0.0	8,256.0		85,000.0	105,000.0	275.0	350.0
OS9	Combustor C	Operation of MSC C with Baghouse	Normal - Steady State	E3	CD13 (P) CD17 (P) CD23 (P) CD26 (P)	PT3	5-03-001-12	0.0	8,256.0		85,000.0	105,000.0	275.0	350.0

U 5 BN-201A 3500 ft3 Lime Storage Silo A

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours Min.	Annual Oper. Hours Max.	VOC Range	Flow (acfm) Min.	Flow (acfm) Max.	Temp. (deg F) Min.	Temp. (deg F) Max.
OS2	BN-201A	Storage of Hydrated Lime	Normal - Steady State	E5	CD7 (P)	PT5	3-99-999-99	0.0	8,760.0		700.0	800.0	0.0	100.0

New Jersey Department of Environmental Protection
Emission Unit/Batch Process Inventory

U 11 BN-201C Lime Storage Silo C

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours Min.	Annual Oper. Hours Max.	VOC Range	Flow (acfm) Min.	Flow (acfm) Max.	Temp. (deg F) Min.	Temp. (deg F) Max.
OS1	BN-201C	Storage of Hydrated Lime	Normal - Steady State	E20	CD18 (P)	PT13	3-99-999-99	0.0	8,760.0		700.0	800.0	0.0	100.0

000000 U5 OS2 (Storage Vessel Content)
Print Date: 7/7/2022

Content Name:	Hydrated Lime
CAS Number:	
Is the Content Under Pressure?	
Pressure (PSIG):	
Physical State:	Solid
Estimated Average Working Volume:	5,300
Units:	f3
Density of Contents:	35.000
Units:	lb/ft^3
Estimated Minimum Storage Temperature (deg F):	0.000
Estimated Maximum Storage Temperature (deg F):	100.000
Estimated Average Storage Temperature (deg F):	70.000
Does the Content Contain VOCs?:	No
Organic Density:	
Units:	
Molecular Weight (Lbs/Lbs-Mole):	
Vapor Pressure at Average Storage Temperature (PSIA):	
Vapor Pressure at 70 deg F (mmHg):	
Estimated Average Annual Throughput:	
Units:	
Estimated Maximum Annual Throughput:	
Units:	

000000 U11 OS1 (Storage Vessel Content)
Print Date: 7/7/2022

Content Name:	Hydrated Lime
CAS Number:	
Is the Content Under Pressure?	
Pressure (PSIG):	
Physical State:	Solid
Estimated Average Working Volume:	5,300
Units:	f3
Density of Contents:	35.000
Units:	lb/ft^3
Estimated Minimum Storage Temperature (deg F):	0.000
Estimated Maximum Storage Temperature (deg F):	100.000
Estimated Average Storage Temperature (deg F):	70.000
Does the Content Contain VOCs?:	No
Organic Density:	
Units:	
Molecular Weight (Lbs/Lbs-Mole):	
Vapor Pressure at Average Storage Temperature (PSIA):	
Vapor Pressure at 70 deg F (mmHg):	
Estimated Average Annual Throughput:	
Units:	
Estimated Maximum Annual Throughput:	
Units:	

Camden Cnty Energy Recovery Assoc LP (51614)

Date: 7/7/2022

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: **U1 MSW A,B,C**

Operating Scenario: **OS0 Summary**

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TCDD Emissions (2,3,7,8-)			0.00000137	0.00000137	tons/yr	No
Ammonia			60.00000000	60.00000000	tons/yr	No
Arsenic compounds			0.00660000	0.00660000	tons/yr	No
Beryllium compounds			0.00016000	0.00016000	tons/yr	No
Cadmium compounds			0.02100000	0.02100000	tons/yr	No
Chromium compounds			0.27000000	0.27000000	tons/yr	No
CO			186.30000000	186.30000000	tons/yr	No
HAPs (Total)			65.04000000	65.04000000	tons/yr	No
Hydrogen chloride			63.90000000	63.90000000	tons/yr	No
Hydrogen fluoride			0.45000000	0.45000000	tons/yr	No
Mercury compounds			0.05300000	0.05300000	tons/yr	No
Nickel compounds			0.22000000	0.22000000	tons/yr	No
NOx (Total)			400.00000000	400.00000000	tons/yr	No
Pb			0.21000000	0.21000000	tons/yr	No
PM-10 (Total)			86.90000000	86.90000000	tons/yr	No
PM-2.5 (Total)			86.90000000	86.90000000	tons/yr	No
Polycyclic organic matter			0.18000000	0.18000000	tons/yr	No
SO2			134.54000000	134.54000000	tons/yr	No
Sulfuric Acid Mist Emissions			32.10000000	32.10000000	tons/yr	No
Dioxins/Furans (Total)			0.00002730	0.00002730	tons/yr	No
TSP			25.30000000	25.30000000	tons/yr	No
VOC (Total)			21.21000000	21.21000000	tons/yr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1 MSW A,B,C

Operating Scenario: OS7

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TCDD Emissions (2,3,7,8-)			0.00000011	0.00000011	lb/hr	No
Ammonia			1.62000000	1.62000000	lb/hr	No
Arsenic compounds			0.00052500	0.00052500	lb/hr	No
Beryllium compounds			0.00001310	0.00001310	lb/hr	No
Cadmium compounds			0.00170000	0.00170000	lb/hr	No
Chromium compounds			0.02150000	0.02150000	lb/hr	No
CO			60.20000000	60.20000000	lb/hr	No
HAPs (Total)			5.25100000	5.25100000	lb/hr	No
Hydrogen chloride			5.16000000	5.16000000	lb/hr	No
Hydrogen fluoride			0.03500000	0.03500000	lb/hr	No
Mercury compounds			0.00430000	0.00430000	lb/hr	No
Nickel compounds			0.01800000	0.01800000	lb/hr	No
NOx (Total)			48.00000000	48.00000000	lb/hr	No
Pb			0.01700000	0.01700000	lb/hr	No
PM-10 (Total)			7.02000000	7.02000000	lb/hr	No
PM-2.5 (Total)			7.02000000	7.02000000	lb/hr	No
Polycyclic organic matter			0.01450000	0.01450000	lb/hr	No
SO2			22.63000000	22.63000000	lb/hr	No
Sulfuric Acid Mist Emissions			2.60000000	2.60000000	lb/hr	No
Dioxins/Furans (Total)			0.00000221	0.00000221	lb/hr	No
TSP			2.04000000	2.04000000	lb/hr	No
VOC (Total)			3.42000000	3.42000000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: **U1 MSW A,B,C**

Operating Scenario: **OS8**

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TCDD Emissions (2,3,7,8-)			0.00000011	0.00000011	lb/hr	No
Ammonia			1.62000000	1.62000000	lb/hr	No
Arsenic compounds			0.00052500	0.00052500	lb/hr	No
Beryllium compounds			0.00001310	0.00001310	lb/hr	No
Cadmium compounds			0.00170000	0.00170000	lb/hr	No
Chromium compounds			0.02150000	0.02150000	lb/hr	No
CO			60.20000000	60.20000000	lb/hr	No
HAPs (Total)			5.25100000	5.25100000	lb/hr	No
Hydrogen chloride			5.16000000	5.16000000	lb/hr	No
Hydrogen fluoride			0.03500000	0.03500000	lb/hr	No
Mercury compounds			0.00430000	0.00430000	lb/hr	No
Nickel compounds			0.01800000	0.01800000	lb/hr	No
NOx (Total)			48.00000000	48.00000000	lb/hr	No
Pb			0.01700000	0.01700000	lb/hr	No
PM-10 (Total)			7.02000000	7.02000000	lb/hr	No
PM-2.5 (Total)			7.02000000	7.02000000	lb/hr	No
Polycyclic organic matter			0.01450000	0.01450000	lb/hr	No
SO2			22.63000000	22.63000000	lb/hr	No
Sulfuric Acid Mist Emissions			2.60000000	2.60000000	lb/hr	No
Dioxins/Furans (Total)			0.00000221	0.00000221	lb/hr	No
TSP			2.04000000	2.04000000	lb/hr	No
VOC (Total)			3.42000000	3.42000000	lb/hr	No

Camden Cnty Energy Recovery Assoc LP (51614)

Date: 7/7/2022

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1 MSW A,B,C

Operating Scenario: OS9

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TCDD Emissions (2,3,7,8-)			0.00000011	0.00000011	lb/hr	No
Ammonia			1.62000000	1.62000000	lb/hr	No
Arsenic compounds			0.00052500	0.00052500	lb/hr	No
Beryllium compounds			0.00001310	0.00001310	lb/hr	No
Cadmium compounds			0.00170000	0.00170000	lb/hr	No
Chromium compounds			0.02150000	0.02150000	lb/hr	No
CO			60.20000000	60.20000000	lb/hr	No
HAPs (Total)			5.25100000	5.25100000	lb/hr	No
Hydrogen chloride			5.16000000	5.16000000	lb/hr	No
Hydrogen fluoride			0.03500000	0.03500000	lb/hr	No
Mercury compounds			0.00430000	0.00430000	lb/hr	No
Nickel compounds			0.01800000	0.01800000	lb/hr	No
NOx (Total)			48.00000000	48.00000000	lb/hr	No
Pb			0.01700000	0.01700000	lb/hr	No
PM-10 (Total)			7.02000000	7.02000000	lb/hr	No
PM-2.5 (Total)			7.02000000	7.02000000	lb/hr	No
Polycyclic organic matter			0.01450000	0.01450000	lb/hr	No
SO2			22.63000000	22.63000000	lb/hr	No
Sulfuric Acid Mist Emissions			2.60000000	2.60000000	lb/hr	No
Dioxins/Furans (Total)			0.00000221	0.00000221	lb/hr	No
TSP			2.04000000	2.04000000	lb/hr	No
VOC (Total)			3.42000000	3.42000000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: **U5 BN-201A**

Operating Scenario: **OS2**

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
PM-10 (Total)			0.09600000	0.09600000	lb/hr	No
PM-2.5 (Total)			0.09600000	0.09600000	lb/hr	No
TSP			0.09600000	0.09600000	lb/hr	No

Subject Item: **U11 BN-201C**

Operating Scenario: **OS1**

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO					lb/hr	No
HAPs (Total)					lb/hr	No
NOx (Total)					lb/hr	No
Pb					lb/hr	No
PM-10 (Total)			0.09600000	0.09600000	lb/hr	No
PM-2.5 (Total)			0.09600000	0.09600000	lb/hr	No
SO2					lb/hr	No
TSP			0.09600000	0.09600000	lb/hr	No
VOC (Total)					lb/hr	No

Appendix B

Emissions Data and Calculations

Camden Country Energy Recovery Associates
Calculation of Potential Emission Rates for Air Quality Control System Upgrade Project

Emission Summary for MWC Units

Pollutant	Concentration	Hourly Mass	Emissions for SOTA Applicability, per unit	Annual Emissions (ton/yr/unit)	Annual Emissions (total for 3 units)
PM	12 mg/dscm7	2.04 lb/hr	8.42 ton/yr	8.42 ton/yr/unit	25.26 tons/yr
PM_{10}	N/A (no curent permit limit)	7.02 lb/hr (1)	28.98 ton/yr	28.98 ton/yr/unit	86.94 tons/yr (1)
$PM_{2.5}$	N/A (no curent permit limit)	7.02 lb/hr	28.98 ton/yr	28.98 ton/yr/unit	86.94 tons/yr
Pb	100 ug/dscm7	0.017 lb/hr	140 lb/yr	0.07 ton/yr/unit	0.21 tons/yr
Cd	10 ug/dscm7	0.0017 lb/hr	14 lb/yr	0.007 ton/yr/unit	0.021 tons/yr
Hg	25 ug/dscm7	0.0043 lb/hr	35.6 lb/yr	0.0178 ton/yr/unit	0.05 tons/yr
CDD/CDF	13 ng/dscm7	2.2E-06 lb/hr	0.018 lb/yr	9.10E-06 ton/yr/unit	2.73E-05 tons/yr
TCDD (2,3,7,8-)	N/A (no curent permit limit)	1.11E-07 lb/hr	0.0009 lb/yr	4.58E-07 ton/yr/unit	1.37E-06 tons/yr
PAH	N/A (no curent permit limit)	0.0145 lb/hr (1)	120 lb/yr	0.06 ton/yr/unit (1)	0.18 tons/yr
SO2 1-hr	50 ppmvd@7%O2	22.63 lb/hr			
SO2 24-hr	24 ppmvd@7%O2	10.86 lb/hr	44.83 ton/yr	44.83 ton/yr/unit	134.5 tons/yr
H2SO4	N/A (no curent permit limit)	2.60 lb/hr (1)	10.70 ton/yr	10.7 ton/yr/unit (1)	32.1 tons/yr
HCl	20 ppmvd@7%O2	5.16 lb/hr	42600 lb/yr	21.30 ton/yr/unit	63.9 tons/yr
HF	N/A (no curent permit limit)	0.035 lb/hr	300 lb/yr	0.15 ton/yr/unit	0.45 tons/yr
As	N/A (no curent permit limit)	0.000525 lb/hr (1)	4.4 lb/yr	0.0022 ton/yr/unit (1)	0.0066 tons/yr
Be	N/A (no curent permit limit)	0.0000131 lb/hr (1)	0.11 lb/yr	0.000054 ton/yr/unit	0.00016 tons/yr
Cr	N/A (no curent permit limit)	0.0215 lb/hr (1)	178 lb/yr	0.089 ton/yr/unit	0.266 tons/yr
Ni	N/A (no curent permit limit)	0.018 lb/hr (1)	149 lb/yr	0.074 ton/yr/unit	0.223 tons/yr

(1) No change from curent permit limit

Calculation of maximum hourly stack flow rate (dscf7/hr and dscm7/hr)

dscf7/hr

$$\frac{451{,}140 \text{ tons waste/yr}}{3 \text{ units}} * \frac{2000 \text{ lb}}{\text{ton}} * \frac{5{,}200 \text{ Btu}}{\text{lb waste}} * \frac{\text{MMBtu}}{1{,}000{,}000 \text{ Btu}} * \frac{\text{yr}}{8{,}256 \text{ hours}} * \frac{14{,}390 \text{ dscf@7\%}O_2}{\text{MMBtu}} = 2{,}725{,}929 \frac{\text{dscf@7\%}O_2}{\text{hr-unit}}$$

dscfm7

$$\frac{2{,}725{,}929 \text{ dscf@7\%}O_2}{\text{hr-unit}} * \frac{\text{hr}}{60 \text{ min}} = 45{,}432 \frac{\text{dscf@7\%}O_2}{\text{min-unit}}$$

dscm7/hr

$$\frac{2{,}725{,}929 \text{ dscf@7\%}O_2}{\text{hr-unit}} * \frac{m^3}{35.31467 \text{ ft}^3} = 77{,}190 \frac{\text{dscm@7\%O2}}{\text{hr-unit}}$$

Based on solid waste permit annual waste limitation of 451,140 tons of waste per year.
14,390 dscf @ 7% O2 is based on the adjusted EPA Method 19 F-Facror methodology as described in Appendix G.

Camden Country Energy Recovery Associates
Calculation of Potential Emission Rates for Air Quality Control System Upgrade Project

Calculation of maximum hourly emission rates from mg/dscm7; ug/dscm7; ng/dscm7 concentrations

Pollutant	Concentration		Conversion		Flow		Conversion		Result
PM	12 mg PM / dscm@7%O_2	*	g / 1,000 mg	*	77,190 dscm@7%O_2 / hr	*	lb / 453.59 g	=	2.04 lb PM / hr-unit
Pb	100 ug Pb / dscm@7%O_2	*	g / 1.E+06 ug	*	77,190 dscm@7%O_2 / hr	*	lb / 453.59 g	=	0.017 lb Pb / hr-unit
Cd	10 ug Cd / dscm@7%O_2	*	g / 1.E+06 ug	*	77,190 dscm@7%O_2 / hr	*	lb / 453.59 g	=	0.0017 lb Cd / hr-unit
Hg	25 ug Hg / dscm@7%O_2	*	g / 1.E+06 ug	*	77,190 dscm@7%O_2 / hr	*	lb / 453.59 g	=	0.0043 lb Hg / hr-unit
CDD/CDF	13 ng CDD/CDF / dscm@7%O_2	*	g / 1.E+09 ng	*	77,190 dscm@7%O_2 / hr	*	lb / 453.59 g	=	2.21E-06 lb CDD/CDF / hr-unit

Calculation of maximum hourly emission rates from ppmdv@7%O2 concentrations

Pollutant	Concentration		Conversion		Flow		Conversion		Result
SO2 1-hr avg.	50 ppmdv@7%O_2	*	1.66E-07 lb/scf / ppm SO2	*	2,725,929 dscf@7%O_2 / hr			=	22.63 lb SO2 1-hr avg. / hr-unit
SO2 24-hr avg.	24 ppmdv@7%O_2	*	1.66E-07 lb/scf / ppm SO2	*	2,725,929 dscf@7%O_2 / hr			=	10.86 lb SO2 24-hr avg. / hr-unit
HCl	20 ppmdv@7%O_2 / 1,000,000 dscf @7%O_2	*	36.46 lb HCl / lb-mol	*	2,725,929 dscf@7%O_2 / hr	*	lb-mol / 385.3 cf	=	5.16 lb HCl / hr-unit

Camden Country Energy Recovery Associates
Calculation of Potential Emission Rates for Air Quality Control System Upgrade Project

Calculation of annual emission rates from hourly emission rate

PM	2.04 lb PM / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	8.42 ton PM / yr-unit	*	3 units	=	25.3 tons PM / yr-3 units
PM10	7.02 lb PM10 / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	28.98 ton PM10 / yr-unit	*	3 units	=	86.9 tons PM10 / yr-3 units
PM2.5	7.02 lb PM2.5 / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	28.98 ton PM2.5 / yr-unit	*	3 units	=	86.9 tons PM2.5 / yr-3 units
Pb	0.017 lb Pb / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	0.07 ton Pb / yr-unit	*	3 units	=	0.21 tons Pb / yr-3 units
Cd	0.0017 lb Cd / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	0.007 ton Cd / yr-unit	*	3 units	=	0.021 tons Cd / yr-3 units
Hg	0.0043 lb Hg / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	0.0178 ton Hg / yr-unit	*	3 units	=	0.053 tons Hg / yr-3 units
CDD/CDF	2.21E-06 lb CDD/CDF / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	9.10E-06 ton CDD/CDF / yr-unit	*	3 units	=	2.73E-05 tons CDD/CDF / yr-3 units
TCDD (2,3,7,8-)	1.11E-07 lb TCDD / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	4.58E-07 ton TCDD / yr-unit	*	3 units	=	1.37E-06 tons TCDD / yr-3 units
PAH	0.0145 lb PAH / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	0.06 ton PAH / yr-unit	*	3 units	=	0.18 tons PAH / yr-3 units
SO2 24-hr avg.	10.86 lb SO2 / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	44.83 ton SO2 / yr-unit	*	3 units	=	134.5 tons SO2 / yr-3 units
H2SO4	2.60 lb H2SO4 / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	10.7 ton H2SO4 / yr-unit	*	3 units	=	32.1 tons H2SO4 / yr-3 units
HCl	5.16 lb HCl / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	21.30 ton HCl / yr-unit	*	3 units	=	63.90 tons HCl / yr-3 units
HF	0.035 lb HF / hr-unit	*	8,256 hr / yr	*	ton / 2,000 lb	=	0.15 ton HF / yr-unit	*	3 units	=	0.45 tons HF / yr-3 units

Camden Country Energy Recovery Associates
Calculation of Potential Emission Rates for Air Quality Control System Upgrade Project

Calculation of annual emission rates from hourly emission rate (continued)

As	0.000525 lb As	*	8,256 hr	*	ton	=	0.0022 ton As	*	3 units	=	0.0066 tons As
	hr-unit		yr		2,000 lb		yr-unit				yr-3 units
Be	0.0000131 lb Be	*	8,256 hr	*	ton	=	0.000054 ton Be	*	3 units	=	0.00016 tons Be
	hr-unit		yr		2,000 lb		yr-unit				yr-3 units
Cr	0.0215 lb Cr	*	8,256 hr	*	ton	=	0.0888 ton Cr	*	3 units	=	0.27 tons Cr
	hr-unit		yr		2,000 lb		yr-unit				yr-3 units
Ni	0.0180 lb Ni	*	8,256 hr	*	ton	=	0.0743 ton Ni	*	3 units	=	0.22 tons Ni
	hr-unit		yr		2,000 lb		yr-unit				yr-3 units

Lime Silo Emissions Calculations

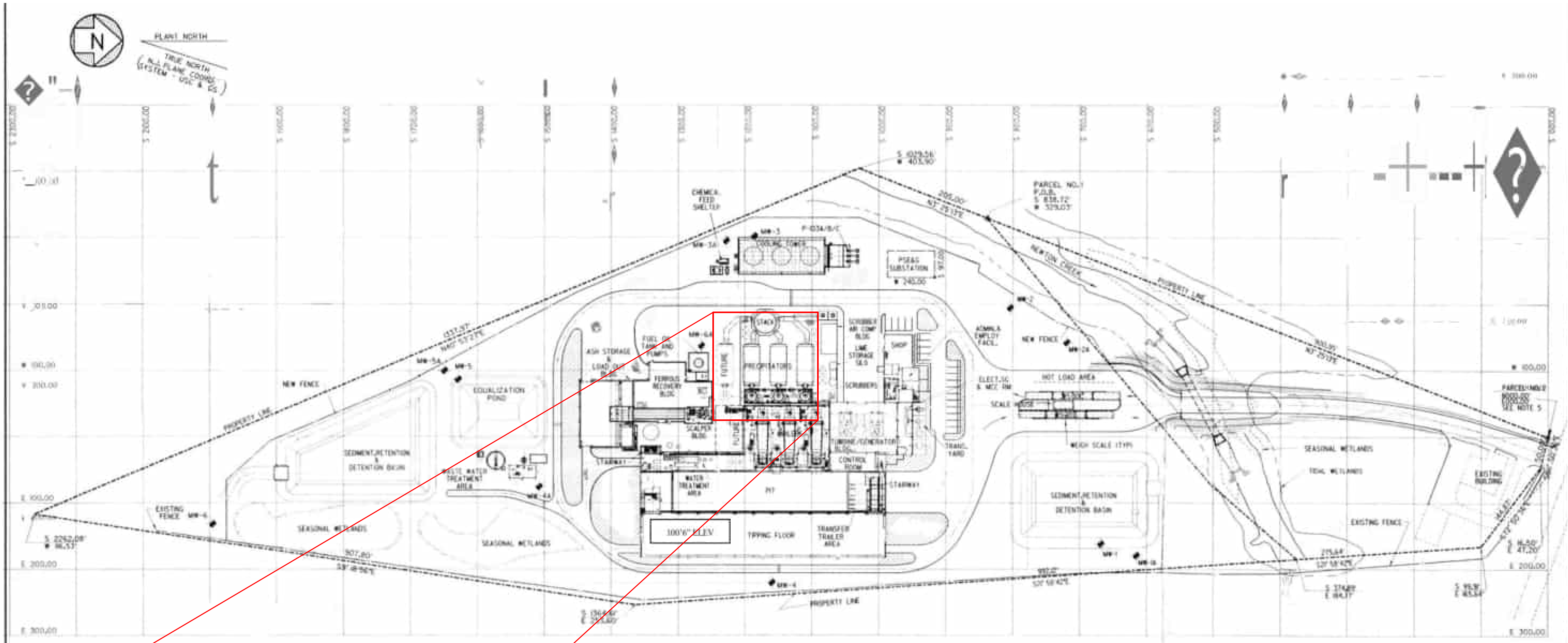
$PM/PM_{10}/PM_{2.5}$

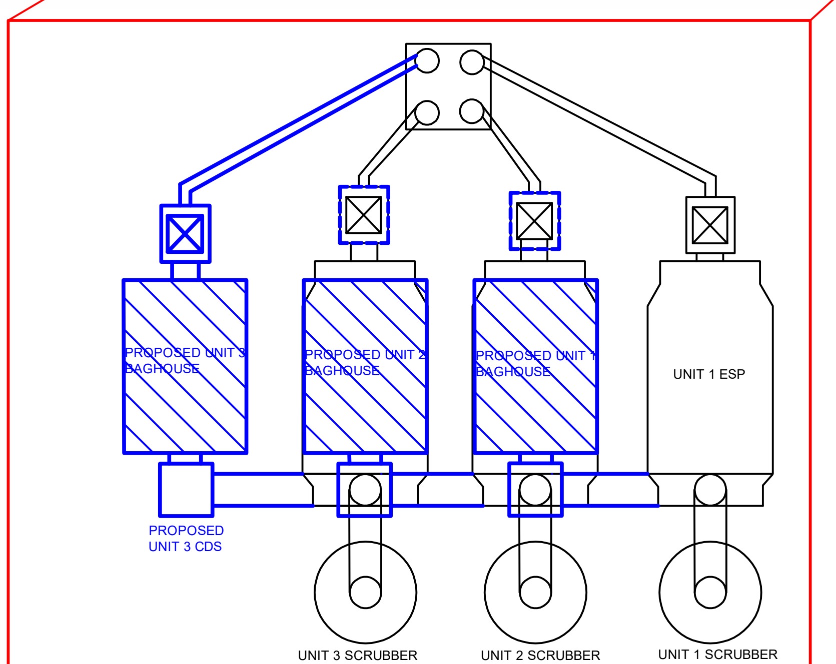
Hourly	0.015 gr $PM/PM_{10}/PM_{2.5}$	*	750 scf	*	60 min	*	lb	=	0.096 tons PM/PM10/PM2.5
	scf		min		hr		7,000 gr		hr-silo
Annual	0.096 lb $PM/PM_{10}/PM_{2.5}$	*	4 hrs	*	90 loadings	*	ton	=	0.017 tons PM/PM10/PM2.5
	hr		silo loading		yr		2,000 lb		yr-silo

Appendix C

Project Drawings

List of Drawings





REVISIONS
1. PRELIMINARY DRAWING – NTS

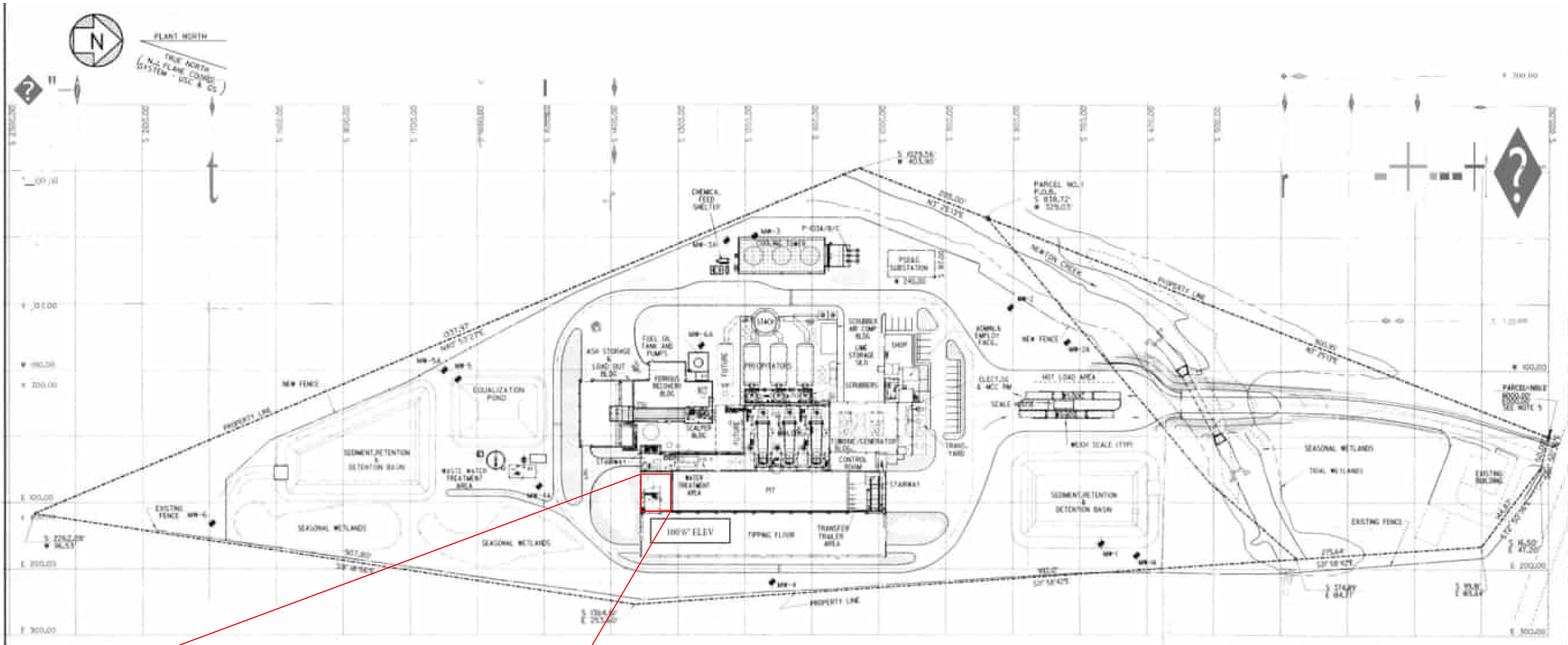
COMPANY CONFIDENTIAL

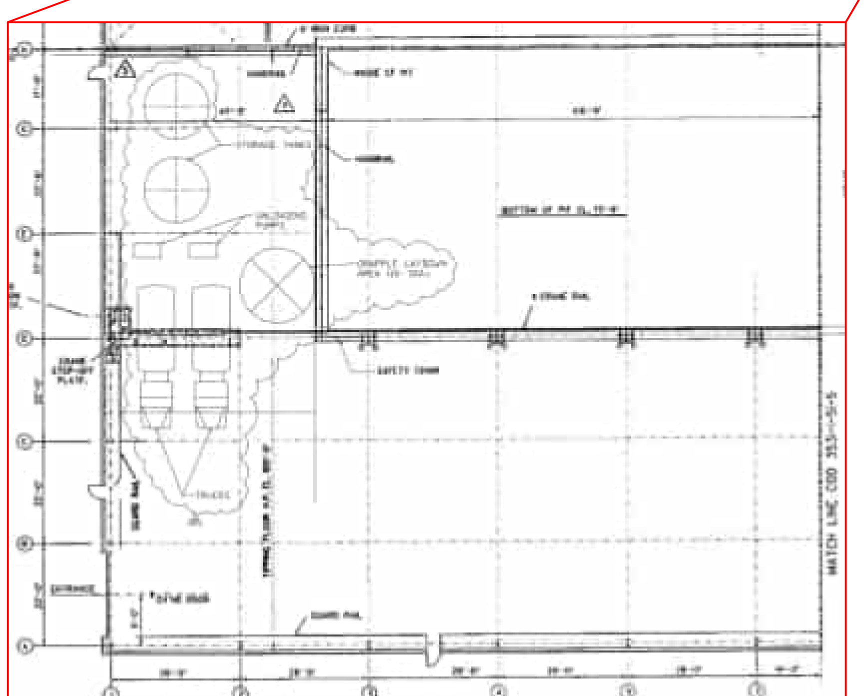
CAMDEN – SITE PLOT PLAN
PROPOSED BAGHOUSE LOCATION

COVANTA

COVANTA CAMDEN
600 MORGAN ST, CAMDEN, NJ 08104

DRAWN	APPROVED	DATE	DRAWING NO.	SHT. NO.	REV.
JME		3/25/22	XX–XXX	1 OF 1	A





REVISIONS
1. PRELIMINARY DRAWING – NTS

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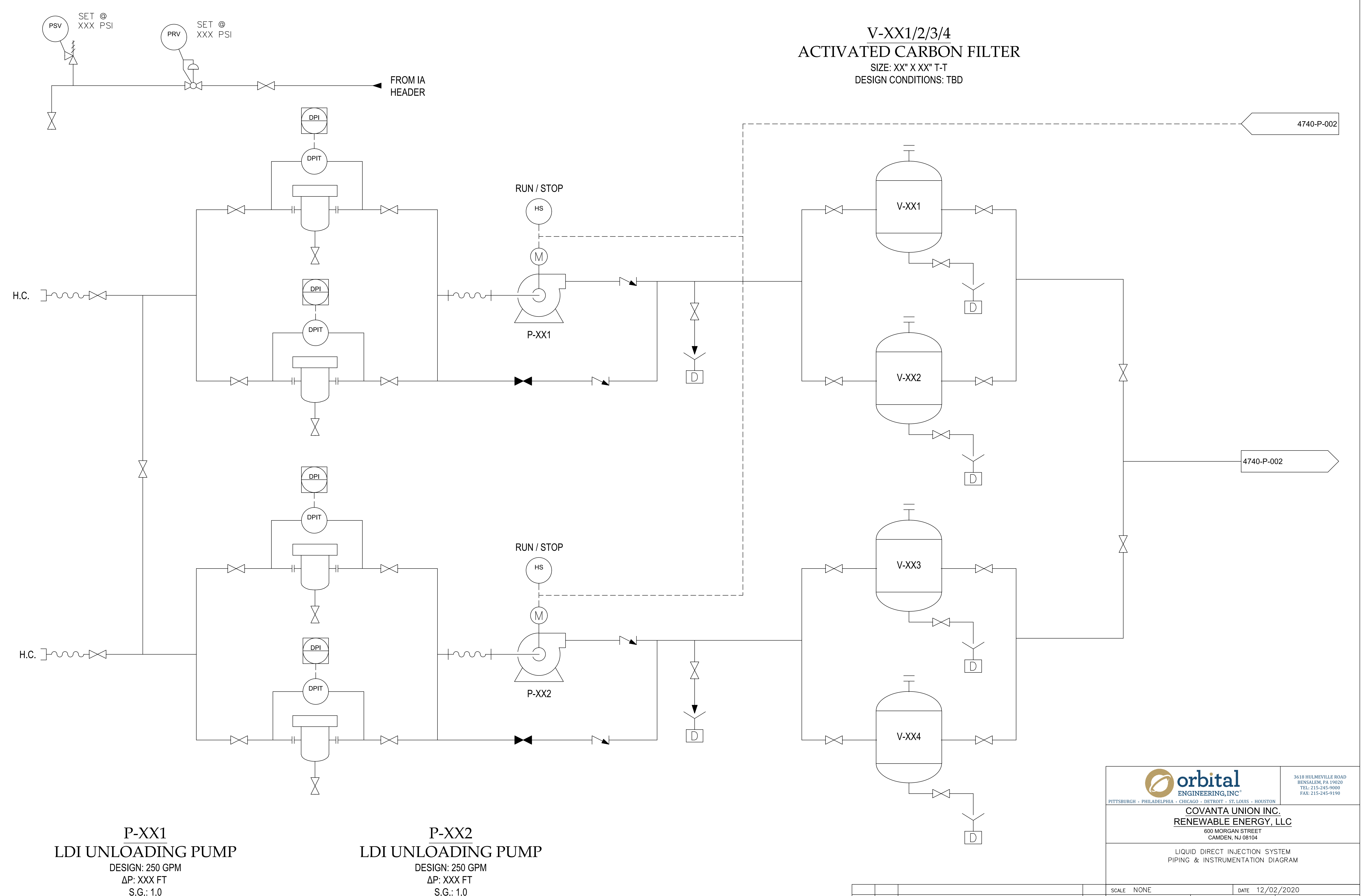
CAMDEN – SITE PLOT PLAN

PROPOSED LDI LOCATION

COVANTA

COVANTA CAMDEN
600 MORGAN ST, CAMDEN, NJ 08104

DRAWN	APPROVED	DATE	DRAWING NO.	SHT. NO.	REV.
JME		3/25/22	XX–XXX	1 OF 1	A



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COVANTA UNION INC.
RENEWABLE ENERGY, LLC
600 MORGAN STREET
CAMDEN, NJ 08104

LIQUID DIRECT INJECTION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM

REV #	DATE	DESCRIPTION	APP'D
A	12/02/20	ISSUED FOR APPROVAL	B.S.

SCALE NONE | DATE 12/02/2020
DRWN A.T. | CHK'D B.S. | APP'D B.S.

ORBITAL PROJECT NUMBER	DRAWING NUMBER	REVISION
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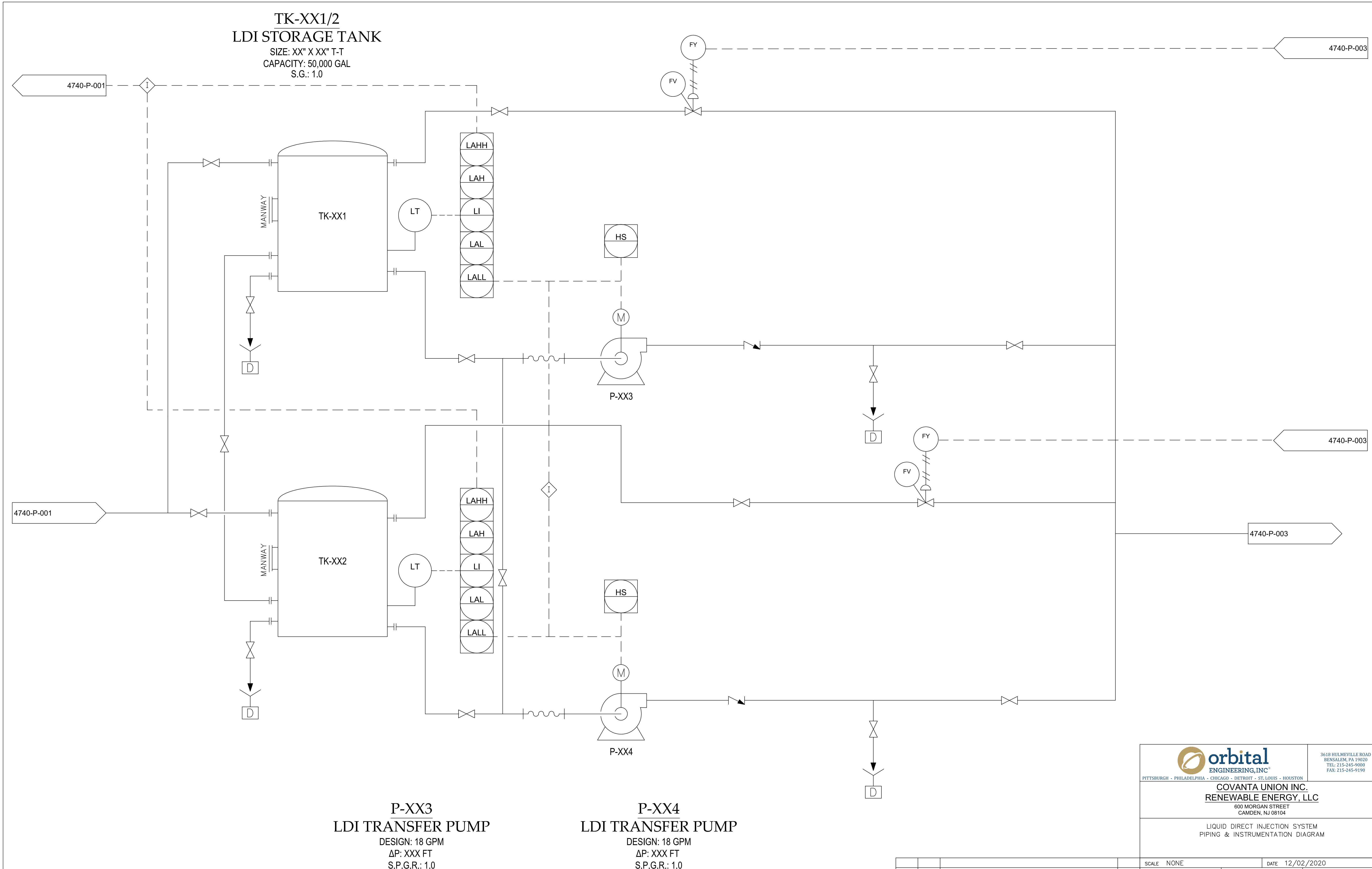

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SCALE NONE | DATE 12/02/2020
DRWN A.T. | CHK'D B.S. | APP'D B.S.

ORBITAL PROJECT NUMBER	DRAWING NUMBER	REVISION
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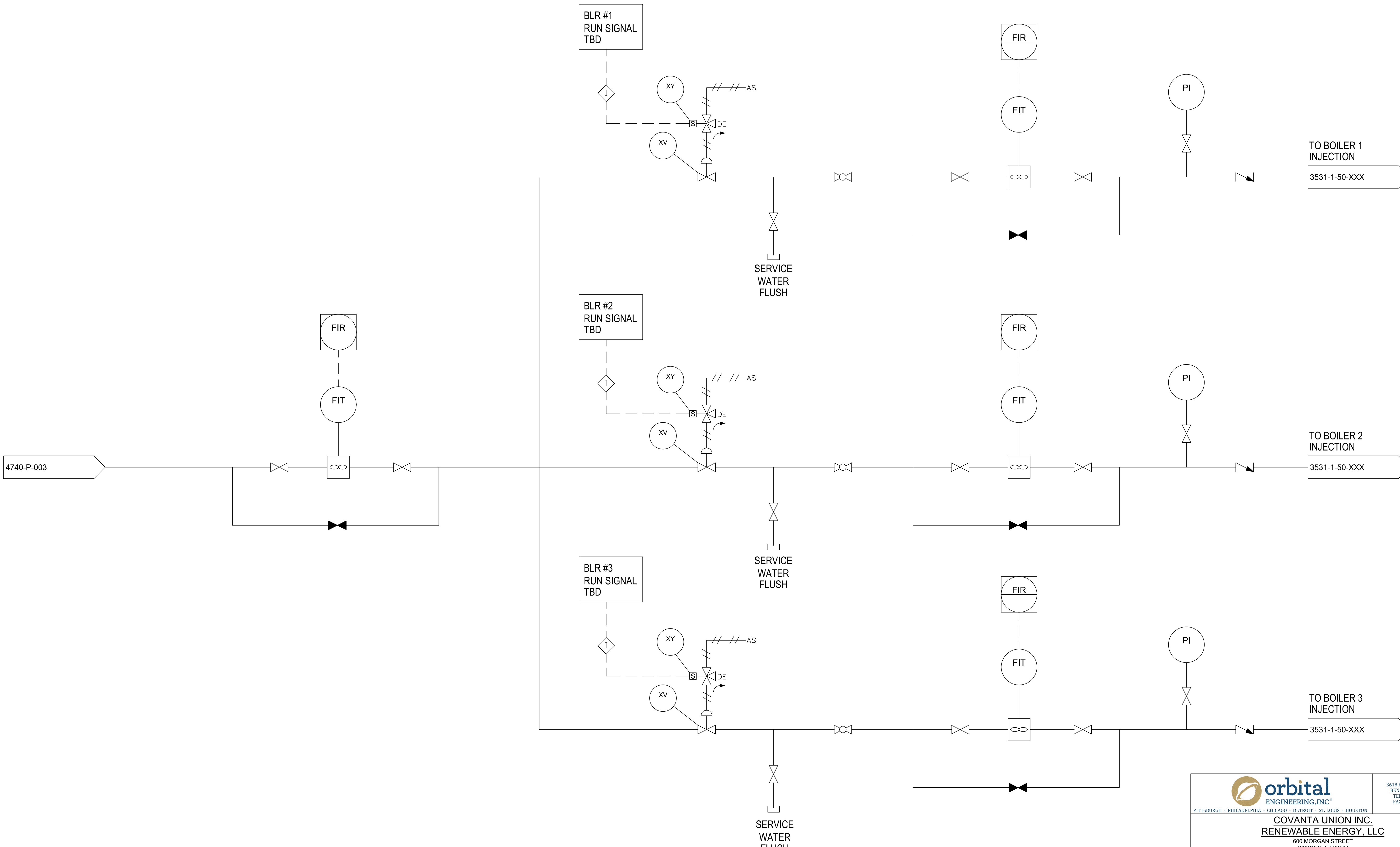

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RENEWABLE ENERGY, LLC
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LIQUID DIRECT INJECTION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM

SCALE NONE | DATE 12/02/2020
DRWN A.T. | CHK'D B.S. | APP'D B.S.

ORBITAL PROJECT NUMBER: PHI.20.4740
DRAWING NUMBER: 4740-P-003
REVISION: A

REV #	DATE	DESCRIPTION	APP'D
A	12/02/20	ISSUED FOR APPROVAL	B.S.

Appendix D

Baghouse System Description

Camden Baghouse System Description

(Note: This document is preliminary and will be revised when the specific vendor is selected, and the detailed design has been completed.)

INDEX PAGE

1.0 INTRODUCTION

1.1 PURPOSE

Treated flue gas is directed from the CDS reactor to the baghouse for cleaning. Entrained particulate is filtered from the gas stream as the gas passes through cloth filter bags within the baghouse. This particulate forms a "filter cake" of lime and fly ash on the bag surfaces. Once formed, the filter cake acts as an additional filter medium. The filter cake also aids in the removal of acids in the flue gas. Filtered gas is delivered to the stack via the induced draft fan for exhaust to the atmosphere. Captured particulate is periodically cleaned from the bags and released into the baghouse hoppers for delivery to the ash conveying system by a pneumatically operated pulse air system. A portion of the captured particulate will be wet conditioned and recirculated back to the CDS reactor.

1.2 SYSTEM OVERVIEW

The baghouse is a self-cleaning modular dust collector designed to remove dust particles from the flue gas streams. It consists of six (6) modules per unit, each containing approximately 17 oz., PPS (generic 'Ryton') bags with a PTFE (e.g., generic 'Gore-Tex') laminate coating. The PPS bags are more robust than fiberglass bags and are a more effective filtration media. The PTFE laminate provides improved filtration for all particle sizes and facilitates cleaning of the filter bags. The inlet and outlet of each of the six (6) modules are connected to common inlet and outlet manifolds. Each module is provided with a manually operated inlet damper and a pneumatically operated outlet damper.

Fabric bags within each baghouse module filter collect dust from the flue gas. The dust laden gas enters the baghouse modules through a side inlet manifold, slows down, changes direction, and passes through the filter bags from the outside to the inside of the bag. Inlet of the gas stream at the side of the modules rather than beneath the bags provides for better distribution of the flue gas and reagent along the entire length of the filter bags, thus providing more effective utilization of the bag filter area. This results in a more uniform filter cake which promotes more effective abatement of emissions. The mechanics of turning and slowing the gas results in some of the dust falling directly into the hopper. The remainder is deposited on the outside of the filter bags. Each filter bag is supported from within by a wire cage. The wire cages prevent the collapse of the filter bags during the filtering operation.

To keep system draft pressure, drop at an acceptable level, the filter bags are periodically cleaned of some of the collected material. The baghouse cleans the bags using a low volume, high pressure pulse of compressed air directed into the clean interior of the bags from their top ends which are open. The compressed air pulse, opposite to the direction of gas flow, expands the bag which causes some of the collected filter cake on the outside of the bag to fall into the hopper below. The high volume, medium pressure pulse provides uniform cleaning of the bags along their entire length.

2.0 COMPONENTS

The overall baghouse design criteria and performance guarantees are as follows. Individual component descriptions and information are contained in the following sections:

Gas temperature (inlet):	Approximately 310° F
Type:	Pulse jet
Number of modules:	6
Air to Cloth Ratios:	
Maximum Continuous Rating:	2.33 ACFM/ft^2 of cloth
110% Maximum Continuous Rating:	2.56 ACFM/ft^2 of cloth
FILTER BAGS	
Material:	PPS
Finish:	PTFE laminate coating
Weight:	Approximately 17 ounces/square yard
Maximum temperature:	375 ºF continuous
PERFORMANCE GUARANTEES	
Filterable outlet dust load:	12 mg/dscm @ 7% oxygen
Opacity:	10% permit maximum
Bag Life:	2-3 years (minimum)

2.1 MODULES

The baghouse is comprised of six (6) individual modules or compartments constructed of carbon steel. These modules provide the needed sectionalization for offline cleaning and/or maintenance. A module consists of a hopper, outlet plenum, tube sheet, and compressed air distribution system.

2.1.1 Hopper

The hopper collects fly ash for removal by the fly ash removal system. An access door is provided for inspecting each hopper interior. Each hopper is installed with a vibrator to dislodge any potential bridging as well as heaters and insulation.

A discharge flange connects the hopper to the fly ash system. All compartment hoppers discharge to a baghouse conveyor. The baghouse conveyers discharge to an intermediate hopper. The intermediate hopper is utilized to feed the collected particles to the recirculation system's wetting mixers. A skimming screw conveyor continuously pulls nonrecycled residues out of the hopper into the residual handling system.

2.1.2 Compartment Outlet Plenum

Each module serves as the housing for the filter bags and contains an outlet plenum for the clean flue gas. The dirty gas and outlet plenum are separated by a tube sheet, to which the filter bags are mounted. An access door is provided for entry into the outlet plenum. This allows access to the top of the tube sheet for inspection, removal, or installation of the filter bag and cage assemblies. Clean gas exits the outlet plenum of each module through the outlet poppet damper and flows into the outlet manifold.

2.1.3 Tube Sheet

The tube sheet supports the filter bags and separates the clean and dirty sides of the baghouse. It also serves as a filter bag inspection platform inside the outlet plenum. The filter bag is inserted into the tube sheet and at the top of the bag a snap band attaches the bag to the tube sheet. The bag cage assemblies are inserted into the bag. The cage assembly is in two (2) pieces to allow for installation and removal in the limited space of the outlet plenum.

2.1.4 Pulse Air Distribution System

This system will utilize dedicated air compressors, air dryer and air header located in the APC area, solenoid actuated diaphragm valves, the pulse pipes, and the cleaning cycle controller. A single pulse pipe is positioned over each row of filter bags and connected to the air receiver with a solenoid actuated diaphragm valve.

The amount of compressed air delivered to the bags is a function of the volume and air pressure inside the air receiver and the length of time the diaphragm valve remains open. The operation of the valves is controlled by the cleaning cycle controller.

The duration of the pulse of air is very short. The valve opens and admits air to the pulse pipe which directs air into the filter bags.

The air burst passes through the top of the bag/cage assembly and down the filter bags. This sudden acceleration of the fabric from the cage followed by deceleration causes most of the accumulated filter cake to separate from the outside of the filter bag. The medium pressure, high volume pulse provides uniform cleaning of the bags along their entire length.

2.2 ACCESS DOORS

There are two access doors on each module, one for the outlet plenum and one for the hopper. During operation, it is important that the door is closed sealed to prevent leakage. In-leakage of outside air cools the steel which is a potential corrosion problem and will cause bag deterioration.

2.3 FILTER BAG

Each bag is approximately 6" in diameter. The bag material is PPS (generic ‘Ryton’) with a PTFE (generic ‘Gore-Tex’) laminate coating. The fabric weight is approximately 17 ounces per square yard. A wear cuff at the bottom of the bags prevents premature failure caused by bag-to-bag abrasion. Support for the fabric is provided by wire cages which are inserted into each bag.

Because of the need to control flexing of the bag material yarns, an engineered fit between the filter bag and the cage is provided. In addition to this, the vertical cage wires are spaced less than an inch apart to provide good support for the fabric. To provide adequate rigidity, the cages are constructed of 11-gauge wire with annular rings.

The filter bags are removed and installed from the clean flue gas outlet plenum. There is no need to enter the dirty side of the baghouse to replace bags. Once the pulse pipes are disconnected, each filter bag and cage assembly can be inserted or removed through an opening in the tube sheet.

The method utilized to seal the filter bag against the tube sheet is accomplished by a metal snap ring that is integral to the upper collar of the bag. Once the bags are inserted and positioned in the inlet plenum tube sheet, a snap ring is used to attach it to the tube sheet. Snap ring spring pressure forms a tight seal to the tube sheet around the upper portion of the bag. A rigid flange on the cage assembly maintains the correct bag alignment. The cage is fabricated in two pieces to facilitate removal in the limited space. To reinstall the cage, first insert bottom portion into bag and angle top portion of the cage into bottom portion while inserting. The filter cage then slides-into the bag as one unit.

2.4 INLET AND OUTLET MANIFOLDS

The inlet and outlet manifolds distribute the flue gases into and out of each individual module. The manifolds are centrally located between the two rows of modules. The flue gas passages and manifolds have been designed to optimize the following essential criteria:

a. Minimize the plenum, compartment damper and system pressure drop.

b. Balance the flow and dust distribution between compartments and between filter bags within a compartment.

2.5 EXPANSION JOINTS

Expansion joints are located at the flue gas inlet and outlet plenums of each module. This allows relief of thermal stress at the points where the modules are connected to the manifolds. Stresses occur because of taking one module offline while the remaining modules are operating at higher gas temperatures. The forces generated by thermal expansion and contraction, if not accommodated, will result in misaligned dampers and structural damage to the modules and manifolds. Non-metallic joints are used because they are corrosion resistant and can handle three-dimensional movement and extreme temperature variances without-cracking or splitting.

2.6 BAGHOUSE DAMPERS

Isolation dampers are located at the flue gas inlet and outlet plenums to each module.

2.6.1 Poppet Dampers

The baghouse is designed to operate under negative pressure, i.e., less than atmospheric pressure. Under these conditions, when a baghouse module is isolated for inspection or performing maintenance, the outlet popper damper is closed. Since this is the only damper that closes during isolation of a module, poppet dampers are used at this location. These dampers are selected for their minimal leakage characteristics.
Poppet dampers consist of a flat circular plate, or blade, connected to a shaft. The shaft is either raised to close or lowered to open the outlet damper. In the closed position, the blade is seated against an opening in the duct work. The duct opening is fitted with a raised collar onto which the circular blade seals. The poppet damper actuator provides enough force to cause a deflection of the blade as it seals around the collar, like the action of a diaphragm seal. The blade is flexible enough to provide a uniform metal seal without creating permanent deformation.

A guide bar provides alignment of the poppet shaft and prevents rotation of the blade, thereby allowing consistent sealing after repeated use. A machined packing gland is used to seal the poppet shaft at the point where it penetrates the duct.

A double acting air cylinder provides the force necessary to open and close the poppet damper. A pin and lock assembly is used to mechanically lock the poppet damper in the closed position for online maintenance. The damper must be locked in a closed position before entering the module.

2.6.2 Butterfly Dampers

Butterfly dampers are used at the flue gas inlet of each module. Leakage is not as critical through this damper, because during module isolation, the poppet damper at the module outlet will also be closed. The primary concern is to use a damper that provides minimal pressure drop characteristics and functions well in a dirty flue gas stream.

Several design features are incorporated into the butterfly inlet dampers to minimize leakage and corrosion. This damper is also mechanically locked in the closed position to ensure safety during maintenance periods. The damper must be locked in a closed position before entering the module.

2.7 INSULATION LAGGING

Insulation and lagging are applied to all hot surfaces including modules, hoppers, inlet, and outlet manifolds.

2.8 HOPPER HEATERS

The hopper heaters are typically low watt density types. The junction box is dust and watertight (NEMA 4X). The heater is controlled by a temperature sensor mounted on the hopper wall.

The hopper heaters are designed to maintain the lower one third of the hopper surface area at typically 270 to 310° F.

2.9 HOPPER LEVEL INDICATOR

There is one level indicator per hopper to detect a high ash level. Each hopper level detector provides a high hopper ash level alarm to the control room.

2.10 HOPPER VIBRATORS

There is one (1) electric hopper vibrator per hopper which produces a pattern of pulsating vibrations to keep the dust particles agitated and in a free-flowing condition. The hopper vibrators are interlocked with the fly ash system to prevent the hopper vibrators from operating when the associated hopper screw conveyer is secured.

2.11 COMPRESSED AIR SYSTEMS

Compressed instrument air is supplied to the baghouse by a compressed air system. The system is comprised of air compressors, air dryer and air receiver.

2.12 BAGHOUSE CONTROL

A screen on the plant control system displays the control system logic. The displays are arranged in a graphic layout which indicates the status of various modes in which the system is operating and monitors the overall pressure drop. It also allows remote control of the following functions:

a. System startup or shut down

b. Manual or automatic cleaning cycle

c. Manual cleaning of an individual compartment

d. Online or offline cleaning

e. Control of outlet dampers

3.0 OPERATION

3.1 STARTUP

3.1.1 Putting Baghouse in Service:

The baghouse will always be in service whenever the induced draft fan is in service.

3.1.2 Verify that all doors and hatches into the flue gas paths are closed and sealed.

3.1.3 Ensure that the hopper heaters are energized before startup and the hopper temperature "low" alarms are not activated.

3.1.4 Inspect instrument tubing and fittings for leaks.

3.1.5 Ensure that all the local cleaning cycle timer control panels are in the off position.

3.1.6 Ensure that the baghouse control panel is energized.

3.1.7 Start the fly ash handling system and verify complete operation.

3.1.8 Verify that the two sacrificial modules inlet and outlet dampers are open.

3.1.9 Start the ID and FD fans and purge the furnace. After purging is complete, shut down the FD fan and place the auxiliary burner in service. See the Combustion Air and Flue Gas System Description for details.

3.1.10 Verify that the pulse air is lined up to all six (6) compartments and that the pulse air regulator is set at 50 PSIG.

3.1.11 When the baghouse outlet gas temperature reaches 285°F, open two (2) module outlet dampers via their control switches. The baghouse outlet temperature will drop until these compartments are warm up.

3.1.12 When the baghouse outlet gas temperature again reaches 285°F and stabilizes, open the four (4) remaining module outlet dampers via their control switches.

3.1.13 Place all the local cleaning cycle timer control panels to the "on" position.

3.1.14 Set the cleaning control switch to "online". This method is preferred for initial cleaning and will be the normal operating mode.

3.2 NORMAL OPERATION

With the baghouse in the normal filtering mode of operation, all the modules are on-line, filtering flue gas. When the differential pressure across the baghouse reaches approximately 6 inches WC (adjust based on actual operation), the pulse air unit will activate. This unit provides backpressure pulses across the filter bags to drop the accumulated ash from the bags. Fabric filter bag cleaning is accomplished by sequentially cleaning the first row of bags in each module, one module at a time, until the baghouse differential pressure is reduced to less than approximately 5.5 inches WC (adjust based on actual operation). Each module remains online during the cleaning cycle. Upon the baghouse differential pressure rises once again to approximately 6 inches WC, the next cleaning cycle begins where the previous cycle left off (i.e., cleaning begins with the first row of bags of the next module in the sequence). After the first row of bags in each module has been cleaned in this manner, cleaning is advanced to the second row of bags in the first module. Eventually each row of bags in each module is cleaned. All operations associated with fabric filter cleaning are controlled automatically or manually through the plant control system.

Online cleaning provides a more stable ID fan operation and subsequent stable combustion than cleaning by removing entire modules from service for cleaning (offline cleaning). It also provides for a more consistent filter cake and thus improved filtration. Online cleaning is also advantageous when one module has been taken out of service for maintenance or repairs. In this condition, taking a second module offline for cleaning will result in higher baghouse differential pressure.

Bag cleaning is accomplished using high volume, medium pressure compressed air pulses blown down into each bag from blow pipes mounted just above the tube sheet in the module outlet plenum. The air pulses travel down the bags in the direction opposite to the direction of the flue gas flow. The filter cake on the bags is dislodged by a combination of the dynamic pressure of the air pulses as they travel down the bags, and by the shock waves generated by the air exhausting from the blow pipe orifices.

The baghouse differential pressure will serve, in general, as the best indicator of overall baghouse performance. In particular, the differential pressure across the individual modules will be the best indicator of the condition of the filter bags. A sudden increase or decrease in pressure drop can mean blinded bags, leaks from holes in the fabric, cleaning system malfunction or full hoppers. Immediate action is required to isolate and solve the problem and prevent bag failures.

The baghouses will be designed so that offline cleaning may also be accomplished if necessary. The off-line cleaning mode allows a module being cleaned to be isolated from the flue gas flow. The offline cleaning feature is particularly useful when a compartment needs to be cleaned prior to performing maintenance and/or repairs on it. During offline cleaning, the outlet damper of the compartment to be cleaned is closed and then each row of bags within the compartment is sequentially cleaned by pulsing. After all the rows have been pulsed, a null period allows the ash which has been cleaned from the bags to settle into the hopper from where it is removed. The outlet damper is reopened at the time the compartment is to be returned to service.

3.2.1 Filter Bag Cleaning

3.2.1.1 Online Cleaning

3.2.1.1.1 The automatic online cleaning mode is initiated at a differential pressure of approximately 6 inches WC across the baghouse as described above. The bags are cleaned, one (1) row at a time, with a momentary burst of air from the compressed air system as described in the previous section. Each module is supplied with its own compressed air cleaning system. This system is comprised of one (1) common header and nineteen (19) diaphragm valves, each provided with a blow pipe which is aligned over a row of bags. The compressed air flows from the header, through the diaphragm valve and into the blow pipe.

3.2.1.1.2 The operation of the diaphragm valve is controlled by a solenoid valve, while the duration and frequency of energization (on and off times) of the solenoid valve are controlled by the cleaning cycle timer.

3.2.1.2 Offline Cleaning

3.2.1.2.1 In the automatic off-line cleaning mode, the baghouse allows the module being cleaned to be isolated from the gas flow.

3.2.1.2.2 The control system sequentially controls the operation of all module outlet poppet dampers and timers. The cleaning operation begins with the outlet poppet damper of the first module closing, preventing further filtering of dust laden gases in that module. A signal is sent from the control system to the module cleaning cycle controller, which sequentially pulses each row of bags. After all rows are pulsed, a null period allows the ash which has been cleaned from the filter bags to settle into the hopper from where it is removed. The outlet damper is then reopened, returning this module to service.

3.2.1.2.3 Then the control system closes the outlet poppet valve of the next module to be cleaned and the process is repeated until all the modules are cleaned.

3.2.1.2.4 Each module will be out of service approximately four (4) minutes for offline cleaning in the automatic cleaning mode. The times allotted for damper closing, the null period or settling period, are programmed into, and controlled by the control system. The duration of the pulse cleaning cycle is adjustable at the cleaning cycle timer for each specific module.

3.2.1.3 Manual Cleaning

3.2.1.3.1 The operator can initiate a manual cleaning of a module. This method is like offline cleaning except only one module is manually selected for cleaning.

3.2.1.3.2 The operator closes the outlet poppet damper for the module to be cleaned.

3.2.1.3.3 The operator then sends a signal to the module cleaning cycle controller which sequentially pulses each row of bags. After all rows are pulsed, a null period allows the ash which has been cleaned from the filter bags to settle into the hopper from where it is removed.

3.2.1.3.4 Upon completion of the cycle, the operator reopens the outlet damper, returning the module to service.

3.3 SHUTDOWN

Shut down of the baghouse should be accomplished in such a manner to prevent fabric filter damage due to lowering gas temperature, as there is potential for moisture or acid condensation on the bags.
Pulse jet cleaning should be manually initiated prior to shut down to remove any excess dust from the filter bags. Initiating a cleaning cycle prior to shut down reduces the likelihood of blinding the filter bags with hard caked dust resulting from moisture condensing on the bags as the unit cools. In addition, falling dust hazards are reduced should module entry be required.

3.3.1 Baghouse Shutdown

3.3.2 Shut down of the entire baghouse can be accomplished once the stoker grates are completely clear of garbage and the spray dryers have been shut down.

3.3.2.1 Stop feeding refuse and close the feed chute damper when refuse level drops below the acceptable level.

3.3.2.2 Place the auxiliary burner in service and burn off the remaining refuse.

3.3.2.3 Monitor the spray dryer inlet SO_2 level and inlet temp. After the level has dropped and remains below 5 PPM and 300°F, secure the spray dryer atomizer. See the Spray Dryer Absorber System Description for details.

3.3.2.4 After all the refuse is burned out, secure the auxiliary burner.

3.3.2.5 Close the module outlet dampers via their associated "open/close" selector switches as flue gas flow allows.

3.3.2.6 Place all the local cleaning cycle timer control panels to the off position.

3.3.2.7 Isolate the modules by closing the module inlet dampers via their associated manual chain operators.

3.3.2.8 Run the fly ash handling system after the baghouse is offline.

3.3.2.9 To preclude any condensation on bags, the hopper heaters should be left in service whenever possible.

REFERENCES (Note: Information will be filled-in when vendor has been selected and detailed design has been completed)

4.1 PIPING AND INSTRUMENTATION DIAGRAMS

Description	**Drawing Number**

4.2 VENDOR LOGIC DIAGRAMS

Description	**Drawing Number**

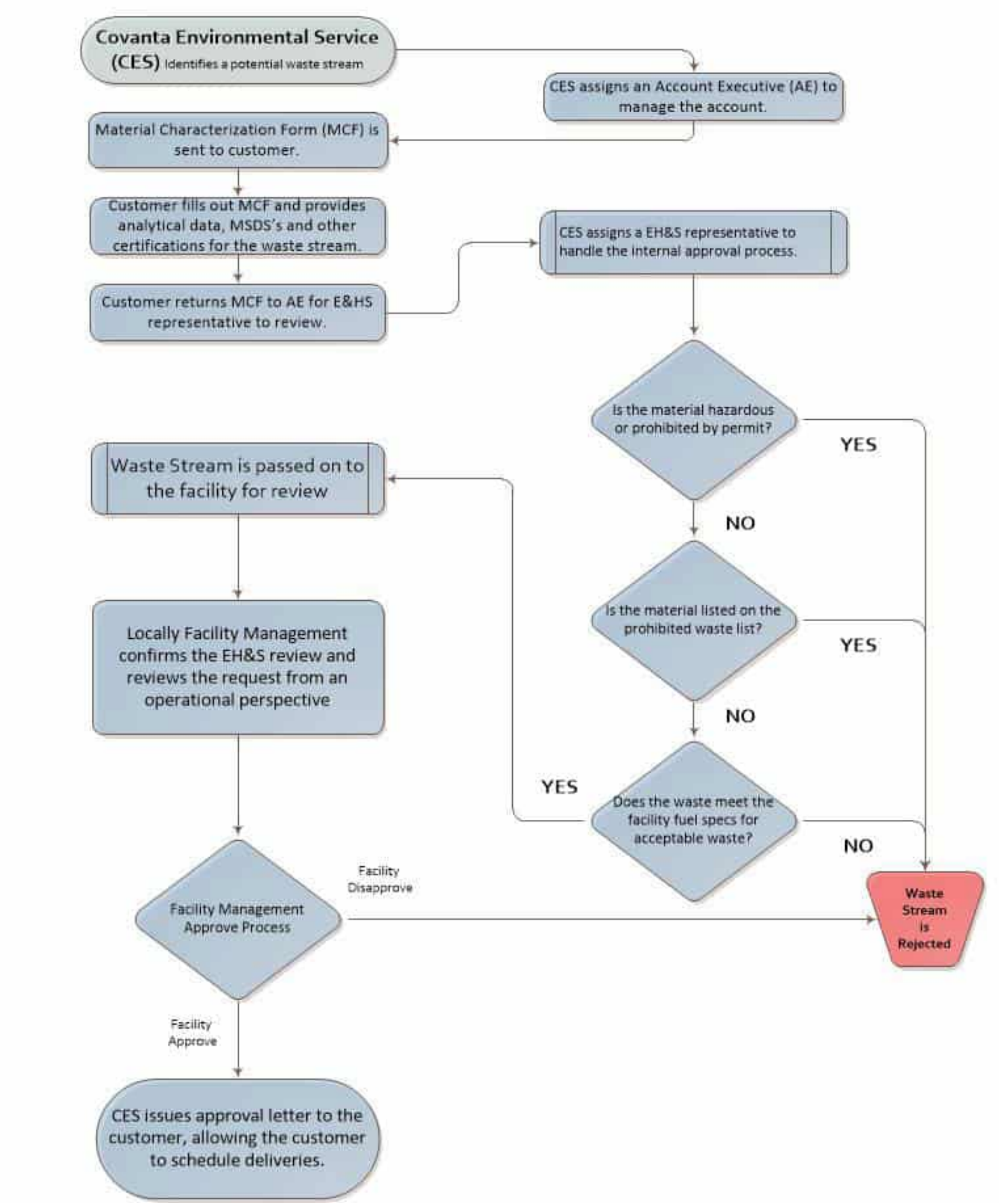
4.3 VENDOR MANUALS

Vendor	**Equipment**	**Equipment Manual**

Appendix E

LDI Waste Approval Process Flow Chart

Covanta Camden LDI Waste Stream Approval Process Flow Chart



Appendix F

Air Quality Modeling Protocol

Air Quality Modeling Protocol

Air Quality Control System Upgrade Project
Camden County Energy Recovery Center
Camden, NJ

July 2022

Delivering a better world

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position

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1. Protocol Overview

Camden County Energy Recovery Associates, L.P., (“CCERA”), a wholly owned subsidiary of Covanta Energy LLC (“Covanta Energy”), operates the Camden County Energy Recovery Center (“CCERC” or “the Facility”) under Program Interest Number 51614. As shown in **Figure 1-1**, the CCERC is located at 600 Morgan Boulevard in the City of Camden, New Jersey. The Facility site is bordered by Interstate 676 on the east, Newton Creek on the south and the southern part of the west property line, an active Conrail right-of-way on the balance of the west property line, and Morgan Boulevard on the north. The CCERA holds an air pollution control operating permit (“Title V Operating Permit” or “Operating Permit”) which was issued on December 22, 2004, and most recently amended on June 23, 2020, by the New Jersey Department of Environmental Protection (“NJDEP”). The current Operating Permit expires December 21, 2019, and is in the process of being renewed. The current Operating Permit remains in effect pursuant to the permit shield provisions of New Jersey Administrative Code (“N.J.A.C.”) 7:27-22, Operating Permits.

The Facility is comprised of three municipal waste combustor (“MWC”) units that are permitted to accept and process various municipal, bulk, food processing, and industrial wastes. The Facility is currently equipped with spray dryer absorbers and electrostatic precipitators (“ESPs”), a selective noncatalytic reduction (“SNCR”) system, and activated carbon injection technology to control air emissions. The CCERA has submitted a permit application (“Application”) to the NJDEP seeking approval of modifications (the “Project”) of the Operating Permit for the CCERC which include the proposed conversion of the existing spray dryer scrubber on each MWC unit to a circulating dry scrubber (“CDS”) system and replacement of the electrostatic precipitator (“ESP”) on each MWC with a baghouse to enhance particulate matter removal and related particulate matter emissions.

The changes also include improvements to the selective noncatalytic reduction (“SNCR”) control system on each MWC, a Liquid Direct Injection (“LDI”) delivery system to allow for the processing of nonhazardous liquid wastes in each of the three (3) MWCs, and associated modifications of the Facility to accommodate the proposed air quality control systems. To facilitate the conversion from spray dryer scrubber to CDS, a new hydrated lime silo will be installed and one (1) of the existing pebble lime silos will be converted to a hydrated lime silo. At that point, the other existing pebble lime silo will be removed from service. The current project schedule includes commencement of construction of the upgrade of the first MWC in 2024 and commencement of operation of all three upgraded MWCs by September 2026, contingent upon the timely receipt of required environmental and construction approvals. If the proposed changes at the CCERC perform as effectively as they have at other Covanta waste-to-energy (“WTE”) facilities, there will be a reduction in emissions of filterable particulate matter, metal emissions, acidic gas emissions, and the emissions of oxides of nitrogen (“NO_X”) from historical average levels measured at the Facility.

Dispersion modeling, in accordance with this modeling protocol as approved by NJDEP, will be conducted as part of the minor modification permit application to demonstrate the Project would not affect compliance with the National Ambient Air Quality Standards (“NAAQS”) or New Jersey Ambient Air Quality Standards (“NJAAQS”). In addition, recently the NJDEP modified the regulations pertaining to the reporting thresholds of many Hazardous Air Pollutants (“HAPs”); reducing a large majority of the reporting thresholds. Per NJDEP regulations N.J.A.C. 7:27-22.3(cc), any air emission source that is modified after the regulations became effective must take into account these new lower thresholds and re-calculate all HAP emissions from the modified (or new) source. It is anticipated that the dispersion modeling analysis will include a second-level risk screening assessment to estimate cancer and non-cancer health risk based on the CCERC HAP emissions.

Preliminary modeling results for the Project sources (MWC stack and lime silos) for criteria pollutant emissions are included in this protocol. As discussed in **Section 4**, the preliminary criteria pollutant modeling results indicate that only the Project 1-hour NO_2 concentration is greater than the U.S. Environmental Protection Agency (“USEPA”) Significant Impact Levels (“SILs”), which would trigger a multisource analysis including nearby background sources and ambient background concentrations for comparison to the NAAQS/NJAAQS. A preliminary review of background sources to be included in the multisource modeling is also provided in **Section 4**. CCERA will work with the Department to finalize the background source inventory and will submit a multi-source modeling protocol for Department approval.

1.1 Organization of the Protocol

This protocol sets forth all requirements considered to be applicable to the air dispersion modeling impact analysis. The remaining sections of the protocol include:

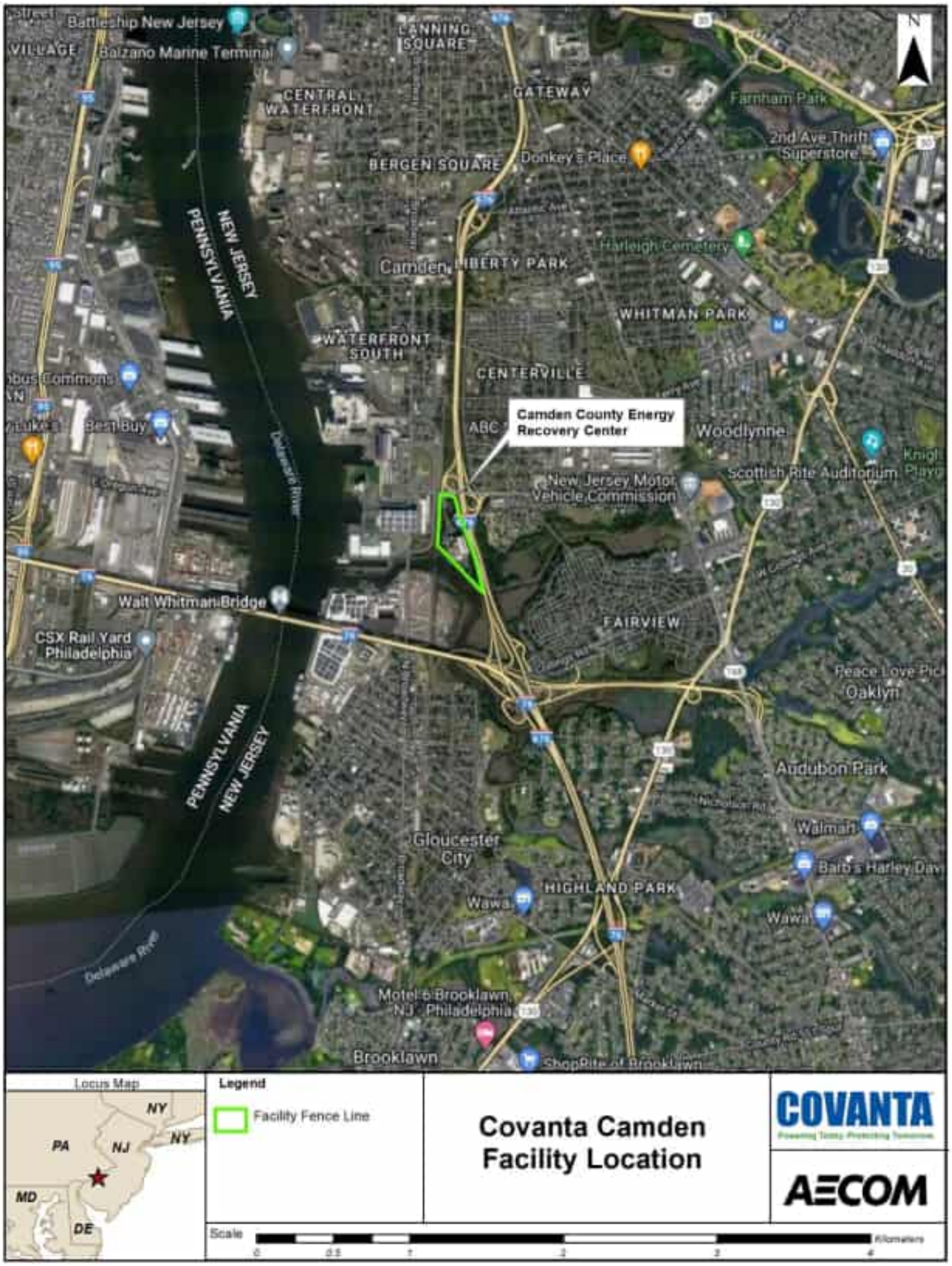
Section 2 – Source Data provides the source stack parameters and emission rates to be modeled.

Section 3 – Modeling Approach describes the proposed modeling approach and model selection.

Section 4 – Preliminary Modeling Results provides preliminary modeling results found using the described modeling approaches.

Section 5 – References.

Figure 1-1 Camden County Energy Recovery Center Location



2. Source Data

The three (3) MWCs exhaust through a common multi-flued stack, shown on **Figure 3-1**. The dispersion modeling will assess three operating loads to determine which would produce the highest concentrations. The minimum load is assumed to have only one (1) MWC operating. The mid load is assumed to have two (2) MWCs operating. The maximum load is assumed to have all three (3) MWCs operating. Parameters associated with the "worst-case" load will be used in the NAAQS/NJAAQS compliance demonstration as well as in the air toxics risk assessment. The $PM_{2.5}$ and PM_{10} modeling for the Project will also include the new proposed hydrated limo silo and existing lime silo that will be converted from pebble lime to hydrated lime storage. To simulate the minimal buoyancy of the particulate matter exhausting from the bin vents associated with each silo, the exit velocity and stack diameter for the vents will be set to minimal values in AERMOD. **Table 2-1** and **Table 2-2** presents the stack parameters and emission rates for modeling of the MWC stack and silo vents, respectively.

Table 2-1 Source Parameters

Model ID	Description	Stack Height (ft)	Stack Temperature (ºF)	Flow Rate (acfm)	Exit Velocity(1) (ft/sec)	Stack Diameter(1) (ft)
MAX	MWC stack, maximum load assumes 3 MWCs operating	365.0	290.0	301,503	59.2	10.4
MID	MWC stack, mid load assumes 2 MWCs operating	365.0	290.0	201,002	59.2	8.5
MIN	MWC stack, minimum load assumes 1 MWC operating	365.0	290.0	100,501	59.2	6.0
LS1	Lime silo vent	75.0	Ambient(2)	765(3)	0.003(4)	0.03(4)
LS2	Lime silo vent	75.0	Ambient (2)	765(3)	0.003(4)	0.03(4)

Notes:

(1) Each flue exit diameter is 6.0 feet. Effective diameter provided for mid and max loads.
(2) Temperature set to zero in AERMOD directs the model to assume ambient temperature exhaust.
(3) Flow rate in acfm based on 750 scfm flow rate and temperature of 70°F.
(4) Negligible buoyancy of vent exhaust simulated by setting exit velocity and stack diameter to minimal values in AERMOD.

Table 2-2 Criteria Pollutant Emissions

Model ID	Description	Emission Rate (g/sec)								
		CO	1-hr NO_2	Annual NO_2	24-hr PM_{10} / $PM_{2.5}$	Annual PM_{10} / $PM_{2.5}$	1-hr SO_2	3-hr SO_2	24-hr SO_2	Annual SO_2
MAX	MWC stack, maximum load assumes 3 MWCs operating	22.76	18.14	11.51	2.65	2.50(1)	8.55	8.55	4.10	3.87(2)
MID	MWC stack, mid load assumes 2 MWCs operating	15.17	12.10	7.67	1.77	1.67(1)	5.70	5.70	2.74	2.58(2)
MIN	MWC stack, minimum load assumes 1 MWC operating	7.59	6.05	3.84	0.88	0.83(1)	2.85	2.85	1.37	1.29(2)
LS1	Lime silo vent	--	--	--	0.00202(3)	0.000497(4)	--	--	--	--
LS2	Lime silo vent	--	--	--	0.00202(3)	0.000497(4)	--	--	--	--

Notes:
(1) Maximum short-term emissions scaled by annual operating hours (8256).
(2) Annual SO_2 emissions based on 24 ppmdv7 24-hour concentration, scaled by annual operating hours (8256).
(3) Maximum short-term emissions scaled by daily operating hours (4 hours/fill).
(4) Maximum short-term emissions scaled by annual operating hours (360).

3. Modeling Approach

The USEPA's AERMOD dispersion model (version 21112) will be used to estimate criteria pollutant and air toxic concentrations (µg/m^3) for the Project for comparison to the NAAQS/NJAAQS and NJDEP health screening risk thresholds, respectively.

The suitability of an air quality dispersion model for a particular application is dependent upon several factors. The selection and application of AERMOD was based upon analysis of the following criteria:

- stack height relative to nearby structures;
- dispersion environment;
- local terrain; and
- representative meteorological data.

The modeling analysis will be conducted in accordance with the NJDEP air quality modeling guidance provided in Technical Manual 1002 (NJDEP, 2021) and the USEPA Guideline on Air Quality Models ("GAQM"; USEPA, 2017).

Modeled concentrations for criteria pollutants will initially be compared with the USEPA SILs. For those pollutants and averaging periods with predicted impacts less than the SILs, compliance with NAAQS/NJAAQS is demonstrated, and additional analysis is not necessary. For those pollutants and averaging periods with modeled concentrations greater than the SILs, a cumulative impacts analysis will be conducted that includes modeling of all facility sources in addition to nearby background sources. The modeled concentrations will then be summed with an ambient background concentration for comparison to the NAAQS/NJAAQS. The NAAQS/NJAAQS are presented in **Table 3-1**. Note that the NAAQS are defined in terms of "block" averages, while the NJAAQS are based on running averages. However, Technical Manual 1002 states compliance with the NJAAQS can be demonstrated using "block" averages similar to the NAAQS if the total modeled concentration (including background concentrations) is less than 90% of the NJAAQS. If the total modeled concentration is greater than 90% of the NJAAQS, running averages must be used to determine compliance (NJDEP, 2021).

Table 3-1 NAAQS/NJAAQS Summary

Pollutant	Averaging Period	NAAQS (µg/m³)	Modeled Rank for Compliance(1)	NJAAQS (µg/m³)	Modeled Rank for Compliance(2)
NO_2	1-hr	188	d	--	--
	Annual	100	a	100	a
TSP	24-hr	--	--	260	b
	Annual	--	--	75	a
PM_{10}	24-hr	150	e	--	--
	Annual	--	--	--	--
$PM_{2.5}$	24-hr	35	f	--	--
	Annual	12	g	--	--
SO_2	1-hr	196	c	--	--
	3-hr	1,300	b	1,300	b
	24-hr	--	--	365	b
	Annual	--	--	80	a
CO	1-hr	40,000	b	40,000	b
	8-hr	10,000	b	10,000	b

Notes:
(1) Compliance with the NAAQS is based on modeled concentrations in terms of "block" averages.
(2) NJAAQS are based on running averages, however, compliance with the NJAAQS can be demonstrated using "block" averages similar to the NAAQS if the total modeled concentration (including background concentrations) is less than 90% of the NJAAQS. Otherwise, running averages must be used (NJDEP 2021).
a Maximum concentration for the 5-year period.
b Highest, second highest concentration of the values determined for each of the 5 modeled years.
c 99th percentile of the annual distribution of daily maximum values averaged over the 5-year period.
d 98th percentile of the annual distribution of daily maximum values averaged over the 5-year period.
e Highest, 6th highest concentration over the 5-year period.
f 98th percentile averaged over the 5-year period.
g Maximum concentration, averaged over the 5-year period.

A health risk screening analysis will be conducted to evaluate the impact of the air toxic emissions for the Project. The analysis will follow the risk screening procedures described in Section 10 of Technical Manual 1002. The analysis will evaluate both acute and chronic health risk effects.

3.1 Good Engineering Practice (GEP) Stack Height Analysis

Good engineering practice ("GEP") stack height is defined as the stack height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes or eddy effects created by the source, nearby structures or terrain features. A GEP stack height analysis was be conducted for the Project point sources (MWC stack and silo vents) with the USEPA's Building Profile Input Processor ("BPIP") in accordance with USEPA's guidelines (USEPA, 1985). The site layout depicting the location of the MWC stack, silo vents and buildings is provided in **Figure 3-1**. The GEP height for the modeled stacks, H_{GEP}, are determined from the dimensions of all buildings which are within the region of influence:

$$H_{GEP} = H + 1.5L$$

where:

H = height of the structure within 5L of the stack which maximizes H_{GEP}, and

L = lesser dimension (height or projected width) of the structure.

For a squat structure, i.e., height less than projected width, the formula reduces to:

$H_{GEP} = 2.5H$

As required by AERMOD, the PRIME version of the BPIP program was employed. The direction-specific building dimensions generated by BPIP-PRIME will be input to AERMOD. **Table 3-2** details the overall GEP summary.

Table 3-2 GEP Stack Height Analysis Summary

Stack	Stack Height (m)	Building Height (m)	Maximum Projected Building Width (m)	Distance from Stack (m)	5L Distance (m)	Calculated Formula GEP Stack Height (m)
MWC Stack	111.25	44.81 (Boiler Building)	44.75	38.5	223.75	111.9
Lime Silo Vent 1	22.86	44.81 (Boiler Building)	44.75	17.5	223.75	111.9
Lime Silo Vent 2	22.86	44.81 (Boiler Building)	44.75	10.0	223.75	111.9

Figure 3-1 Facility Layout – Point Source Locations, Building and Structure Heights

3.2 Dispersion Environment and Local Topography

The application of AERMOD requires characterization of the local (within 3 kilometers (“km”)) dispersion environment as either urban or rural based on prevalent land use. According to USEPA modeling guidelines, if more than 50 percent of an area within a 3-km radius of the proposed project is classified as rural, then use of rural dispersion coefficients should be used in the dispersion modeling analysis.

Based on land-use information provided on United States Geological Survey (“USGS”) topographic maps and recent aerial photography, the area within 3-km of the facility is considered urban. Therefore, the urban option will be used in the application of AERMOD. The population value to be used in AERMOD will be 6,107,906, which is based on the 2020 estimated population for the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Metro Area Metropolitan Statistical Area (U.S. Census Bureau 2022).

3.3 Meteorological Data

The modeling analysis will be conducted with AERMOD-ready meteorological data provided by NJDEP (NJDEP, 2022), consisting of 5-years (2016-2020) of surface data from Philadelphia International Airport and concurrent upper air data from Sterling, VA.

3.4 AERMOD Receptors

In accordance with Technical Manual 1002, the modeling will use a Cartesian receptor grid consisting of the following receptor spacing:

- Along the fence line with 25-meter (m) spacing;
- From the fence line to 1 km with 50-m spacing;
- From 0.5 km to 1.5 km with 100-m spacing;
- From 1.5 km to 3 km with 250-m spacing;
- From 3 km to 5 km with 500-m spacing;
- From 5 km to 10 km with 1000-m spacing; and
- From 10 km to 20 km with 2000-m spacing.

Note that based on preliminary modeling all maximum impacts are anticipated to occur within 1-km of the Facility where there is 50-m receptor spacing. Therefore, additional fine grid modeling should not be necessary to further refine the model results.

Receptor height scales at each receptor location were developed using AERMAP (version 18081), the terrain preprocessor for AERMOD. The receptor coordinates are referenced to North American Datum (NAD) 1983. The receptor grid is shown in **Figures 3-2** and **3-3** which show the near field and far field receptors, respectively.

In addition to a Cartesian receptor grid, sensitive receptors consisting of the nearest residences, parks, schools, hospitals, and nursing homes will be included in the health risk modeling; see **Figure 3-4**.

Figure 3-2 Near Field Receptors

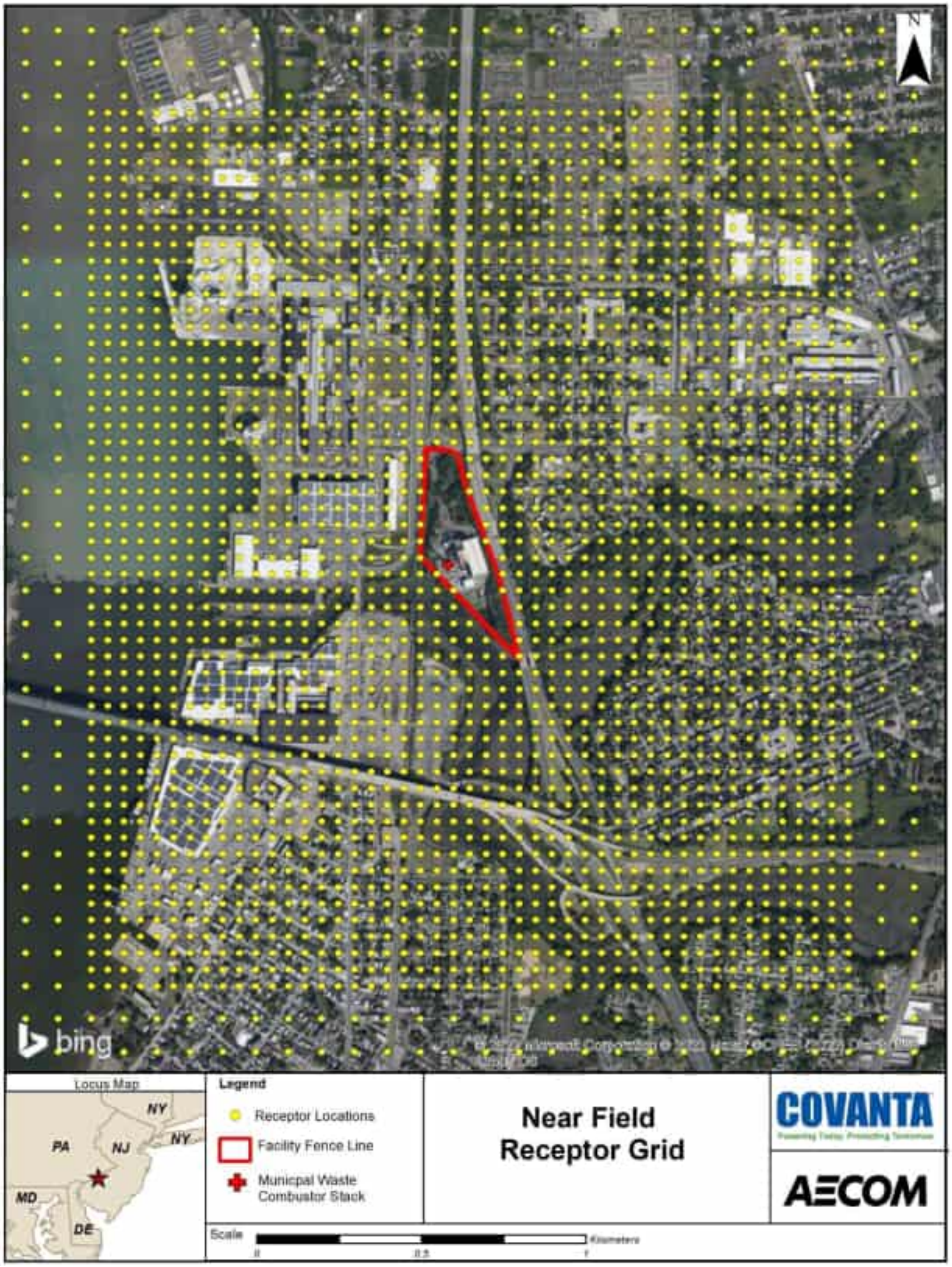


Figure 3-3 Far Field Receptors

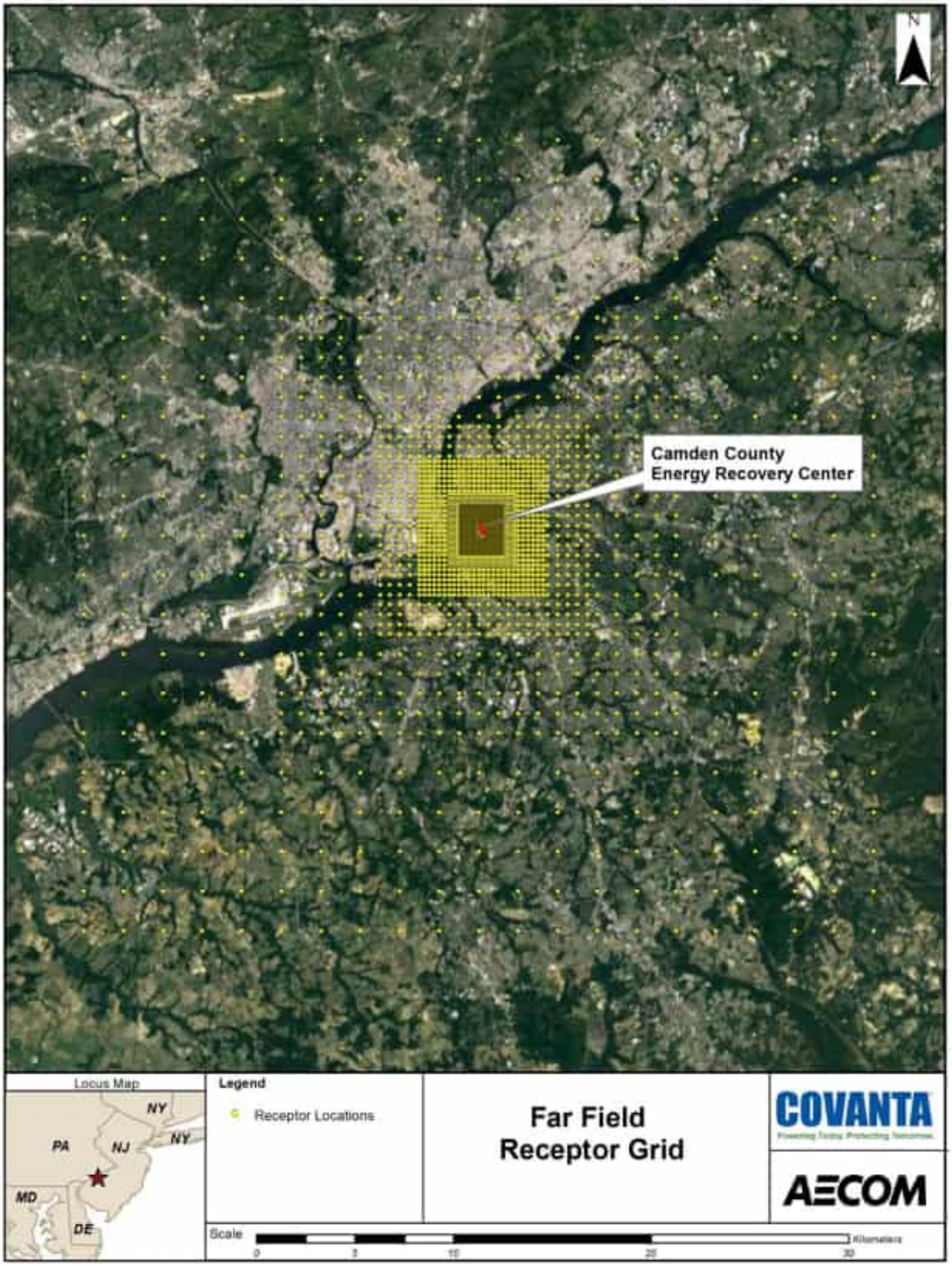
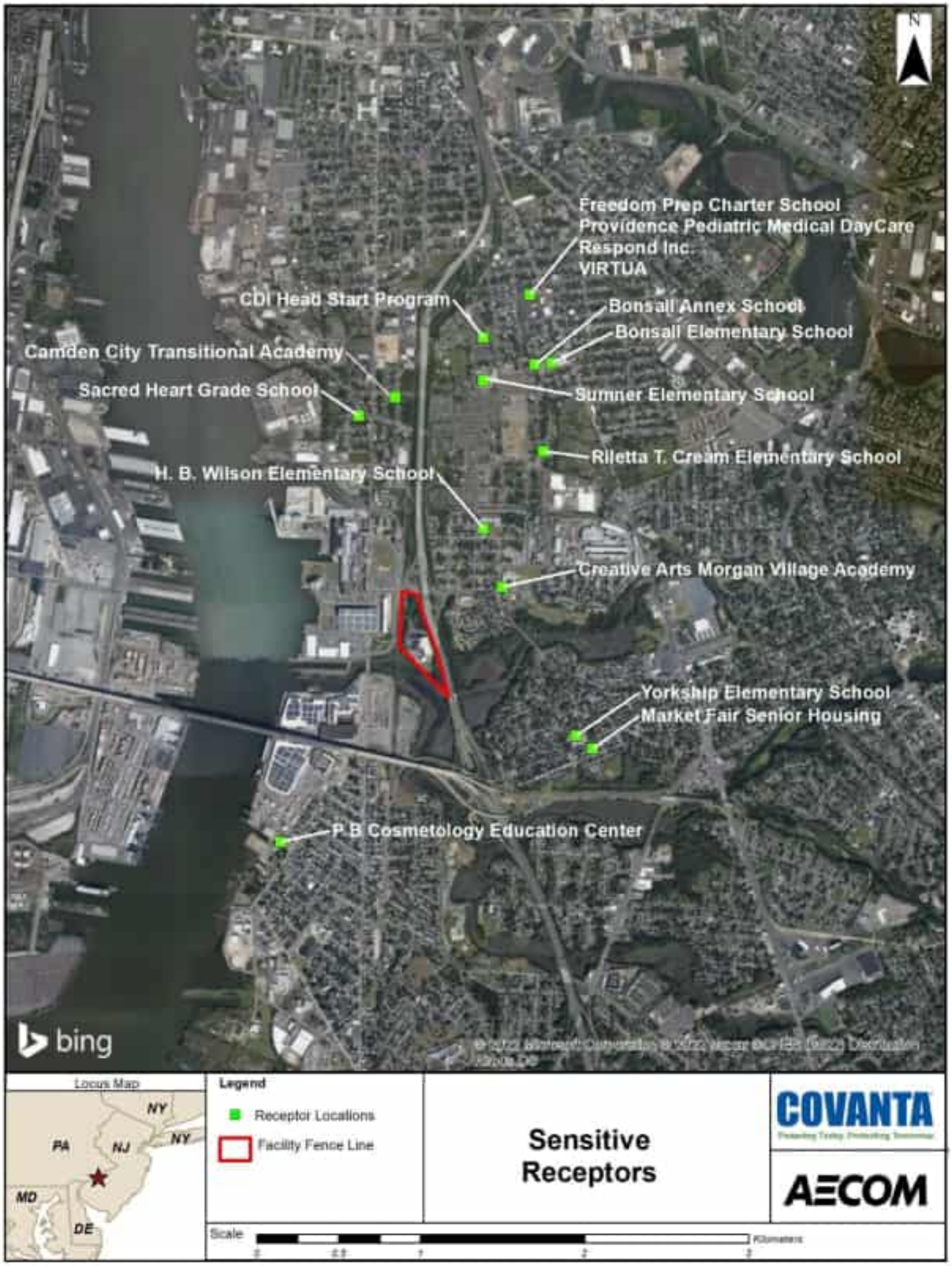


Figure 3-4 Sensitive Receptors for Health Risk Modeling



3.5 Air Toxics Risk Assessment

The NJDEP requires applicants to address potential inhalation-based health risks for sources of hazardous air pollutants (HAPs) for which potential emissions exceed the HAP-specific reporting thresholds stated in Subchapter 22, *Operating Permits*. The first step is typically a risk screening procedure to conservatively estimate health risk where ambient concentrations for annual and short-term averaging periods are conservatively estimated using emission rates and dispersion look-up tables combined within the NJDEP's risk screening spreadsheet. Impacts of HAPs can also be predicted through air quality dispersion modeling, and the predicted impacts can be incorporated into the NJDEP's risk screening spreadsheet.

The first-level risk screening is designed to evaluate a calculated risk below the "negligible" threshold which is defined as cancer risk less than or equal to ten in a million (Table 5.2 of Technical Manual 1003, *Guidance on Preparing a Health Risk Assessment for Air Contaminant Emissions* (NJDEP 2018)) and a hazard quotient of less than or equal to one for non-carcinogenic risk (Table 5.3 of Technical Manual 1003) for a facility-wide assessment. If the conservatively calculated risk is above negligible thresholds, second tier analysis is required.

A second-level risk screening assessment will be conducted for the CCERC that will utilize AERMOD dispersion modeling results. The short-term and annual AERMOD results will be incorporated into the NJDEP's risk screening spreadsheet which will carry out the proper calculations to estimate cancer and non-cancer health risk based on the facility permitted emission rates.

4. Preliminary Modeling Results

Preliminary modeling results for the Project are presented below. An assessment of the different operating loads indicated that the maximum load (3 MWC units operating) is the worst-case. Therefore, the significant impact analysis and multisource analysis assumed the maximum load case for the MWC stack.

4.1 Criteria Pollutant Significant Impact Analysis

Table 4-1 compares the preliminary maximum AERMOD modeled concentrations for the Project sources, MWC stack and lime silos ($PM_{2.5}$ and PM_{10} only), to the USEPA's SILs. Modeling was based on the maximum load assuming three (3) MWCs are operating (the preliminary modeling confirmed this was the worst-case scenario). For those pollutants and averaging periods that are less than their respective SILs (all but 1-hr NO_2), compliance with the NAAQS would be demonstrated and additional analysis would not be required. Because the maximum 1-hour NO_2 concentration is expected to be greater than the SIL, a multisource modeling analysis would be required to demonstrate NAAQS compliance, as discussed below. The preliminary Significant Impact Area (SIA) for 1-hour NO_2 was found to be 1.33 km and is shown in **Figure 4-1**.

Table 4-1 Preliminary Significant Impact Analysis

Pollutant	Averaging Period	Rank	Maximum AERMOD Predicted Concentrations (µg/m³)					Maximum AERMOD Concentration (µg/m³)	USEPA SIL (µg/m³)
			2016	2017	2018	2019	2020		
NO_2	1-hr(1)	H1H	10.86					**10.86**	7.5
	Annual	H1H	0.36	0.27	0.32	0.30	0.31	**0.36**	1
PM_{10}	24-hr	H1H	0.57	0.58	0.56	0.59	0.56	**0.59**	5
	Annual	H1H	0.08	0.06	0.07	0.07	0.07	**0.08**	1
$PM_{2.5}$	24-hr(1)	H1H	0.53					**0.53**	1.2
	Annual(1)	H1H	0.07					**0.07**	0.2
SO_2	1-hr(1)	H1H	5.66					**5.66**	7.9
	3-hr	H1H	5.24	5.40	5.22	5.10	4.89	**5.40**	25
	24-hr	H1H	0.85	0.86	0.84	0.90	0.85	**0.90**	5
	Annual	H1H	0.12	0.09	0.11	0.10	0.10	**0.12**	1
CO	1-hr	H1H	15.69	15.15	15.58	15.79	16.00	**16.00**	2000
	8-hr	H1H	10.85	11.48	11.02	12.06	10.47	**12.06**	500

Notes:

H1H = highest-1st-high.

(1) Significance is determined by averaging the high-1st-high at each receptor over the 5-years modeled and comparing to the SIL. All other pollutants/averaging periods determined by comparing the maximum high-1st-high to the SIL.

4.2 Background Source Inventory

For those pollutants and averaging periods with modeled concentrations greater than the SILs, a multisource modeling analysis will be conducted that includes modeling of all facility sources in addition to nearby background sources. Preliminary modeling indicates that the maximum 1-hour NO_2 modeled concentration for the Project is the only pollutant/averaging period that will exceed the SIL. Therefore, it is expected that multisource modeling will only be required for 1-hour NO_2. In accordance with NJDEP air quality modeling guidance (NJDEP, 2021), nearby sources with the following criteria will be included in the multi-source modeling:

- Sources with the potential to emit > 25 tons per year (tpy) of NO_2 and located within the SIA (1.33 km in preliminary modeling), and
- Sources with the potential to emit > 100 tpy of NO_2 and located within the SIA + 10 km (11.33 km).

This section includes a preliminary inventory that has been developed for sources located in New Jersey. Note that CCERA is currently working on identifying and developing an inventory of sources located in Pennsylvania which will be included in the multi-source modeling protocol.

An initial review of NJDEP's "What's in my Community" website[1] was conducted to identify potential sources located in New Jersey to be included in the modeling. AECOM then obtained Title V permits available from NJDEP's website for the identified sources to determine potential emissions to apply the NJDEP criteria listed above. **Table 4-2** presents the facilities located in New Jersey identified for potential inclusion in the multisource modeling analysis. **Figure 4-1** depicts the identified New Jersey sources with respect to the Facility.

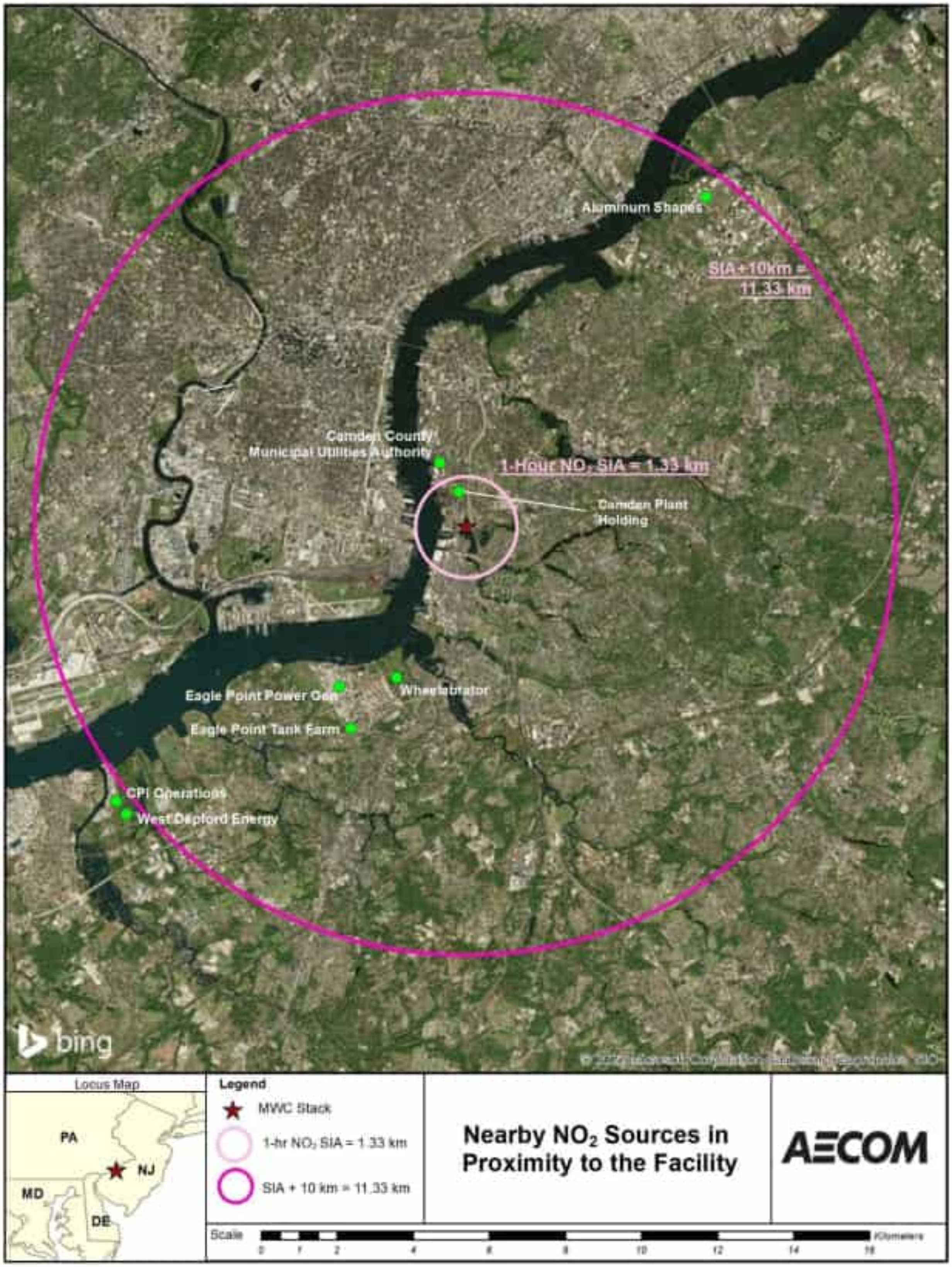
Table 4-2 Nearby NO_2 Sources Identified for Potential Inclusion in Multisource Modeling

PI No.	Site Name	County	UTM Easting(1) (m)	UTM Northing(1) (m)	Distance from CCERC (km)	Permitted Potential NOx (tpy)	NJDEP Reported NOx(2) (tpy)
Within SIA (1.33 km) and NO_2 Potential Emissions > 25 tpy							
51608	CAMDEN PLANT HOLDING LLC	Camden	489817	4418620	0.9	169	14
52517	CAMDEN CNTY MUA DLWR #1 WPCF(3)	Camden	489315	4419381	1.8	28.2	NA
Within SIA + 10 km (11.33 km) and NO_2 Potential Emissions > 100 tpy							
55793	WHEELABRATOR COMPANY L P	Gloucester	488179	4413739	4.4	472	232
56220	EAGLE POINT POWER GENERATION LLC	Gloucester	486676	4413496	5.4	245	62
56002	EAGLE POINT TANK FARM AND DOCK(4)	Gloucester	486985	4412401	6.1	94	15
51609	ALUMINUM SHAPES LLC	Camden	496320	4426371	10.7	122	4
56078	WEST DEPTFORD ENERGY LLC(3)	Gloucester	481075	4410145	11.7	185	105
55831	CPI OPERATIONS LLC(3)	Gloucester	480810	4410491	11.7	220	29

Notes:
NA: Not Available
(1) NAD83 UTM zone 18
(2) NJDEP Data Miner Report, facility emissions reported to Emission Statement Program, average from 2017-2020. https://njems.nj.gov/DataMiner.
(3) Source is just outside of distance threshold, but still conservatively included.
(4) Source is just under the emissions threshold, but still conservatively included.

[1] NJDEP "What's in My Community" website Facility Report for major sources within 14 km of the RRF and minor sources within 2.5 km of the RRF obtained in March 2022. Available at: https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=76194937cbbe46b1ab9a9ec37c7d709b

Figure 4-1 Nearby NO_2 Sources in Proximity to the Facility



4.3 Background Concentrations

As part of the multisource modeling analysis, to demonstrate NAAQS/NJAAQS compliance, cumulative modeled concentrations due to the Facility and nearby sources are summed with ambient background concentrations that represent sources not explicitly modeled. As discussed above, preliminary modeling indicates that only 1-hour NO_2 concentrations will exceed the SILs and therefore it is expected that a cumulative multisource modeling analysis will only be required for 1-hour NO_2. As such, ambient background concentrations for 2019-2021 for the Spruce Street monitor in Camden have been developed for the NAAQS compliance demonstration, as shown in **Table 4-3**.

Table 4-3 Ambient Background Concentrations

Pollutant	Averaging Period	98th Percentile Concentration[(1)] (ppb)			3-Year Average (ppb)	3-Year Average ($\mu g/m^3$)
		2019	2020	2021		
NO_2	1-hour	45	41	48	44.7	84.0

Notes:

(1) Data obtained from USEPA AirData website (monitor values report), available at: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.

5. References

NJDEP 2018. Technical Manual 1003. Guidance on Preparing a Risk Assessment for Air Contaminant Emissions. New Jersey Department of Environmental Protection. Division of Air Quality.

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NJDEP 2021. Technical Manual 1002. Guidance on Preparing an Air Quality Modeling Protocol. New Jersey Department of Environmental Protection. Division of Air Quality. May.

NJDEP 2022. AERMET input files provided via email from MaryEllen Mason (NJDEP) to Amanda MacNutt (AECOM) on February 23.

United States Census Bureau. Metropolitan and Micropolitan Statistical Areas Totals: 2010-2020. Accessed March 2022. Available at: https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-totals-metro-and-micro-statistical-areas.html.

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USEPA 2017. Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter. Federal Register, Vol. 82, No. 10. January 17, 2017. Available at: https://www.epa.gov/sites/production/files/2020-09/documents/appw_17.pdf

Appendix G

USEPA Method 19: F-Factor Calculation Methodology

USEPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxide Emission Rates, provides a set of calculation procedures for estimating flue gas flow rate from heat release. This methodology is for many fuels including municipal solid waste.

USEPA Method 19 can be directly used to convert stack concentrations to an equivalent mass emission rate. Equation 19-1 from EPA Method 19 for estimating the mass-based emission factor is provided below.

E = Cd * Fd * [20.9 / (20.9-O2,d)]

Where:

E : pollutant emission factor as lbs/MMBTU

Cd : pollutant concentration, dry basis, as nanogram / scm or pound / standard cubic foot (lbs/scf)

Fd : Flue gas flow rate as standard cubic feet per million BTU = 9,570 dscf/MMBtu

O2,d : dry oxygen content, volume %

To maintain consistent units with USEPA regulatory standards that are referenced to 7 % O2, the heat input-based factor of 9,570 scf/MMBtu must also be adjusted to 7 % O2. Therefore, for this exercise the “Fd” factor for Equation 19-1 is 14, 390 dscf at 7 % O2/MMBtu [9,570 * (20.9/(20.9-7)].

Table 19-1 from EPA Method 19 provides a set of conversion factors that are used to convert pollutant concentrations to mass emission rates.

From	To	Multiply by
lbs/scf	ng/scm	$1.602 * 10^{13}$
ppm SO_2	lbs/scf	$1.660 * 10^{-7}$
ppm NO_X	lbs/scf	$1.194 * 10^{-7}$
ppm SO_2	ng/scm	$2.66 * 10^{6}$
ppm NO_X	ng/scm	$1.912 * 10^{6}$

The EPA F-Factor is expressed as dry standard cubic feet of flue gas per million BTU per hour of heat release (MMBTU/hr) The heat release component of EPA Method 19 is the factor estimated by MSW charging rate (pounds per hour) and the calorific value of the MSW (expressed as Btu/lb). The MSW charging rate is estimated from the steam generation rate (reported hourly) and the steam/MSW ratio. The calorific value is estimated to be 5,200 Btu/lb and will be verified by a Relative Accuracy Test Audit that compares measured flue gas flow rates with calculated flue gas rates.