Case No. 9482

Revised Environmental Review Document -- Section 3.0 Project Description

3.0 Project Description

This chapter provides a description of the key components and systems of the proposed Repowering Project. The descriptions provide an estimate of the expected character, quality, and quantity of potential emissions and discharges associated with Project construction and operation. Also described are proposed measures to limit impacts on the environment. In response to the requirements for project information listed in COMAR 20.79.03.01, Description of Generating Station, the specific sections in this chapter are:

- 3.1—General Description
- 3.2—Project Design and Operational Features
  - Major components and process descriptions
  - Site layout
  - Fuel characteristics
  - Air emissions and controls
  - Water use and wastewater effluents
  - Onsite drainage and stormwater management (SWM)
  - Solid and hazardous wastes
- 3.3—Rationale for Site Selection and Project Conceptual Design
- 3.4—Impact on State Economics
- 3.5—Project Effect on Electric System Stability and Reliability
- 3.6—Features of Required Electrical System Upgrades
- 3.7—Project Schedule
  - Major milestones
  - Construction plans

The facilities and equipment descriptions and Project schedule presented in this chapter are based on CP Crane's current plans and engineering and design information available for the proposed Project at this time.

3.1 General Description

The planned Repowering Project at CP Crane will involve the design, construction, and operation of:

- Three natural gas- and ULSD oil-fired aero-derivative GE LM6000 CTs.
- Liquid ULSD oil handling, piping, and storage.
- A natural gas compression station with associated treatment, piping, and regulation equipment.
- Water treatment and wastewater handling facilities.
- Electrical interconnection facilities.
- Ancillary equipment.

The electric generation units and associated equipment will be constructed on a portion of the approximately 157-acre Crane Station property. The Project’s total nominal generating capacity at International Organization for Standardization (ISO) conditions will be 150 MW, relative to the approximately 400-MW capacity of the existing coal-fired units. The CTs are expected to serve as peaking units and operate at an annual capacity factor of up to 27 percent. The design of the CTs will allow them to start up and reach full load in 10 minutes or less and shut down quickly multiple times per day if circumstances warrant. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ULSD fuel oil in situations when natural gas is not available in sufficient quantities.

Other Project components will include new natural gas compression facilities; liquid ULSD fuel oil delivery, handling, and storage facilities; process water supply storage, pumping, and treatment facilities; black start generator; continuous emissions monitoring; and wastewater collection and handling facilities. The electricity generated by the proposed CTs will be transmitted to the power grid via a new 115-kilovolt (kV) substation consisting of new generator step-up transformers, sulfur hexafluoride gas circuit breakers, and other mandated substation equipment. The new substation will connect to the existing electrical transmission lines present at Crane Station substation.

CP Crane's development plans for the Project have been designed to take full advantage, both environmentally and economically, of the Project site's location, existing infrastructure, and proximity to key support facilities. First, the CTs will be located inside the boundaries of an existing power plant, one that has been in active use since 1961. The specific area within the existing power plant property has been previously impacted and is currently the location of parking area and infrastructure, which will be removed, repurposed, or relocated onsite.

Second, given the new CTs will be located at a currently active power plant, the Project will be able to utilize some of the existing fuel- and water-related facilities, as well as in-plant auxiliaries. Natural gas will be the CTs' primary fuel. A natural gas pipeline already delivers gas to the site and has sufficient capacity to supply the new CTs operating at full load. The facility will utilize the existing onsite city and raw water supplies. A new water treatment facility will be installed to meet the Project's process water needs. Wastewater from the Project will discharge to the existing plant wastewater system, which will be repurposed in supporting the discharge of the newly installed equipment and balance of plant systems. The new CT installation will also connect to and make use of the current plant emergency fire water system, where required.

Third, the new CTs will take full advantage of the existing units' interconnection to the electrical transmission system. As mentioned previously, only a short 115-kV generation lead will be needed to make the Project's interconnection to the existing electrical transmission system. The interconnection's structures and lines will be located entirely on the Crane property. The Project will require no new offsite transmission lines or structures.

The following sections provide descriptions of the proposed electric generating units, operations of major processes and systems, and other facilities that will comprise the CP Crane CT Repowering Project.

3.2 Project Design and Operational Features

3.2.1 Major Components and Process Descriptions

The major components and systems of the proposed Repowering Project will include:

- Power Generation Equipment—The power block will consist of three GE LM6000PC SPray INTercooling® (SPRINT®) CT units operating in simple-cycle configuration, with associated auxiliary and control systems. Each CT will be equipped with an inlet air evaporative cooling system, the use of which will result in decreased power degradation at high ambient temperatures. A separate inlet air heater coil will be included to provide freeze protection to the inlet air system.
- Natural Gas Supply—Natural gas supply to the CTs will be supplied from an existing onsite pipeline. A new gas compression system will increase the pressure of the natural gas from the current pressure of approximately 350 to the required 675 pounds per square inch. The system will include the required equipment for natural gas operation. Anticipated equipment (to be confirmed at final design) includes gas heaters, coalescing filters, and pressure-regulating equipment. In the event of low pipeline pressure, an additional gas compressor will be installed to continue reliable operation during these restricted conditions as well.
- Fuel Oil Off-loading, Storage, and Handling Facilities—ULSD fuel oil will be delivered to the site via truck and stored in two new tanks equipped with the proper containment system for liquid fuel operation during periods of restricted or limited natural gas availability. The required piping and forwarding pumps to deliver ULSD fuel oil to the CTs will be installed. In support of PJM's capacity performance requirements, the new tanks will have storage capacity to support 72 hours of continuous full-load operation of the three new CTs.
- Water-related Systems and Equipment—City water will be supplied from the existing power plant's raw water supply. A new water treatment system will be installed to demineralize the raw water to a condition suitable for use in the CTs. This new water treatment system will demineralize the raw water using reverse osmosis and electro-deionization equipment, as required. Once the water is suitable for use, it will be stored in new, aboveground tank(s). Wastewater streams resulting from this water treatment will be routed to the existing wastewater system for disposal. Equipment with condensate,

oily water drains, secondary oil containment, and the liquid fuel offloading station will be piped to a new oily water drain system with oily water separator, which will tie into the existing wastewater system for required management of the waste fluids. Existing stormwater systems will be modified as necessary to regulate stormwater flows consistent with regulatory requirements.

- Onsite Electrical Equipment—Each of the three Repowering Project CT generators will be connected to a dedicated generator step-up transformer and then to a new substation. The power block facilities will also be equipped with two auxiliary transformers to provide lower voltage power to auxiliary equipment via electric distribution systems within the facility. The existing 14-MW CT will be connected to a step-up transformer and connected to the same new substation. The required transmission line protection devices and metering equipment will be connected to the overhead conductors, allowing the proper protection and metering of the new CTs' output. The power output of the CTs will be connected to both circuits (#110591 and #110592) of the existing outgoing 115-kV transmission line, which formerly transmitted the CP Crane coal-unit power. The 115-kV line is owned and operated by Baltimore Gas & Electric Company (BGE). Medium- and low-voltage electrical distribution equipment will be installed to provide electrical power to Project equipment. This equipment will include transformers, switchgear, motor control centers, wire, and cable tray.
- Ancillary Equipment—Significant other CT plant components will include continuous emissions monitoring systems and fire protection equipment. The continuous emissions monitoring systems will be installed for each of the CTs to monitor and log emissions data of each CT's exhaust gas. A sample probe will be installed on each exhaust stack, and the sample gas will be routed through a heated sample line to sample conditioners and fed into certified gas analyzers. The data from the analyzers will be recorded in a certified data acquisition and handling system. The equipment will perform the required daily calibrations to meet EPA requirements. Control valves and instrumentation will be used to monitor and regulate the balance of plant systems in support of the CT's requirements. These items, as well as other equipment, will be orchestrated by an Allen Bradley-based platform control system. The controls will be housed in power distribution centers for the CTs, where operators can perform required measures in operating the plant.

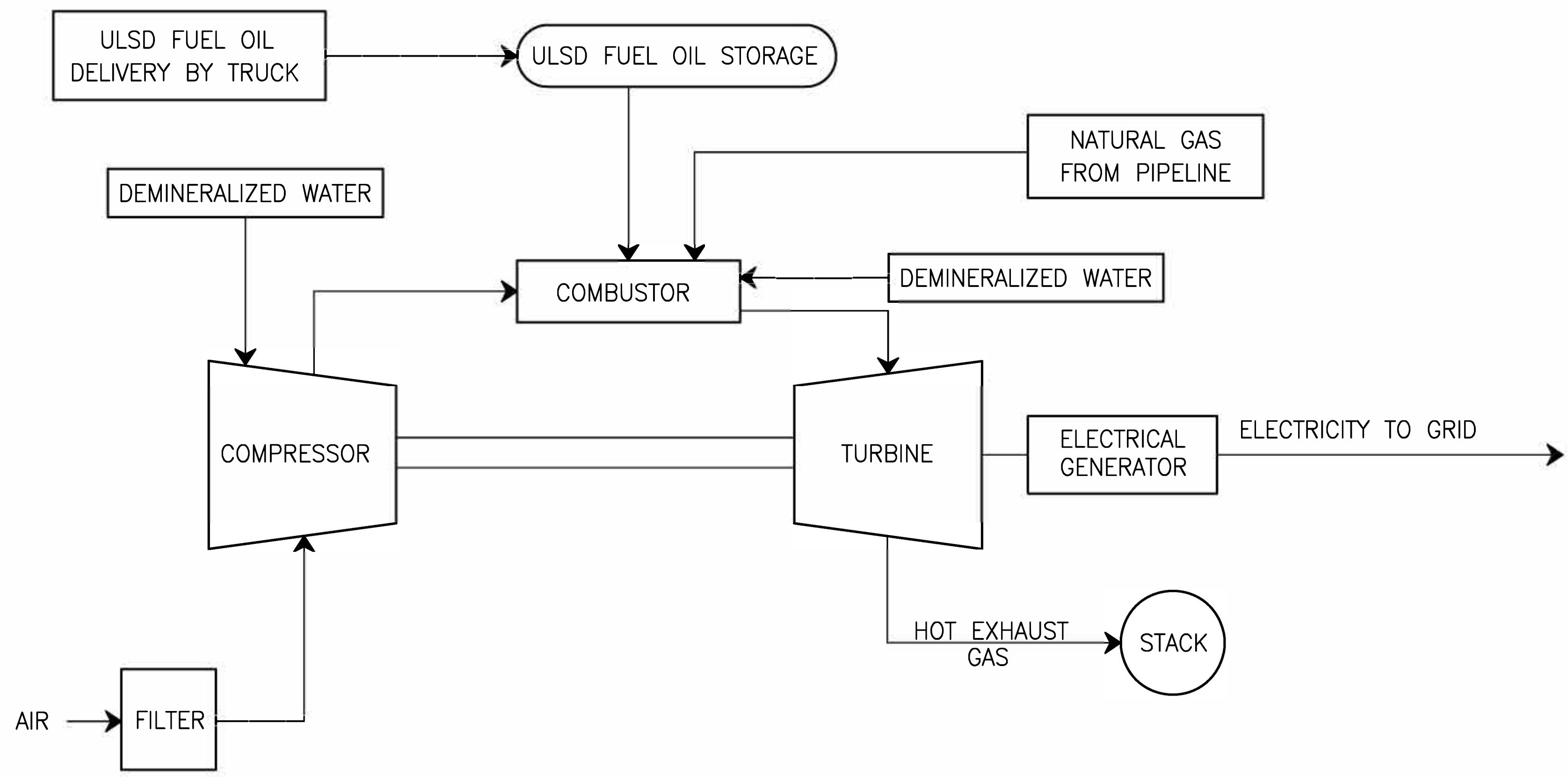
The Project will tie into the existing plant's fire protection system, and the required number of fire hydrants, per local code, will be located in the Project area. In addition, the CTs will be equipped with standard GE carbon dioxide-based fire protection systems.

Space is being reserved for the possible future addition of battery storage at the CP Crane plant.

Figure 3.2-1 presents a simplified process flow diagram showing a basic simple-cycle CT system and other principal plant systems. The following paragraphs provide additional information on the Project's power generation equipment components and conceptual design features.

The Project will employ three state-of-the-art GE LM6000PC CT packages, each offering the latest technology, efficiency, reliability, and environmental performance. The plant will be capable of producing approximately 150 MW of electricity (gross, at ISO conditions), with each CT nominally rated at 50 MW. With its 10-minute fast-start and ramping capabilities, the LM6000 is designed for intermediate-load and load-following utility service and peaking applications. It has a proven record of high availability and reliability in the power generation industry. Project CTs will be equipped with dual-fuel combustors with a demineralized water injection system to reduce NO_x emissions during operation. Demineralized water can also be injected to inter-cool the gas stream for increased output.

CTs are advanced technology engines that convert latent fuel energy into mechanical energy using compressed hot gas (i.e., air and products of combustion) as the working medium. CTs deliver mechanical energy by means of a rotating shaft used to drive an electrical generator, thereby converting a portion of the engine's mechanical output to electrical energy. In the CT cycle, ambient air is first filtered and then compressed by the CT compressor section. The CT compressor section increases the pressure of the combustion air stream and raises its temperature. The compressed combustion air is then combined with fuel, which is ignited in the CT's high-pressure combustor to produce hot exhaust gases. These high-pressure, hot gases next expand and drive the CT to produce rotary shaft power. The turbine rotor is coupled to an electric generator as well as to the CT compressor.



SIMPLE–CYCLE COMBUSTION TURBINE

FIGURE 3.2-1.
SIMPLIFIED FLOW DIAGRAM OF A BASIC SIMPLE-CYCLE POWER SYSTEM

Source: ECT, 2018.

Environmental Consulting & Technology, Inc.

For supplying electrical power during relatively short periods of peak demand, CTs used as simple-cycle (stand-alone) units have advantages over those constructed to operate in combined-cycle (which includes a heat recovery steam generator and steam turbine). The principal advantage of a simple-cycle CT is the ability to start up in less than 10 minutes, as opposed to combined-cycle units, which can take hours to come up to full load. Simple-cycle CTs are also compact and require smaller project sites, limiting the effect on the existing real estate. The final advantage is the reduced water requirement, as there is no need for an additional cooling cycle or cooling tower needed with steam power cycle condensing

The proposed Project CTs will be used as peaking units. Each CT will be capable of stable operation, within air permit limits, from 50 to 100 percent of CT design load.

For the Crane Repowering Project each CT will be outfitted with a modular, multiple-stage filtration system consisting of inlet screens, a prefilter and final barrier filter, as well as an inlet air heating system. The latter system will allow for safe operation of the CTs during prevailing icing conditions. Waste heat from the CT exhaust is used to provide thermal energy for heating a glycol-water mixture. This mixture is then pumped up to the heating coils mounted in each module of the air filter house. The coils span the width and height of the filter face and heat the entire area profile of the air stream entering the filter house; both package ventilation air as well as combustion air is heated. The glycol-water mixture is returned to the pumping skid after rejecting its heat into the air filter.

The CTs will also be capable of operating with evaporative cooling to increase electrical output during warm weather and high electrical demand periods. Evaporative cooling lowers the inlet air temperature to the gas turbine for additional power when needed. This system is designed for non-recirculation of evaporative cooling water from a sump in the bottom of the inlet air filter. Lowering the inlet air temperature increases the air density and increases the mass flow through the CT, thus increasing power output. Based on an analysis of late afternoon temperatures for one summer week in 2017, the average temperature during this period in the area was 87.1 degrees, with an average relative humidity of 50.1 percent. Under these conditions,

evaporative cooling would be expected to increase power output from the three units from 123.4 to 133.3 MW net power on liquid fuel and 129.1 to 133.7 MW net power on natural gas.

Each CT package will have a weatherproof, acoustic enclosure. The enclosure will provide average noise emissions of 85 dBA measured at a 3-ft (1.0-meter) horizontal distance and 5 ft (1.5 meters) above grade during full load operation. Figures 3.2-2 and 3.2-3 provide a typical rendering and a photograph, respectively, of an LM6000 CT package with enclosure.

3.2.2 Site Layout

Figure 3.2-4 shows the general Project site plan and layout along with the Project CTs and related site improvements in the context of the existing Crane Station. The new, Project-related equipment is shown in red, as are the areas proposed for use during construction for laydown and parking. The CT power block will be located generally west of the existing Crane Station Unit 2 Power Plant building. An existing site structure will be repurposed as the water treatment building, and a water storage tank(s) will be installed for demineralized water. Several existing plant components will be demolished to allow space for the new site layout. These components include the Unit 2 air heater, Unit 2 dust collector, Unit 2 electrical control and vacuum blower building, and the urea tanks. These components, highlighted on Figure 3.2-4, are located on the southwest side of the existing boiler structure.

Two 490,000-gallon capacity fuel oil tanks will be located in a bermed area west of the three CTs. A paved area for fuel oil truck ingress, egress, and unloading will be provided as well as roads for maintenance vehicles.

Figure 3.2-5 depicts a detailed arrangement showing the major Project equipment. The land area required for the Project CT power block and associated facilities will comprise less than approximately 4 acres of the Crane Station property. The CTs will be located outdoors. The height of the CT stacks will be 150 ft above final grade.

Space is being reserved for up to 100 MW of capacity for up to a 4-hour duration of batteries, or 400 megawatt-hours.

FIGURE 3.2-2.

RENDERING OF AN LM6000 CT UNIT

Source: ProEnergy, 2018.

ECT Environmental Consulting & Technology, Inc.

FIGURE 3.2-3.

PHOTOGRAPH OF AN LM6000 CT UNIT

Source: ProEnergy, 2018.

Environmental Consulting & Technology, Inc.

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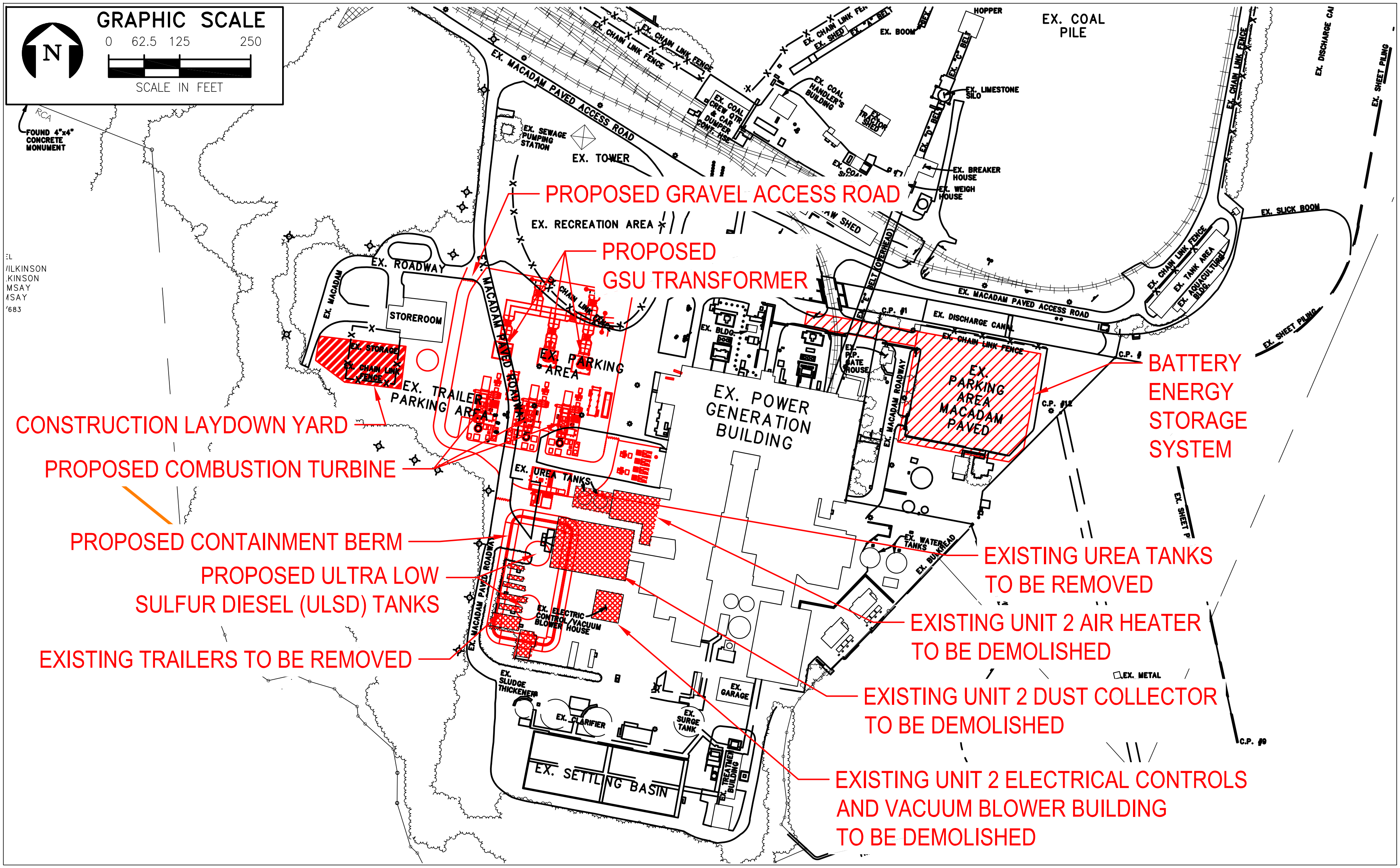

FIGURE 3.2-4.

GENERAL LAYOUT OF EXISTING POWER PLANT AND PROPOSED PROJECT

Source: ECT, 2018; DMW, Inc., 2008; Pro Energy, 2018.

ECT Environmental Consulting & Technology, Inc.

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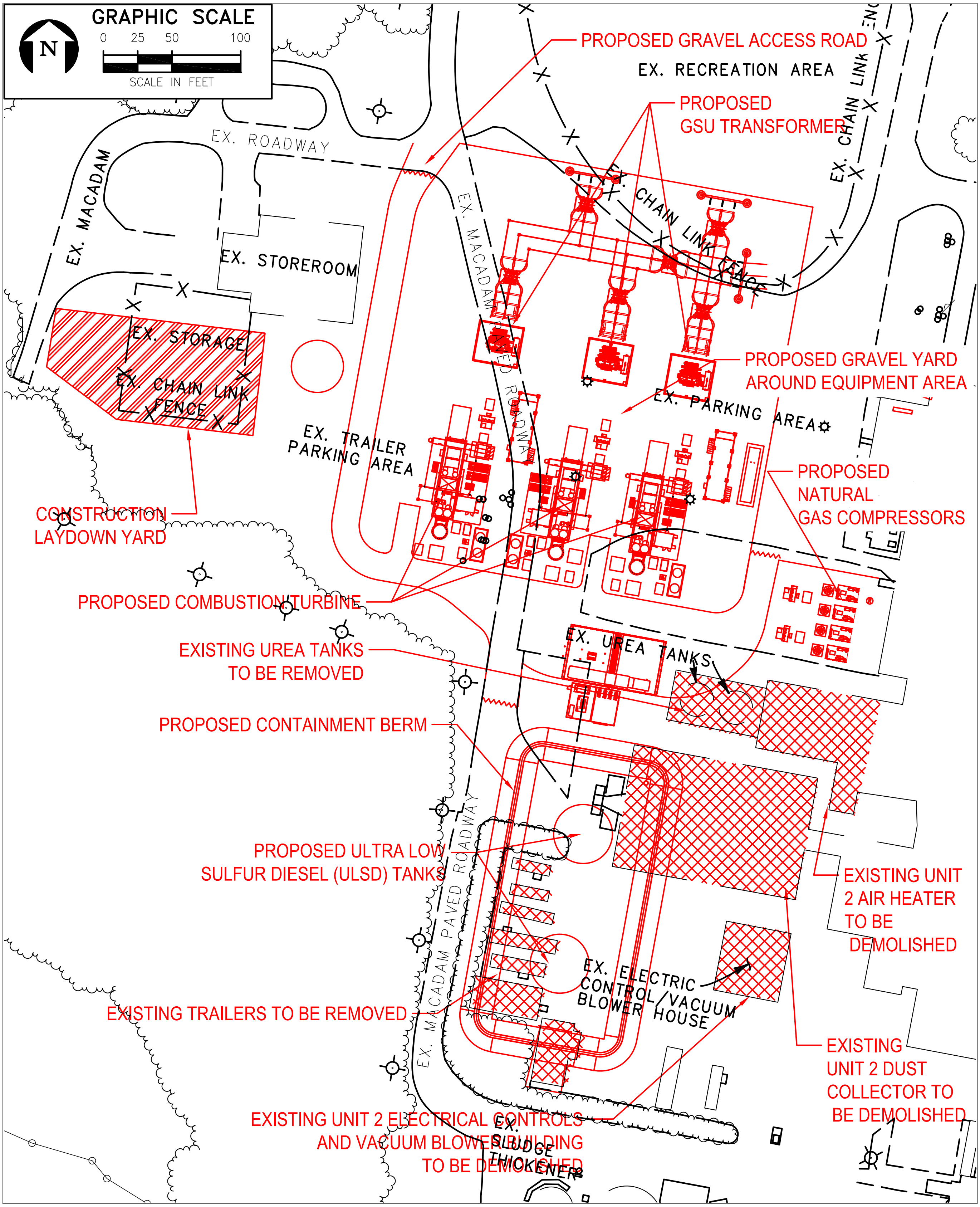

FIGURE 3.2-5.

DETAILED PROJECT EQUIPMENT ARRANGEMENT

Source: ECT, 2018; DMW, Inc., 2008; Pro Energy, 2018.

Environmental Consulting & Technology, Inc.

3.2.3 Fuel Characteristics

To provide cost-effective, reliable power, the Repowering Project at CP Crane will be designed and permitted to fire clean-burning fuels: pipeline-quality natural gas and ULSD fuel oil.

Composition of the natural gas will be typical pipeline-quality gas with a maximum sulfur content of 0.5 grain of sulfur per 100 standard cubic feet (gr S/100 scf). Based on the natural gas net heat rate (million British thermal units per hour [MMBtu/hr]), all CTs will combust approximately 1.44 million standard cubic feet per hour (MMscf/hr) operating at full load, and at a temperature of 59°F. As stated in Appendix C for Case 7 (i.e., 100-percent load), each CT will burn approximately 0.48 MMscf/hr.

The ULSD fuel oil sulfur content will be a maximum of 15 parts per million by weight (ppmw). Assuming all CTs are being fired at 100-percent load on ULSD fuel oil at a temperature of 59°F, the total maximum fuel oil consumption will be approximately 10,125 gallons per hour. As stated in Appendix C for Case 10 (i.e., 100-percent load), each CT will burn 3,375 gallons per hour.

3.2.4 Air Emissions and Controls

3.2.4.1 Air Emissions Types and Sources

The principal sources of air emissions from CP Crane will be the three new CTs. The pollutants emitted in the largest quantities will be NO_x, carbon dioxide (CO), PM, particulate matter less than or equal to 10 micrometers (PM_{10}), and particulate matter less than or equal to 2.5 micrometers ($PM_{2.5}$); lesser amounts of SO_2, VOCs, lead, and sulfuric acid (H_2SO_4) mist will also be emitted from the CTs.

Other sources of emissions include a newly installed black-start generator, an existing 14-MW (summer capability) CT, an existing emergency generator diesel engine, and an emergency fire water pump diesel engine. The ULSD fuel oil off-loading and storage tanks will constitute relatively minor sources of VOC emissions. Some fugitive PM emissions will also occur due to truck traffic. For calculating the Project's maximum potential annual emissions, all three new CTs were assumed to operate:

- At 100-percent load.
- At a 27-percent annual capacity factor, equivalent to 2,365 hours per year (hr/yr) (excluding startup/shutdown).
- On ULSD fuel oil for approximately 10 percent of the 2,365 hours, or approximately 237 hr/yr.
- With 250 startups/synchronous events and shutdowns per year (75 hours), 25 of which could be on ULSD fuel oil.

Maximum hourly criteria pollutant emissions rates (exclusive of startup and shutdown) for each new CT are summarized in Table 3.2-1 for natural gas and ULSD fuel oil. Details of the hourly emissions calculations are included in the supporting documentation for the air permit application (see Appendix C).

Table 3.2-1. GE LM6000 Emissions Rates (per CT)

Pollutant	Maximum Emissions Rate (lb/hr)	
	Natural Gas	ULSD Fuel Oil
NO_x	44.73	75.07
CO	35.15	41.19
VOC	3.46	6.43
PM*	5.10	15.51
PM_{10}*	5.10	15.51
$PM_{2.5}$*	5.10	15.51
SO_2	0.68	0.72
Lead	0.0002†	0.0067‡
H_2SO_4	0.10	0.11
CO_2e	54,224	74,930

Note: lb/hr = pound per hour.

*Filterable and condensable emissions.
†Lead emissions calculated based on AP-42 Table 1.4-2 (EPA, 1998).
‡Lead emissions calculated based on AP-42 Table 3.1-5 (EPA, 2000).

Sources: ProEnergy, Performance Data, 2018.
ECT, 2018.

Table 3.2-2 presents projected post-Project maximum annualized emissions. For the new CTs, modes of operation with maximum emissions rates were factored into calculations of annualized

emissions. In addition to emissions during normal load operations (i.e., between 50- and 100-percent CT loads), emissions during startup and shutdown events were also included.

Under normal circumstances, the newly installed black-start generator and existing emergency equipment will be expected to operate for only a few hours per year for testing and maintenance. However, for purposes of calculating the facility's maximum potential annual emissions, the emergency engines were conservatively assumed to operate up to 100 hours for testing, maintenance, and operation, as required. The existing CT annual emissions are based on the maximum actual emissions from 2012 through 2016.

Details of the annualized emissions calculations are included in the supporting documentation for the permit application (see Appendix C).

Table 3.2-2. Maximum Post-Project Potential Annualized Emissions Rates

Pollutant	Annualized Emissions Rates (tpy)				
	Proposed Three CT Units	Proposed Black-start Generator	Existing Emergency Fire Water Pump	Existing Emergency Generator	Existing CT Unit
NO_x	169.93	1.52	0.62	0.93	21.00
CO	127.08	1.88	0.13	0.20	0.08
PM*	21.82	0.089	0.044	6.60E-02	0.27
PM_{10}*	21.82	0.089	0.044	6.60E-02	0.27
$PM_{2.5}$*	21.82	0.089	0.044	6.60E-02	0.27
SO_2	2.44	1.22E-03	0.041	6.15E-02	1.59
Lead	3.23E-03	—	—	—	3.35E-04
VOC	13.38	0.21	0.049	0.074	0.01
H_2SO_4	3.73E-01	9.34E-05	0.003	4.71E-03	—
Formaldehyde†	1.27	5.55E-05	1.65E-04	2.48E-04	6.70E-03
Total hazardous air pollutants	2.01	1.20E-03	5.53E-04	8.31E-04	3.05E-02
CO_2e	200,060	115.16	22.84	34.35	3,530.39

Note: CO_2e = carbon dioxide equivalent.
tpy = ton per year.

*Filterable and condensable emissions.
†Highest individual hazardous air pollutant.

Sources: ProEnergy, 2018.
CP Crane, 2018.
ECT, 2018.

3.2.4.2 Air Emissions Controls

The conceptual design of the Project incorporates state-of-the-art technology at every step. The new CTs' high efficiency will reduce emissions per unit of output by producing each megawatt-hour of electricity with less fuel. The use of low-sulfur fuels for the CTs also has the benefit of reducing emissions relative to most other potential fuels.

The use of low-sulfur fuels, along with highly efficient combustion, will limit $PM/PM_{10}/PM_{2.5}$ emissions from the new CTs. The CTs will also be equipped with water injection to reduce emissions of NO_x to low levels. SO_2 and H_2SO_4 emissions will be controlled by use of pipeline-quality natural gas containing no more than 0.5 gr S/100 scf (annual average) and ULSD fuel oil having a sulfur content of no more than 15 ppmw (Table 3.2-3).

Table 3.2-3. Summary of Air Emissions Controls

Pollutant	Means of Control
$PM/PM_{10}/PM_{2.5}$	Exclusive use of pipeline-quality natural gas and ULSD fuel oil (CTs)
	Efficient combustion
	ULSD fuel oil (emergency diesel engines)
CO and VOC	Advanced combustion design
NO_x	Advanced combustion design (CTs and emergency engines)
	Wet injection (CTs)
SO_2/H_2SO_4	Exclusive use of pipeline-quality natural gas and ULSD fuel oil (CTs)
	ULSD fuel oil (emergency diesel engines)

Source: ECT, 2018.

3.2.4.3 New Source Review Applicability Determination

A new source review (NSR) applicability determination was prepared for each applicable NSR pollutant specified in the Code of Federal Regulations (CFR), Title 40, Part 51.166. These pollutants include NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, CO, ozone (as VOC), lead, H_2SO_4, and greenhouse gases (GHGs).

The proposed Project is deemed to be subject to prevention of significant deterioration (PSD) or nonattainment new source review (NNSR), if there is a "significant emissions increase" for a

pollutant, as defined in 40 CFR 51.165 and .166, if the sum of the increases and decreases associated with the project exceeds the pollutant-specific thresholds or significant emissions rate (SER).

Emissions increases were calculated for the proposed Project and were compared to the pollutant-specific SER listed in Table 3.2-4. Results show emissions increases for NO_x, CO, PM_{10}, $PM_{2.5}$, and GHG (carbon dioxide equivalent [CO_2e]) are above their respective SER, indicating netting analyses are required. For the other pollutants, emissions increases are not significant, hence NSR is not applicable.

Table 3.2-4. Proposed Project Emissions and Comparison to the SER

Pollutant	Proposed Project (tpy)	SER (tpy)	Netting Required
NO_x	171.45	25	Yes
CO	128.96	100	Yes
VOC	13.59	25	No
PM	21.91	25	No
PM_{10}	21.91	15	Yes
$PM_{2.5}$	21.91	10	Yes
SO_2	2.44	40	No
H_2SO_4	3.73E-01	7	No
Lead	3.23E-03	0.6	No
CO_2e	200,175	75,000	Yes

Note: tpy = ton per year.

Sources: ProEnergy, Performance Data, 2018.
ECT, 2018.

As per COMAR 26.11.17.01, for an existing electric utility steam generating unit, baseline actual emissions are determined by the average rate, in tons per year (tpy), at which the unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding the date on which a complete application was submitted. In addition, the average rate must be adjusted downward to exclude emissions that exceeded the emissions limitation during the 24-month baseline period. Table 3.2-5 summarizes the contemporaneous decreases based on the data provided by CP Crane for the pollutants having proposed Project emissions above the SER. There are no contemporaneous emissions increases.

Table 3.2-5. Contemporaneous Project Emissions

Description of Emissions	Emissions (tpy)				
	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2e
Baseline actual emissions (Units 1 and 2)	1,235.03	131.83	82.87	35.87	776,674

Sources: CP Crane, 2018.
ECT, 2018.

The final step of NSR applicability is a netting analysis to determine the significant net emissions increase for those pollutants that cause a significant increase. For NSR to apply, there must be a significant net emissions increase for that pollutant; i.e., the sum of the emissions increase from proposed Project and any other contemporaneous increases or decreases from the entire facility must be above the SER for that pollutant.

As shown in Table 3.2-6 the proposed Project does not result a significant net emissions increase for any NSR pollutant. In fact, the Project's estimated maximum annual emissions are indicated to be much less that actual emissions from the existing coal-fired units.

Table 3.2-6. Netting Analysis

Description	Emissions (tpy)				
	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2e
Proposed Project (proposed increases)	171.45	128.96	21.91	21.91	200,175
Baseline actual emissions (Units 1 and 2) (proposed decreases)	1,235.03	131.83	82.87	35.87	776,674
Other contemporaneous emissions	0.00	0.00	0.00	0.00	0.00
Net emissions increase/ decrease	**-1,063.57**	**-2.87**	**-60.95**	**-13.95**	**-576,499**
NSR SERs	25	100	15	10	75,000
Significant modification (Yes/No)	**No**	**No**	**No**	**No**	**No**

Sources: CP Crane, 2018.
ECT, 2018.

The complete air emissions source construction permit application for the proposed Project is provided in Appendix C. The application includes further details of proposed emissions and all supporting documentation.

3.2.5 Water Use and Wastewater Effluents

Figure 3.2-6 provides a conceptual water balance diagram for the Repowering Project. Water for the new facility will be drawn from the existing plant's raw water system. This water will be treated to provide demineralized water quality for use in the CTs. Demineralized water will be used for direct injection in the CTs for NO_x emissions control and power augmentation. Evaporative cooling will be used as a secondary power augmentation. The water will be injected at rates as follows for the various needs.

- NO_x control, natural gas firing: 55 gallons per minute (gpm) per CT
- NO_x control, ULSD fuel oil firing: 70 gpm per CT
- Power augmentation (SPRINT®): 17 gpm per CT
- Evaporative cooling: 12 gpm per CT

Water will also be used for washing the turbine compressor. The equipment drainage streams will be collected and sent to the existing plant's wastewater system.

3.2.6 Onsite Drainage and SWM

3.2.6.1 SWM Requirements

The Project will incorporate a comprehensive SWM system designed to manage onsite drainage and stormwater flows from within the Project footprint. The existing site SWM system will need to be modified to meet the rules outlined in the following paragraphs. Stormwater will be managed by a proposed bioretention pond.

SWM system design and operating features will be developed to provide adequate onsite stormwater controls, minimize impacts to surrounding waters, and comply with federal, state, and local requirements.

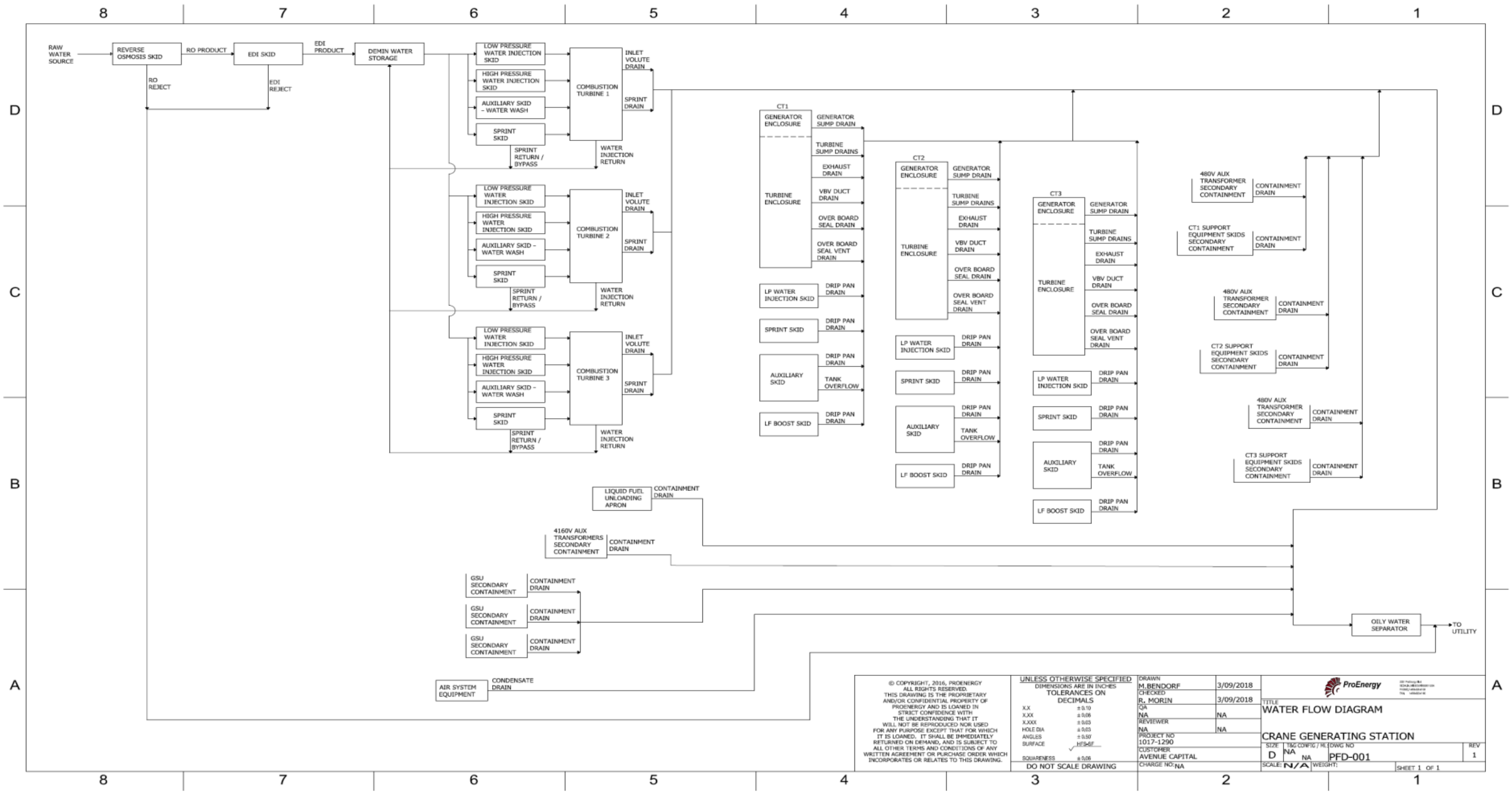

FIGURE 3.2-6.

CONCEPTUAL WATER BALANCE

Source: ProEnergy, 2018.

Environmental Consulting & Technology, Inc.

In general, in the Project's final design phase, the proposed SWM system and facilities will be evaluated in detail for compliance with the requirements for a general permit in accordance with COMAR 26.08.04.09B and elements of MDE's Stormwater Design Manual, Volumes I and II, as adopted by Baltimore County. The general permit will incorporate compliance with the following:

- National Pollutant Discharge Elimination System (NPDES) regulations for stormwater discharges associated with industrial activities. Maryland is an NPDES-delegated state with general permitting authority and has issued a general permit for industrial stormwater discharges. Coverage for the Project will be sought under the state general permit, in continuance of the current situation.
- Modification of Crane Station's stormwater pollution prevention plan, which establishes the procedures and practices to be implemented to manage stormwater runoff as well as erosion and sediment.
- Modification of the Station's spill prevention, control, and countermeasure (SPCC) plan, including specific features to equip onsite chemical, solvent, lubricant, and fuel storage and unloading areas with adequate containment facilities to protect the Project and its surroundings in the event of an accidental spill.

The primary goals under these regulations are to maintain, as nearly as possible, the predevelopment runoff characteristics of the site and minimize stream channel erosion, pollution, siltation, sedimentation, and local flooding.

3.2.6.2 Construction Stormwater Runoff Control

A grading permit application, SWM permit, and erosion and sediment control plan for the construction activity will be submitted to the Baltimore County Permits Approvals and Inspections. The plan will be certified by a licensed professional engineer. In addition, a notice of intent will be submitted for coverage under MDE, General Permit for Construction Activity, under the NPDES program.

The CP Crane CT Project will comply with requirements of the grading permit, stormwater permit, and NPDES general permit that have specific and general conditions regarding stormwater discharge. These include the use of best available technology for erosion and

sediment control, periodic inspections, inspections following rainfall events, and maintenance of records. Following facility construction, a notice of termination will be submitted for the NPDES permit for construction activity.

Before construction commences, the limits of construction disturbance (approximately 8 acres, including construction laydown areas and construction parking) will be demarcated onsite. Erosion control measures prescribed in the grading permit to be implemented will include installation of silt fencing and stabilized construction entrances. Additional measures will include a temporary sediment basin and potentially perimeter swales and/or diversion dikes.

Temporary construction entrances, laydown areas, and contractor parking areas will be designated. These temporary areas will be stabilized with a 3-inch layer of crusher run stone placed on a compacted sub-base if the selected area is not already stabilized. A gravel apron will be used at the intersection of the construction entrance with local roads to prevent tracking of sediments offsite and provide a measure of protection to the road. Soil stockpile areas will be protected by silt fencing to control sediment transport. Other disturbed areas may be protected with mulch prior to final stabilization. Construction areas not needed for facility operation will be restored to their natural conditions following completion of construction activities. Areas outside the limits of construction activities will remain undisturbed.

During active construction, disturbed areas will be stabilized with vegetation, gravel, or paving following finish grading. At the end of the construction phase finish, grading will include the conversion of the temporary sediment basins and/or perimeter dike system to the permanent SWM system. Permanent seeding will occur during the first planting season after the final grading. A seed mixture suitable to the site soil conditions will be used. The specific elements of the construction phase SWM system will be included in the grading permit application.

3.2.6.3 SWM Operations

In general, SWM within Baltimore County must conform to the specific design requirements of Article 33, Title 4, of the Baltimore County Code and the 2000 Maryland Stormwater Design Manual (2009). Additionally, SWM must conform to MDE's SWM regulations.

Stormwater runoff from the approximately 5-acre proposed CP Crane CT Project area currently sheet flows across the existing paved parking area to several inlets north of the parking lot area. These inlets are piped to a wooded area north and west of the parking area that drains south to Seneca Creek.

A conceptual SWM plan describing current site runoff characteristics and proposed postdevelopment SWM runoff elements is being developed in accordance with the requirements discussed previously and will serve as the basis for the design of the Project SWM system, as incorporated into the Station's existing system.

Key features of the plan are summarized as shown in Figure 3.2-7 and are described as follows:

- Maintain as nearly as possible to the current conditions total Project site stormwater runoff directions and flows from the Project development area.
- Divert as much as possible offsite runoff from disturbed areas.
- Attain pollutant removal goals by providing storage needed to capture and treat 90 percent of the average annual stormwater runoff volume.
- Provide overbank flood protection by preventing the postdevelopment 2-year, 24-hour storm event peak discharge rate from exceeding the predeveloped peak discharge rate.
- Provide extreme flood volume to prevent flood damage from large storm events; maintain boundaries of the predevelopment 100-year floodplain and protect the physical integrity of best management practice (BMP) control structures.
- Implement BMPs to reduce pollutant loads from the Project site to a level at least 10 percent below the load generated at the site prior to development (per CBCA requirements).
- Release stormwater pond emergency discharge to Seneca Creek.

3.2.6.4 Runoff Management/Stormwater Conveyance

The Project SWM system will be designed to segregate process contact and nonprocess contact stormwaters as described in the following subsections.

Noncontact Stormwater

All runoff from nonprocess contact areas, such as rooftops, paved and gravel surfaces, and unimproved open space areas, will be collected and routed to generally follow the existing flow directions into the appropriate SWM control areas as previously described.

Wherever practical, noncontact stormwaters will be conveyed via overland flow to a bioretention pond for physical and biological treatment prior being discharged at a controlled rate. Where overland flow is not possible, runoff will be directed over the site via a closed stormwater sewer system that discharges into a stormwater quality bioretention pond.

Contact Stormwater

Contact stormwater is defined as stormwater runoff in and around equipment areas where potential contamination could occur, such as outdoor transformers or chemical storage or unloading areas.

Stormwater runoff from areas where potential oil contamination could occur will be directed into an onsite oily water separator for treatment prior to release to the local municipal wastewater treatment facility. Oil collected will be trucked offsite for recycling or disposal.

3.2.7 Solid and Hazardous Wastes

During operation of the Repowering Project CTs, nonhazardous solid wastes will generally be limited to small quantities of mixed office waste and general plant refuse. These wastes will be disposed of at an offsite, licensed landfill. Inlet air filters for the CTs will require periodic change-outs as filter performance degrades. These filters will be disposed of at an offsite, licensed landfill.

The facility will also produce maintenance and other wastes typical of power generation operations. Used oils collected from the oil/water separator, spent lubricating oils, oily rags, and used oil filters from the CTs will be transported offsite by an outside contractor and recycled or disposed. Periodic plant maintenance and overhaul activities will generate somewhat larger quantities of solid waste. Depending on the nature of the wastes, they would be disposed at an offsite licensed solid waste landfill or by a licensed hazardous waste contractor.

Minimal quantities of hazardous wastes and universal wastes will only be occasionally produced at the plant. Efforts will be made to select and use cleaners/degreasers, paints, and other maintenance chemicals to produce nonhazardous wastes. In circumstances where hazardous wastes are generated by the plant, the wastes will be managed in accordance with applicable federal and state requirements.

Washdown wastes will be generated from the periodic cleaning of the turbine blades. These wastes may include alkaline and acidic cleaning solutions used for cleaning of the CTs after the units are put into service. These wastes may contain detectable concentrations of metals and will be collected in the water wash tank prior to disposal to the oil/water separator or, if required, disposal at a licensed offsite disposal facility.

3.3 Rationale for Site Selection and Project Conceptual Design

3.3.1 Site Selection Alternatives

As previously stated, the process of selecting a site was driven by several factors, including access to infrastructure and land use compatibility. The existing CP Crane site has at least eight characteristics making it attractive for the Repowering Project:

- Immediate access to the electric transmission system via the existing onsite CP Crane substation that currently supports 499 MW of generation output
- Existing natural gas interconnection and metering station onsite
- Existing onsite raw water and wastewater treatment systems
- Proximity to existing sewer infrastructure
- Continued use of the existing site, which is a long-time power plant site
- Site environmental suitability, including buildable acreage, minimal wetlands, buffer, forest, etc.
- Retention and recommercialization of existing power plant facilities (14-MW gas turbine and associated ULSD fuel oil storage tank)
- Advantageous location close to a major load center

Virtually any other redevelopment or new build facility in the BGE zone would require construction of lengthy and costly new transmission lines and/or gas pipelines with their associated environmental, social, and economic impacts. Such a project at an already undeveloped site in the BGE zone would not be economically viable in the current power market.

3.3.2 Facility Conceptual Design Alternatives

The proposed site layout has been designed to minimize environmental impacts. The 157-acre parcel has ample acreage and essentially all necessary infrastructure in place for a CT redevelopment project. The proposed layout was established with consideration for both proximity to existing infrastructure and avoidance of environmental impacts. The Repowering Project was sited to avoid impacts to tidal and nontidal wetlands, forests, and wildlife habitat. The associated plant infrastructure (e.g., utilities, groundwater wells, SWM ponds, construction laydown, parking, etc.) was also sited to minimize environmental impacts by leveraging the existing CP Crane infrastructure, including roads, existing natural gas connection and water connection, existing generation lead lines, and existing spare parts building.

Alternative generation technologies, fuels, and emissions control systems were considered for the Repowering Project. The feasibility of the following conventional power generation technologies and fuels were evaluated:

- Simple-cycle CT (oil and/or natural gas)
- Combined-cycle CT (oil and/or natural gas)
- Conversion of the existing coal units to natural gas and/or oil
- Installation of SCR at the existing coal units

The aero-derivative, simple-cycle, duel-fuel technology was selected for the Repowering Project largely because of the following significant advantages over the other technology/fuel options:

- Shorter construction schedule
- Lower environmental impacts due to air emissions
- Lower operation and maintenance costs
- Less acreage needed for plant footprint

- Operational flexibility and ancillary services capability
- Higher reliability with dual-fuel capability

Using a proprietary market analysis, MRP determined additional generation was needed in the PJM market, specifically the BGE load serving area. When reviewing possible locations for this new generation, MRP limited its site alternatives analysis to the CP Crane site and then focused on the basic project development requirements for a new power project, such as proximity to a PJM grid interconnection with additional capacity, fuel storage, and a source of water.

To summarize, MRP analyzed the CP Crane station site in terms of the following minimum criteria:

- Sufficient clear land, 2 acres or greater, located as closely as practical to the existing power plant operations and infrastructure
- Access to 115 kV or greater electrical transmission lines with at least 160 MW of capacity injection rights
- Existing access to natural gas and the ability to add fuel oil supply and storage facilities suitable to fuel the Project for 72 consecutive hours
- Access to existing viable water supply sources
- Access to sufficient existing infrastructure required for ULSD fuel oil deliveries
- Ability to obtain required permits and licenses
- Community acceptance
- Avoidance or minimization of potential impacts to the environment and natural resources

The Repowering Project will minimize pollution over alternate power generating technologies in several ways that will result in lower environmental impacts than other power generation alternatives. The Repowering Project will be a clean and efficient addition to the electrical power grid in Maryland.

Specific Project systems have been conceived and designed to minimize pollution. Primary examples include:

- The use of natural gas and ULSD fuel oil for the CTs, which will result in:
  - Significantly less solid waste relative to other generation, especially coal-fired.
  - No excessive fugitive dust emissions and other environmental disturbances (e.g., noise) from delivery, storage, or handling of coal.
- The selection of CTs that incorporate advanced water injection combustion technology to minimize NO_X emissions, combined with efficient combustion design that minimizes the formation of CO and VOC at the same time.

The repowered Crane Station will be an industrial asset to the community and will have minimal environmental impacts. In addition to minimizing environmental impacts, having the flexibility to the use natural gas or ULSD fuel oil will enhance the ability of the Repowering Project to serve the market and enhance the reliability and resilience of PJM and the BGE locational deliverability area.

3.4 Impact on State Economics

The proposed Repowering Project will have a positive impact on the economics of the state of Maryland through the creation of jobs and the redevelopment of electrical generating capacity to economically meet existing demand and support future economic growth. The Project will employ approximately 75 construction workers at its peak of construction. CP Crane will have a strong preference for hiring skilled local workers for construction.

3.5 Project Effect on Electric System Stability and Reliability

The proposed repowering of Crane Station as described in this application is an important factor to allow the continued operation of the plant. Therefore, the proposed modification allows Crane to continue to support electrical system stability and reliability.

The Repowering Project will provide replacement electric generating capacity and voltage control at the same injection point the CP Crane coal-fired plant served for many years. Although the total generating capacity of Crane Station after implementing the Repowering Project will be less than the original coal-fired plant, the Project generating units will provide PJM with additional generating flexibility, including faster startups and faster load changing capacity.

The Repowering Project will deliver its produced electricity directly into existing BGE 115-kV transmission lines that cross portions of the Crane site. These lines are part of the PJM Interconnection, the largest centrally dispatched control area in North America. PJM, in fulfilling its responsibility for overall system stability and reliability, coordinates the operation of approximately 178,600 MW of generating capacity.

The PJM services area is vast and includes all or part of Maryland, Pennsylvania, New Jersey, Delaware, Virginia, the District of Columbia, Illinois, Indiana, Kentucky, Michigan, North Carolina, Ohio, Tennessee, and West Virginia. Through the established process, the Project will operate in conformance with the requirements of PJM. These requirements will also meet the reliability criteria and standards of the North American Electric Reliability Council (NERC) and BGE.

In conformance with its tariff, filed and approved by the Federal Energy Regulatory Commission, PJM has established procedures and requirements for generators that propose to interconnect with the PJM Interconnection. The Repowering Project has initiated the PJM process and will continue with that process to develop and construct a project that conforms to PJM's requirements concerning electric system stability and reliability. Central to this process is a series of electrical studies required for each proposed generator, which include a feasibility study, system impact study, and facilities study where PJM determines such studies are needed. These studies result in the view by PJM of the system's needs and the fit of the Project into the PJM system. MRP and its consultants are working with PJM on the study process.

In applying the criteria of PJM, NERC, and BGE, any unacceptable impact is addressed with a proposed system upgrade or modification to maintain system goals. The proposed Project is expected to require minimal, if any, PJM system modifications or upgrades.

3.6 Features of Required Electric System Upgrades

Each of the Repowering Project CT units will be connected to a dedicated generator step-up transformer. The power block facilities will also be equipped with two auxiliary transformers to

provide redundant lower voltage power to auxiliary equipment via electric distribution systems within the facility. The Project will be interconnected to the BGE electric transmission network through a new substation consisting of two separate 115-kV buses with a bus tie breaker (in a normally open position) between the two new 115-kV buses with each new 115-kV bus separately connected to one of the existing BGE 115-kV transmission lines located on the CP Crane site, just to the north of the proposed Project facilities. The Project will have the ability to interconnect to either or both existing lines. MRP has applied for PJM generator interconnection for the Repowering Project. Any required offsite transmission system upgrades will be completed by BGE and/or others, and such upgrades are not included in this CPCN filing.

3.7 Project Schedule and Construction Plans

3.7.1 Major Schedule Milestones

The following list presents the major schedule milestones that pertain to engineering, construction, and operation of the Repowering Project. These milestones are estimates based on the most recent information and are subject to change:

Milestone	Date
Finalize site layout and one-line diagram	April 2018
Submit CPCN application	May 2018
Limited notice to proceed for engineering	December 2018
Receive CPCN and other necessary permits and approvals	December 2018
Begin detailed design and procurement	January 2019
Demolition/relocation of existing warehouses	March 2019
Begin onsite Project construction	March 2019
Set CTs	July 2019
Energize switchyard	September 2019
Initial CT startup, commissioning and testing	October 2019
Commence commercial operation	December 2019

3.7.2 Construction Plans

The planned date to start onsite construction of the Project is March 2019, after the necessary licenses and permits are obtained and engineering is advanced to a sufficient level. Construction

of the Project will require approximately 10 to 12 months. Under this schedule, the Project would reach commercial operation in December 2019. Project construction activities will include:

- Site mobilization.
- Demolition/relocation of existing buildings in the area of the proposed CTs and supportive systems.
- Site preparation and excavation.
- Forming, installation of rebar, and pouring of concrete foundations.
- Installation of underground utilities and routings.
- Site backfill and compaction.
- Mechanical and electrical equipment installation.
- Steel erection.
- Piping, electrical wiring, and controls installation.
- Final site grading and cleanup.
- Equipment commissioning, startup, and testing.

The first step in the onsite power plant construction process will be demolishing the structures currently occupying the area proposed for the new CTs. Existing plant equipment to be demolished includes the Unit 2 air heater, dust collector, and electrical control and vacuum blower building and the urea tanks. General site preparation, including minor modification of the plant's existing SWM system, will follow. Ingress/egress to the Project site will be constructed to provide access for construction equipment. During construction, vehicles and equipment will access the site via the plant's existing entrance. Site preparation will consist primarily of grading and leveling. Given the site's low elevation and proximity to surface waters, it is possible dewatering may be required during construction of foundations and underground piping. Areas for materials and equipment laydown will be created.

CP Crane and its engineers will assess whether pile-supported foundations may be necessary at the power block location and other major foundation locations. More information will be available after Project-specific geotechnical investigations are completed. Following concrete foundation construction and underground installation, major equipment will be set in place and

buildings constructed. Finally, piping, electrical wiring, and controls installation will proceed to complete the Project construction phase.

Construction of the associated facilities (electrical transmission interconnection and related structures, water treatment facilities, and fuel delivery systems) will begin concurrently with construction of the CTs. These construction activities are anticipated to be completed within the approximately 10- to 12-month overall Project construction schedule.

Once the power plant and associated facilities are in place, equipment will be put through necessary commissioning, start-up, and testing procedures. Upon completion of these procedures and any necessary adjustments, the plant will be ready for commercial operation.

The average annual construction labor force is expected to be approximately 60 workers, with an estimated 75 workers at the peak of the construction period. Most of the construction labor force is expected to be drawn from within the county and the surrounding area, where significant existing construction workforce is available and currently working in the county. Work will normally be scheduled for six 10-hour days per week. A limited second shift or longer work days may be established for schedule recovery to make up for bad weather or unforeseen problems.

It is conservatively assumed that nearly all construction workers will travel to work using their personal vehicles with an average loading of 1.2 persons per vehicle. During peak times, up to 75 workers will arrive, resulting in approximately 63 vehicles arriving at the site each morning and departing at the end of the day. Shift hours by skillset may be staggered if needed to reduce peak congestion.

Construction employees will remain onsite during the day and will most likely bring their own lunches. Significant traffic associated with break activities during the day will not be generated by onsite employees during the day associated with break activities. A small number of supervisory personnel are expected to arrive and depart the site each day.

Delivery of materials and equipment will occur via truck to the Crane site. Construction traffic will be directed to adhere to a specific route designed for minimal area congestion, safety, and efficiency.

References

U. S. Environmental Protection Agency (EPA). 1995 (as updated). AP 42, Fifth Edition, Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.