Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
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January 5, 2017

Mr. John Chillemi, President
NRG Canal 3 Development, LLC.
9 Freezer Rd
Sandwich, MA 02563

RE: SANDWICH
Transmittal No.: X269143
Application No.: SE-16-015
Class: OP
FMF No. 315656
PROPOSED AIR QUALITY PLAN APPROVAL

Dear Mr. Chillemi:

The Massachusetts Department of Environmental Protection (MassDEP), Bureau of Air and Waste, has reviewed your Major Comprehensive Plan Application ("Application") listed above, dated February 5, 2016. The Application was supplemented with amendments thereto dated October 2016. This Application concerns the proposed construction and operation of a 350-megawatt (MW) nominal simple cycle electric generating combustion turbine and ancillary equipment (the "Project") to be located at 9 Freezer Road in Sandwich, Massachusetts, on the site of your existing Facility, Canal Station. Canal 3 Development LLC will be the owner and operator of the Project. The Application bears the seal and signature of George S. Lipka, P.E., Massachusetts Registered Professional Engineer number 29704.

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control" regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-O, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP's review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby **proposes** to grant this **Plan Approval** for said Application, as submitted, subject to the conditions listed herein.

This Plan Approval combines and includes the 310 CMR 7.02 Comprehensive Plan Approval and the 310 CMR 7.00: Appendix A: Emission Offsets and Nonattainment Review (also called "nonattainment new source review" or "NNSR") approval. This Plan Approval allows for construction and operation of the proposed Project. This Plan Approval describes the proposed Project, the Application and other requirements. This Plan Approval sets out conditions for emission control systems, emissions limits, Continuous Emissions Monitoring Systems ("CEMS"), Continuous Opacity Monitoring Systems ("COMS"), monitoring and testing, record keeping, reporting and other requirements.

Additionally, NRG Canal 3 Development, LLC ("Applicant" or "the Permittee") is required to obtain a Prevention of Significant Deterioration ("PSD") Permit pursuant to 40 CFR 52.21. MassDEP administers the PSD program under a Delegation Agreement with the U.S. Environmental Protection Agency. MassDEP is concurrently issuing a separate PSD Permit for this Project.

Based on MassDEP's review and subsequent analysis of the Best Available Control Technology ("BACT") analyses submitted by the Applicant for all air contaminants emitted by this proposed Project including: volatile organic compounds (VOC), carbon monoxide (CO), particulate matter ($PM/PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), greenhouse gases (GHG), ammonia (NH_3) and Hazardous Air Pollutants (HAP), MassDEP concurs that the emission limits contained in this Plan Approval represent BACT for this Project.

Based on MassDEP's review and subsequent analysis of the Lowest Achievable Emission Rate ("LAER") analysis for NOx, included in the Application, MassDEP concurs that the NOx emission limits contained in the Plan Approval represent LAER for all emission units for this Project.

Finally, based on information in the record, MassDEP has determined that there is a potential condition of air pollution that could be caused by the Project in the absence of a GHG emission limit. [1] Therefore, MassDEP has included in this Plan Approval requirements that create annual

[1] By adopting the GWSA, the Legislature has made a determination on behalf of the Commonwealth that without a significant reduction in the current level of GHG emissions by 2020 and an even more significant reduction by 2050, there will be significant harm to human health and the environment. The federal government has concurred that GHG emissions are air pollutants that endanger human health and the environment. On April 2, 2007, in a landmark decision pressed by the Commonwealth of Massachusetts as well as other states, the Supreme Court determined that GHGs, including carbon dioxide, are air pollutants covered by the Clean Air Act. *See* Massachusetts v. EPA, 549 U.S. 497 (2007). The Supreme Court required EPA, under Section 202(a) of the federal Clean Air Act (CAA), to determine if GHGs threaten public health and welfare, that is, make what is called an "endangerment" finding. On December 7, 2009, the EPA Administrator signed an endangerment finding regarding greenhouse gases under section 202(a) of the Clean Air Act that found that the current and projected concentrations of GHGs endanger the public health and welfare of current and future generations. 74 Fed. Reg. 66,496 (2009). The Administrator determined that greenhouse gas pollution threatens Americans' health and welfare by leading to long lasting changes in our climate that can have a range of significant negative effects on human health and the environment.

declining CO_{2e} limits on all sources of greenhouse gas included in the Project. The requirements are designed so the Project will not emit GHG emissions that may cause or contribute to a condition of air pollution, or cause damage or threat of damage to the environment, as required by the state Clean Air Act, M.G.L. c. 111, §§ 142A-142E, MassDEP air regulations, 310 CMR 7.00, and M.G.L. c. 21A, § 2 and 8.

The Permittee shall comply with the declining annual CO_{2e} limits by either controlling the Project's operations to limit actual CO_{2e} emissions below the applicable year's CO_{2e} limit, or use over-compliance credits created when the Project's actual annual project-wide emissions of CO_{2e} are less than the Project's applicable year's CO_{2e} limit.

The requirements are also designed so the Project will help achieve the 2020 mandate to reduce GHG emissions by 25% from 1990 emission levels, and the 2050 mandate for an 80% reduction from 1990 emission levels as required by the Global Warming Solutions Act ("GWSA"), M.G.L. c. 21N, and as emphasized by the decision by the Supreme Judicial Court in *Kain v DEP*, 474 Mass. 278 (2016) ("*Kain*"). To demonstrate compliance with the declining annual CO_{2e} limits, MassDEP has incorporated monitoring, recordkeeping and reporting requirements into the Plan Approval.

Furthermore, MassDEP was directed by Governor Baker to finalize regulations, effective on or before August 11, 2017, to impose annual declining GHG emission limits on multiple sectors in the Commonwealth (see Executive Order 569)[2]. On December 16, 2016, MassDEP proposed for public hearing and public comment regulations to meet Section 3(d) requirements, Executive Order 569 and the *Kain* decision. In the proposed regulations, MassDEP addresses GHG emissions from existing and potential new facilities in the electric generation sector.

MassDEP has designed the declining the GHG emissions limit in this Plan Approval to balance the need to restrict GHG emissions from the Project, which could cause a condition of air pollution and jeopardize meeting the GWSA goals, against the important need to support intermittent renewable power and ensure grid reliability. In structuring the declining GHG emissions limit in the Plan Approval, MassDEP took into account the proposed Project's efficiency and quick-start capabilities. These capabilities will facilitate the integration and operation of intermittent renewables (such as wind and solar) into Massachusetts and New England. Supporting intermittent renewable resources at an increasing rate into the ISO-New England electricity grid will be key to the Commonwealth's ability to achieve the long-term GWSA goals of an 80% reduction in GHG emissions from 1990 levels by 2050. As part of that effort and under the mandates of the GWSA, Massachusetts must demonstrate a reduction in GHG emissions from electricity imported into Massachusetts from the ISO-New England region as well as from electricity generated within the Commonwealth. *See* M.G.L. c. 21N, § 2.

[2] http://www.mass.gov/governor/legislationexecorder/execorders/executive-order-no-569.html

The GHG emissions limit in this Plan Approval is set initially at a level proposed by the applicant. MassDEP has determined that a GHG emission limit set initially at 810,500 tpy of CO_{2e} is sufficiently stringent to prevent a condition of air pollution. While the Project will likely operate below this initial emission limit, there is great uncertainty in the energy market as to which facilities will run given the demand for electricity in any particular year, and the Project is likely to run more frequently than older, existing facilities of the same type due to its quick start capabilities. In addition, extreme weather, electric generating facility scheduled and unscheduled outages, and transmission infrastructure scheduled and unscheduled outages can dramatically affect grid operations.

After input from stakeholders on the Section 3(d) regulations during the notice and public comment process required under M.G.L. c. 30A, MassDEP intends to finalize Section 3(d) regulations by August 2017. Those regulations, along with other measures MassDEP has already adopted or proposes to adopt, will ensure that statewide GHG emissions will meet the 2020 goals of the GWSA and the *Kain* decision. In anticipation of the final Section 3(d) regulations, MassDEP has included a provision in this Plan Approval that provides notice to the Permittee that the annual declining CO_{2e} limits included in this Plan Approval will be superseded by the applicable conditions included in Section 3(d) regulations when adopted.

Please review the entire Plan Approval, as it stipulates the conditions with which the Applicant must comply in order to operate the Project in compliance with this Plan Approval.

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1. Description of Project and Application

The Permittee has proposed the construction and operation of a nominal 350-megawatt ("MW") peak electric generating unit at the existing Canal Generating Station located at 9 Freezer Road in Sandwich, Massachusetts. The proposed new unit for the project will consist of a simple-cycle combustion turbine fired with natural gas as the primary fuel, with limited firing of ultralow sulfur distillate ("ULSD") as the backup fuel. The combustion turbine generator ("CTG") will operate no more than 4,380 hours per year, with ULSD firing limited to 720 hours per year.

The Project will be located on approximately 12 acres within the existing NRG Canal Station property. The Project and the existing NRG Canal Station are part of the same Facility, but NRG Canal 3 Development, LLC. will be subject to a separate Operating Permit, which will be issued in accordance with MassDEP Regulations at 310 CMR 7.00 Appendix C. All permitting applicability determinations, including, but not limited to New Source Review (310 CMR 7.00 Appendix A) PSD, New Source Performance Standards ("NSPS"), and National Emissions Standards for Hazardous Air Pollutants ("NESHAP") will be based upon the Facility in its entirety.

NRG Canal owns two non-contiguous tracts of land, which total approximately 88 acres. The Station Property consists of a 52-acre tract north of a railroad Right of Way ("ROW"). The proposed nominal 350 MW CTG will be located on approximately 12 acres on the eastern portion of this 52-acre Station Property. A separate 36-acre tract southern area is located to the south of the railroad ROW. The majority of the existing Canal Generating Station is located on the 52-acre Station Property. Major components associated with existing Canal Station include two (2) steam-electric generating units, one (1) 498-foot exhaust stack, eight (8) aboveground storage tanks; two (2) NH_3 storage tanks; and appurtenant structures and infrastructure. Two aboveground oil storage tanks are located on the 36-acre tract south of the railroad ROW. Natural gas service is provided by an existing Algonquin Gas Transmission ("AGT") pipeline, which is located under the Cape Cod Canal and is accessed at the western end of the 52-acre Station property.

Directly north of the 52-acre Station Property is the Cape Cod Canal, which has recreational walkways/bike paths located directly next to and on each side of the Canal. Canal Station has a docking facility located on the south side of the Canal for the docking of vessels, including oil delivery barges. The area directly north of the Canal, across from Canal Station, is primarily undeveloped. Scusset Beach State Reservation, which includes a campground and beach on Cape Cod Bay, is located to the northeast of the Project site, north of the Canal. On the South side of the Canal, the Town of Sandwich Marina, the Cape Cod Canal Visitors Center, and the USACE Sandcatcher Recreation Area are located to the east of the Project site. Further east is an area of mixed-use development. Several seasonal restaurants, including the Pilot House Restaurant and Lounge, Joe's Lobster Market, and Seafood Sam's Restaurant are located to the east of the Project site, on the south of the Cape Cod Canal, along with the Global Companies

LLC fuel oil tank farm, and a United States Coast Guard Station. A more densely developed residential area is located farther east, extending to Scusset Harbor.

Immediately south of the Station Property is an active railroad ROW, owned by the Massachusetts Department of Transportation ("MassDOT") and operated by Cape Cod Central Railroad. The tracks are used by both the Cape Cod Scenic Railroad and by freight trains. The nearest residence to the Station Property is located on Freezer Road, adjacent to and just south of the railroad tracks. Two additional single-family homes are located on Briarwood Avenue, south of the Station Property. Eversource owns an electrical substation, located south of the railroad ROW. Undeveloped wooded areas south of the Station Property extend to Tupper Road. To the east of Freezer Road, north of Tupper Road, are The Shipwreck Ice Cream and Marylou's Coffee.

South of Tupper Road, commercial development extends to Old King's Highway (Route 6A). This area includes a Super Stop & Shop, CVS Pharmacy, Citizen's Bank, Eastern Bank, Bobby Byrnes Restaurant, Cafe Chew, and the Post Office. Farther south, across Old King's Highway, is a mix of commercial and residential uses. Shawme-Crowell State Forest is approximately 1 mile south of the Station Property.

West of the Station Property is undeveloped wooded land in the town of Bourne. Farther west is a mix of commercial and residential land uses along Old King's Highway.

The Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) has developed an Environmental Justice (EJ) Policy, and has identified EJ neighborhoods as areas with annual median household income equal to or less than 65% of the statewide median or populations 25% or greater of individuals classified as minority, foreign born, or lacking English language proficiency. The purpose of an EJ analysis is to determine whether the construction or operation of a proposed facility would have a significant adverse and disproportionate burden on an Environmental Justice community. Based on the determination of EJ areas as done by EOEEA, there are no mapped Environmental Justice communities within 5 miles of the Canal Generating Station. The closest EJ area is to the west, in Onset MA, approximately 7.5 miles from the Project site.

The electric grid in New England is operated by an entity known as the Independent System Operator New England ("ISO-NE"). When ISO-NE determines new generating capacity is needed, one approach that is used by ISO-NE is what is known as a Forward Capacity Auction (FCA). Parties interested in supplying new capacity submit location-specific bids for such capacity. In recent years, ISO-NE has been conducting an annual FCA in February. The Applicant submitted a capacity bid for the Project in ISO-NE's most recent forward capacity auction (FCA #10), which took place on February 8, 2016. The Project's bid was accepted and the Project is now obligated to be able to supply electricity starting June 1, 2019.

The new construction will include one (1) simple-cycle combustion turbine with a nominal maximum electrical output of 350 megawatts. The CTG generating system will include: one

General Electric ("GE") model GE- 7HA.02 CTG turbine; an evaporative inlet air cooler; an SCR system with an ammonia (NH_3) injection skid; an oxidation catalyst system; tempering air fans; an exhaust stack; a two-winding main generator step-up transformer; an auxiliary transformer; and electrical switchgear. The Project will also include two ancillary emission units, a 500-kilowatt (electrical) ("kWe") emergency diesel generator engine (581-kW [mechanical]), and a 135-brake-horsepower ("bhp") emergency diesel fire pump engine.

The existing Canal Station consists of two steam boilers (5,973 MMBtu/hr oil-and natural gas-fired, and 5,083 MMBtu/hr oil-fired), each serving a nominal 560 MW turbine generator, as well as two auxiliary boilers, two emergency generators, one emergency fire pump, and one gas heater. This Plan Approval does not regulate the existing equipment or the associated emissions.

The new combustion turbine will be equipped with a selective catalytic reduction ("SCR") emissions control system with Low-NOx burners and aqueous ammonia injection to reduce emissions of nitrogen oxides ("NOx") and an oxidation catalyst to reduce emissions of carbon monoxide ("CO") and volatile organic compounds ("VOC") and volatile organic Hazardous Air Pollutants ("HAP"), including formaldehyde. Other air pollutant emissions include sulfur dioxide, sulfuric acid mist, particulate matter, greenhouse gases, non-VOC HAP, and unreacted ammonia. A single 220-foot tall exhaust stack will disperse exhaust gases from the combustion turbine to the atmosphere.

For the purpose of determining the particular applicable requirements of the federal NSPS for Greenhouse Gas Emissions for Electric Generating Units (40 CFR Part 60 Subpart TTTT), operation of the combustion turbine will not exceed a 40% capacity factor ("cf"), based on a three-year rolling average. The three-year rolling average capacity factor is determined in accordance with Subpart TTTT based on net electric output basis (actual net-electric sales divided by potential net electric generation if the unit had operated for 8,760 hours in each year).

In order to limit the potential emissions of the new CTG, the operation of the new CTG will be limited as follows:

- Operation of the CTG (all fuels) limited to 4,380 hours per consecutive 12-month period,
- ULSD firing limited to 720 hours per consecutive 12-month period,
- Total quantity of natural gas fired limited to 14,554,740 MMBtu (50 °F full load firing rate times 4,380 hours),
- Total quantity of ULSD fired limited to 2,499,120 MMBtu (0 °F full load firing rate times 720 hours),
- Incorporation of startup / shut down ("SUSD") events, based on 180 SUSD cycles on natural gas and 80 SUSD cycles on ULSD. While the actual number of SUSD events is not specifically limited, the SUSD emissions must be tracked and included in total emissions to ensure the emission limits are not exceeded.

The emergency generator will only operate during power outages, for maintenance, for readiness testing, and for compliance demonstration purposes. The emergency generator will not provide

"black start" capabilities for the CTG. The emergency fire pump will only operate during emergencies, for maintenance, for readiness testing, and for compliance demonstration purposes.

The Project includes various features to reduce the level of sound emissions, which include:

- increased casing thickness for the SCR and an acoustic shroud that will envelop the exhaust gas diffuser and the transition duct from the CTG exhaust to the SCR casing,
- additional exhaust silencing to reduce stack outlet noise,
- enclosures around the gas turbine, lube oil skid, and generator,
- lowered height of the tempering air fan inlet plenum box from 50 feet above grade to 35 feet above grade,
- orientation of the tempering air inlet away from sensitive receptor locations,
- a noise barrier near the tempering air fans,
- low-noise fans for the cooling module, with a noise barrier near the module,
- acoustically treated walls for the fuel gas compressor enclosure,
- low-noise generator step-up transformer, and
- turbine air inlets equipped with an 8-foot silencer with an acoustically lined weather hood.

Table 1, below, lists the potential air contaminant emissions from the Project, along with the PSD Significant Emission Rates and the NNSR Applicability thresholds. The final two columns show whether pollutants are subject to PSD and/or NNSR review, based on the existing facility classification as a major stationary source. The Applicant has documented that there have not been any physical or operational changes to the existing Canal Station in the past five (5) years, so for purposes of determining a net emissions increase, there are not any emissions increases or decreases that are contemporaneous with this proposed Project.

Table 1

Potential Emissions
(tons per year)

Pollutant	Combustion Turbine[1]	Emergency Generator Engine[2]	Fire Pump Engine[2]	Project-wide PTE	PSD Significant Emission Rates	NNSR Applicability Thresholds	Does PSD Apply?	Does NNSR Apply?
NOx	103.5	0.67	0.13	104.3	40	25	yes	yes
VOC	23.3	0.04	0.04	24.4[3]	40	25	no	no
CO	94.0	0.67	0.17	94.8	100		no	
SO_2	11.1	1.1×10^{-3}	2.7×10^{-4}	11.1	40		no	
$PM/PM_{10}/PM_{2.5}$	60.4	0.03	0.01	60.5	15 PM_{10} 10 $PM_{2.5}$		yes	
NH_3	50.3	NA	NA	50.3				
Pb	0.004	NA	NA	0.01	0.6		no	
H_2SO_4	12.0	8.7×10^{-5}	2.1×10^{-5}	12.0	7		yes	
GHG (as CO_2e)	932,325	123	29	934,401[4]	75,000		yes	

Table 1

Potential Emissions
(tons per year)

Pollutant	Combustion Turbine[1]	Emergency Generator Engine[2]	Fire Pump Engine[2]	Project-wide PTE	PSD Significant Emission Rates	NNSR Applicability Thresholds	Does PSD Apply?	Does NNSR Apply?
Max single HAP	1.6	$6.0x10^{-5}$	$2.1x10^{-4}$	1.6				
Total HAP	3.9	1.3x10-3	$7.2x10^{-4}$	3.9				

Table 1 Key:

CO = Carbon monoxide
CO_2e = Carbon dioxide equivalents
GHG = Greenhouse gases
H_2SO_4 = Sulfuric acid mist
NA = Not applicable
HAP = Hazardous Air Pollutants
NH_3 = Ammonia
NNSR = nonattainment new source review (310 CMR 7.00 Appendix A)
NOx = Nitrogen oxides
Pb = Lead
PM = Particulate matter
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
PSD = Prevention of Significant Deterioration (40 CFR part 52 section 52.21)
PTE = Potential to emit
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds
tpy = tons per year
SF_6 = sulfur hexafluoride

Table 1 Notes:

1. Includes emissions from the combustion turbine firing at 100% load for 4,380 hours per year, of which 720 hours are firing ULSD, and assumes 180 starts and stops firing natural gas and 80 starts and stops firing ULSD
2. Based on operating the fire pump and emergency generator engines 300 hours per year.
3. Includes 1.0 tpy VOC emissions from ULSD working and breathing losses.
4. Includes allowance for 1,561 tpy CO_2e from methane leaks and 3 tpy CO_2e from potential SF_6 leaks.

2. Emission Offset and Nonattainment Review

Massachusetts has only come into attainment of the 2008 air quality standard for ozone in the last few years. When Massachusetts was not in attainment with the ozone air quality standard, MassDEP promulgated the emission offset and nonattainment new source review requirements in 310 CMR 7.00: Appendix A. Those requirements protect the ozone air quality in the Commonwealth and protect other states from the effects of Massachusetts's NOx and VOC emissions. NOx and VOC emissions are precursors to the formation of ground level ozone.

Massachusetts, except for Dukes County, is now classified Unclassifiable/Attainment with respect to the 2008 ozone standard. However, Massachusetts is in the Ozone Transport Region and states in the Ozone Transport Region are required to maintain programs applicable to nonattainment areas, such as NNSR, even in the absence of, or outside of standard nonattainment area.

The Project's potential NOx emissions exceed the threshold for NNSR as noted in Table 1, above. Therefore, the Project is subject to NNSR, which requires, among other things, offsets, LAER for new emissions, and a demonstration that the benefits of the Project outweigh its environmental and social costs.

Also, note that MassDEP has demonstrated to EPA that Massachusetts facilities, area sources, and mobile sources do not contribute to ozone nonattainment in other states.

Offsets

The Applicant must offset the total permitted annual NOx emissions from the Project by a greater reduction in the actual emissions of NOx from other emission sources. MassDEP requires an offset ratio of at least 1.26 tons of offset emissions for each ton of the Project's annual potential emissions (1.26 is derived from the federally required 1.2:1 offset ratio coupled with a 5% public benefit set aside). All offsets used must be federally enforceable.

Since annual potential NOx emissions from the Project are 104.3 tons per year, the Applicant is required to obtain 131.4 tons per year of offsets (104.3 x 1.26 = 131.4).

NRG has control of 4,209.2 tons per year of NOx ERCs that have been certified by the New York State Department of Environmental Conservation ("NYSDEC"). These ERCs were created by the permanent shutdown of Lovett Generating Station, which was located in Tomkins Cove, Rockland County, NY. MassDEP has initiated a process to execute a Memorandum of Understanding ("MOU") with the NYSDEC, which allows the use of New York ERCs for the purpose of satisfying MassDEP NOx offsets requirements pursuant to 310 CMR 7.00, Appendix A. Any offsets obtained from New York will be adjusted, as necessary, to reflect the current requirements of the Clean Air Act. Additional details on the suitably of the Lovett ERCs is described in the following paragraphs.

As specified in 310 CMR 7.00 Appendix A, for a major modification of a major stationary source of NOx located in an area that is not a nonattainment area, prior to commencing operation of any emission unit(s), for which offsets are required under 310 CMR 7.00: Appendix A, NOx emission offsets must actually occur and be obtained from the same source or other sources within the Ozone Transport Region. Since the Lovett Station emission reductions have occurred, NYSDEC has certified the ERCs, and Lovett Station is located in the Ozone Transport Region that includes both Massachusetts and New York, as defined in the Clean Air Act, the ERCs meet these requirements.

If the project were located in a nonattainment area, 310 CMR 7.00 Appendix A specifies that emission offsets must occur and be obtained from a source in the same nonattainment area, unless:

- The emission reductions are obtained from another area that has an equal or higher nonattainment classification than the nonattainment area in which the new source is proposed; and

- When the new source or modified source is proposed in a nonattainment area, emissions from the other area contribute to a violation of a National Ambient Air Quality Standard ("NAAQS") in the nonattainment area in which the new or modified source would be constructed (i.e., from an upwind nonattainment area).

Barnstable County, Massachusetts is classified as "Unclassifiable/Attainment" for the 2008 8-hour ozone standard, Rockland County, New York is classified as "Marginal" nonattainment for the 2008 8-hour ozone standard. Therefore, Rockland County, New York has an equal or higher nonattainment classification, as compared to Barnstable County, Massachusetts. This would satisfy the first requirement noted above. Additionally, New York State is considered "upwind" of Massachusetts for weather conditions associated with elevated ground-level ozone concentrations. Precursor pollutants from New York State contribute to elevated ground-level concentrations of ozone in Massachusetts. Therefore, ERCs from the Lovett Station satisfy the second requirement.

Should the MOU between MassDEP and NYSDEC not be finalized by the commencement of commercial operation, then the Permittee will use "discrete" ERCs, that is, ERCs in the MassDEP Mass ERC Bank. The Massachusetts Mass ERC Bank is a registry for ERCs quantified by mass, i.e., tons. The Permittee must hold a minimum of five years of ERCs in the Mass ERC Bank (657 tons), upon commencement of commercial operation and for each subsequent year. Each year, the Permittee must surrender 131.4 tons of NOx ERCs from the Mass ERC bank corresponding to the total annual potential NOx emissions. The Permittee must add additional ERCs to its Mass ERC Bank holdings if annual use causes its holdings to fall below the five years of ERCs calculated at the beginning of each year. The Permittee may use ozone-season ERCs in the Mass ERC Bank for allowable year-round operation. Non-ozone season ERCs may be used only for non-ozone season allowable operation. At any time after the MOU between the MassDEP and NYSDEC is finalized, the Permittee may elect to surrender 131.4 tpy of suitable rate-based NOx ERCs generated in New York to satisfy the Project NOx offset requirements. If this occurs, then the Permittee obligations for holding and surrender of Mass Bank ERCs shall cease.

Lowest Achievable Emission Rate Analysis

The Application includes an analysis of LAER for the Project's NOx emission sources. MassDEP regulations define LAER as the more stringent rate of emissions based on the following:

(a) The most stringent emissions limitation which is contained in any state [State Implementation Plan] for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or
(b) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within a stationary source.

The LAER analysis concluded there is no NOx emission limitation in a State Implementation Plan that is more stringent than the most stringent emission limitations achieved in practice, so the analysis concentrated on identifying the most stringent emission limitation achieved in practice for simple-cycle combustion turbines with rated capacity greater than 25 MW firing natural gas and fuel oil. The applicant investigated LAER emission limits in pre-construction or operating permits and the RACT/BACT/LAER Clearinghouse ("RBLC"). The Applicant investigated other information sources, including recent permits issued by MassDEP and BACT and LAER determinations issued by New York and Oregon.

The LAER analysis investigated three techniques for limiting NOx emissions: alternative fuels, process modifications, and add-on controls. The Applicant considered five add-on control technologies, three of which were not technically feasible for the proposed combustion turbine. The Applicant found a dry low NOx combustor with selective catalytic reduction ("SCR") while firing natural gas and SCR with water injection while firing ULSD to be essential for reaching LAER for NOx emissions from the combustion turbine.

The LAER analysis concluded that LAER corresponds to NOx emission limits for simple-cycle combustion turbines of 2.5 parts per million, volumetric dry (ppmvd) corrected to 15% oxygen (O_2) while firing natural gas and 5.0 ppmvd at 15% O_2 while firing fuel oil. To meet LAER, the combustion turbine will use good combustion practices, low NOx burners with water injection, and SCR. Good combustion practices, or good combustion controls, as referred to throughout this Plan Approval, refers to maintaining the appropriate air to fuel mixtures, air/fuel contact and combustion residence times to achieve proper combustion in accordance with the manufacturer's combustor design. This includes limiting residual emissions of CO and VOC while also limiting NOx formation in accordance with the combustor design.

The LAER analysis also considered NOx emissions from the emergency generator engine and the emergency fire pump engine. The Applicant conducted similar analyses for each engine. 40 CFR 60 Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines regulates emissions from these engines. Similar to the LAER analysis for

the combustion turbine, the Applicant searched for emission limitations in practice and investigated the same three techniques for limiting NOx emissions: changing raw materials, process modifications, and add-on controls.

The LAER analysis found the most stringent NOx emission limits in practice for emergency generator engines and fire pump engines to be 3.5 grams per kilowatt-hour (g/kW-hr) and 4.0 g/kW-hr (mechanical), respectively. The Applicant proposed these emission levels as LAER for the emergency generator engine and the emergency fire pump engine.

Based on MassDEP's independent review and analysis of the LAER analysis for NOx included in the Application, MassDEP determined that the NOx emission limits proposed by the Applicant represent LAER for the combustion turbine, the emergency generator engine, and the emergency fire pump engine.

Alternatives Analysis

The Application includes an alternatives analysis corresponding to 310 CMR 7.00: Appendix A(8)(b), which states:

> "By means of an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed new or modified stationary source, the owner or operator of the proposed stationary source or modification shall demonstrate to the satisfaction of the Department that the benefits of the proposed source significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification."

Analysis of Alternative Sites

The Applicant evaluated seventeen (17) candidate sites for the development of a simple-cycle combustion turbine generator power plant. The seventeen sites were located in Somerset, MA (2 locations), Sandwich, MA, Dartmouth, MA, Dighton, MA, Weymouth, MA, Martha's Vineyard, MA (2 locations), Cos cob (Greenwich), CT, Branford, CT, Torrington, CT (2 locations), Milford, CT, Middletown, CT, Uncasville, CT, Norwalk, CT, Middletown, CT, and Tiverton, RI. These seventeen locations were evaluated based on space availability, access to adequate natural gas, availability of electrical transmission infrastructure, including location within the electrical grid, and availability of water infrastructure.

Based on the criteria listed above, the seventeen sites were narrowed down to three sites, located at Brayton Point Station, Somerset, MA, Canal Station, Sandwich, MA, and Middletown, CT. These three locations were evaluated on multiple locational, environmental, and community based criteria, as follows:

- Locational: site size, availability on construction lay-down and parking, proximity to electrical load, availability of natural gas, electrical interconnection, water availability, zoning/ land use, and permitting process.

- Environmental: Air Quality, water use / discharge, wetlands/ waterways, noise, zoning/ land use, historical/ archaeological, visual impacts, traffic, solid/ hazardous waste, electrical/ magnetic field impacts, material storage / safety, and proximity of construction lay-down.
- Community: local acceptance, tax impacts for the town, proximity of neighbors.

All three locations were considered to be potentially suitable sites but Brayton Point and Canal are both in the SEMA/ RI sub-region and have larger sites to accommodate construction, thereby eliminating Middletown CT from further consideration. Canal was deemed superior relative to solid and hazardous waste and has the advantage of being the only electrical generating station on Cape Cod, enhancing reliability to the Cape. For these reasons and because Brayton Point is not under NRG's ownership control, the Canal site was the preferred location.

Alternative Configurations at the Canal Site.

Once the Canal site was identified as the preferred site, the Applicant considered multiple configurations at that location. The proposed configuration was established based on minimal impact to previously undisturbed land, minimal wetlands impact, orientation efficient routing of electrical interconnections, adequate buffer to property lines, maximizing the buffer to the waterfront, and air quality considerations.

Analysis of Alternative Project Sizes

ISO-NE has projected a shortfall of 238 MW of generation capacity in the SEMA/RI capacity zone. By year 2019, the year the Applicant proposes the Project to be in service, the total generating capacity of the market will be lower by more than 1,700 MW.

The Project size was chosen based upon the projected 1,700 MW reduction in ISO-NE capacity by 2019, participation in the ISO-NE Ten Minute Non Spinning Reserve ("TMNSR") market, previously discussed site considerations and CTG technology. The Canal site will not support a larger project and a smaller project would most likely require development on sites, which are less desirable as discussed, above.

Analysis of Alternative Production Processes

The Application contains a copy of written testimony submitted to the Massachusetts Energy Facilities Siting Board ("EFSB"), when compared to alternative fossil-fuel technologies, the proposed simple-cycle, dual-fuel, quick-start generating Project on balance contributes to a reliable, low-cost, diverse regional energy supply with minimal environmental impacts

With respect to the fossil-fuel technology comparison, the assessment eliminated both exclusively oil-fired and coal-fired technologies from further consideration because such

technologies faced significant cost, technological, and/or environmental hurdles, and, as such, neither technology appears to be feasible with respect to siting in Massachusetts.

The assessment then compared the proposed GE 7HA.02 simple-cycle natural gas-fired turbine with two fossil-fuel alternatives: (1) the GE LMS 100, a natural gas-fired simple-cycle peaking technology; and (2) the Siemens SGT6-5000F 2x2x1, a natural gas-fired combined-cycle technology. Specifically, the assessment compared the three technologies with respect to: (1) reliability; (2) cost; (3) diversity in energy supply; and (4) environmental impacts.

With respect to reliability, the assessment determined that the Project's GE 7HA.02 technology offers a number of positive attributes relative to other identified technologies. This type of technology has a better ramp rate at startup relative to the other technologies; is preferable to the combined-cycle technology with respect to ramping ability to full load; is equipped with automatic generation control ("AGC") that will enable it to receive automatic dispatch signals from the system operator, which enables a fast response time in the event the system experiences unexpected losses of load, generation, or transmission; has comparable outage rates relative to the other technologies; and is capable of being constructed in significantly less time than the larger and more complex combined-cycle unit.

With respect to cost, the assessment compared the three technologies on the basis of estimated capital costs (dollars per kilowatt [$/kW]), fixed O&M costs, and variable O&M costs. The assessment determined that the estimated overall capital costs and fixed O&M costs of the GE 7HA.02 technology was lower than those of the GE LMS100 and Siemens SGT6-5000F. The assessment also concluded that all three technologies have comparable estimated variable O&M costs. As such, the assessment determined that the combination of economic attributes of the GE 7HA.02 compared favorably to the other evaluated technologies.

With respect to diversity of energy supply, the assessment determined that the proposed Project technology offers diversity advantages over the LMS 100 due to its higher ramp rate and lower turn-down minimum. Moreover, the assessment determined that the efficiency and operating flexibility attributes of the combustion turbine technology will become increasingly more important to the system supply mix as the region increase its reliance on renewable energy resources and Canadian imports.

With respect to environmental impacts, the assessment determined that the three selected technologies all will have lower heat rates than many of the existing, operating fossil fuel generating units, meaning higher efficiency and lower variable O&M costs. These attributes will lead to these units being dispatched ahead of existing fossil fuel units, which generally are less efficient and have higher variable O&M costs.

There are new "quick-start" combined-cycle technologies (a/k/a "flex plants") that have been developed that will allow a certain portion of the turbine output to be available in 10 minutes from initial startup, while the steam-cycle portion of the combined-cycle unit warms up. However, in order to be able to bring the required 300+ MW to the grid in 10 minutes, two F-

class CTGs would be required to accomplish the same function in the TMNSR market as the proposed H-class CTG. The two F-class "quick-start" CTGs would provide 300+ MW for the TMNSR market as well as over 600 MW of combined cycle generation. This two-unit "quick-start" CTG plant would operate in a fundamentally different manner, requiring participation in both the TMNSR and day ahead energy markets to make the project financially viable. A much larger combined cycle project would require additional land for development, increase fuel consumption, and dramatically increase water consumption. The cooling system would most likely require a dry cooling system that would be a significant new source of noise emissions. A single "quick-start" F-class combined-cycle unit would only be able to provide approximately 150 MW in in the TMNSR market. Neither one or two "quick-start" F-class combined-cycle units is considered commercially feasible since it would never be selected in the ISO-NE FCA due to the substantially higher capital cost and significantly diminished 10-minute generation capability relative to that cost.

Analysis of Alternative Environmental Control Techniques

The Project will use natural gas as the primary fuel, ULSD as a back-up fuel and will incorporate state-of-the-art emissions control technology, resulting in extremely low emissions. The Project's NOx emissions will meet LAER, which requires the source to install pollution control equipment that results in the lowest emission rates that are technically feasible. A top-down BACT analysis evaluated other pollutants.

There are no alternative environmental control techniques beyond those chosen for the Project that can lower air pollutant emissions.

Project Benefits and Environmental and Social Costs

The Application documents the proposed Project's benefits as well as its environmental and social costs.

With respect to Project benefits, the Application states that an important benefit of the Project is that it will add reliability to the regional electrical system and provide resources to support intermittent and variable resources, including renewable resources. Canal Station Units 1 and 2 are currently the only significant electric generating units on Cape Cod. Canal Station Units 1 and 2 each take approximately 12 hours to start up, and cannot respond to immediate power needs if there are problems with the electric supply or with the supply of intermittent renewable resources such as solar and wind. The Project will be able to provide its full electric output capability in 10 minutes. This will provide a significant public benefit in terms of providing a quick response to system outages and also to support the market penetration of renewable resources. Renewable resources such as wind and solar are intermittent resources, since they depend of wind or sunshine being available in real time. If these resources are not available, the Project can provide quick backup power to replace these intermittent renewable resources until they become available again.

The Application also indicates that the proposed Project will provide financial benefits including jobs during and after construction, and will have a significant positive impact on the town of Sandwich's property tax base and local economy. The peak construction workforce is expected to include approximately 150 construction workers, which will bring positive economic impacts to these workers and their families as well as the local economy. The Applicant has indicted that they plan to locally source goods and services to support the Project during both construction and operation as much as feasible. In addition, the Applicant is developing a package of local support measures for the Town of Sandwich. The annual quantity of tax revenue from the Canal Station site is expected to double with the construction of the Project.

The Application indicates another Project benefit is that the Applicant will need to acquire Regional Greenhouse Initiative (RGGI) allowances in proportion to actual CO_2 emissions. RGGI funds are reinvested for public benefit, including investment in energy conservation measures, which will reduce fuel use and emissions from such sources as home heating oil consumption.

An additional Project benefit discussed in the Application is that since the Project will be dispatched ahead of older, less efficient generation on the electric grid, operation of the Project is projected to reduce regional CO_2 emissions.

While the Project will have certain environmental impacts and social costs, the Application outlines mitigation measures incorporated into the Project in order to reduce emissions and any related social costs. In all cases, Project impacts will meet the requirements of applicable laws and regulations that require minimization of impacts.

Regarding air quality, although the Project will result in emissions to the ambient atmosphere, the Project will not cause or contribute to an exceedance of any National or Massachusetts Ambient Air Quality Standard. This will be achieved through the implementation of Best Available Control Technology and Lowest Achievable Emission Rates, by using state-of-the-art equipment and control technology and by using natural gas and ultra-low sulfur diesel, the cleanest burning fossil fuels available. The Project will offset its NOx emissions by using offsets. The Project will also surrender CO_2 and SO_2 allowances under the RGGI and the federal Acid Rain Program, respectively.

MassDEP's Noise Policy limits the increase in residual (L_{90}) noise levels to no more than 10 A-weighted decibels (dBA) above ambient levels. Maximum sound level impacts from operation of the Project were calculated at the closest noise-sensitive receptors for both daytime and nighttime. During operation, the Project is expected to increase background sound levels by less than 7 dBA at the closest residence during the nighttime. Since ambient noise levels were found to be 5 to 10 dBA lower during the nighttime, daytime impacts would be less. A cumulative impact analysis was performed for the operation of the existing Units 1 and 2 and the proposed Project, even though simultaneous operation of all three units is expected to occur infrequently. Results of this analysis led to incorporation of additional noise mitigation on Units 1 and 2 in order to reduce cumulative noise impacts. The proposed Project and existing Station will

comply with MassDEP's Noise Policy during all operating scenarios, with a cumulative increase in nighttime L_{90} noise levels no greater than 10 dBA.

Regarding chemical storage, both the ULSD tanks and the aqueous ammonia storage tanks will be equipped with full secondary containment. Accidental release modeling found that the impacts of a complete failure of one aqueous ammonia tank are below applicable health impact thresholds at the fence line and beyond the Facility site.

With respect to wetland resources, the FEMA 100-year flood zone, also known as Land Subject to Coastal Storm Flowage ("LSCSF"), is the only wetland resource area, defined under the Massachusetts WPA and subject to Sandwich Wetland Bylaws, located on the Project Site. LSCSF has no specified performance standards set by the Massachusetts Wetland Protection Act (WPA). The proposed electrical transmission interconnection lines will traverse an offsite bordering vegetated wetland. Two poles will be placed in the buffer zone and heights of trees crossed will be maintained at no higher than 20 feet. In order to minimize potential impacts from coastal storms, the Project has been designed so that buildings and ancillary structures will be elevated 2.3 feet above the existing 100-year flood elevation, to a minimum elevation of 16 feet North American Vertical Datum of 1988 (NAVD-88). Temporary impacts during construction will be mitigated through the implementation of the Project's Storm Water Pollution Prevention Plan.

With respect to stormwater, prior to commencement of construction, a detailed erosion and sediment control plan will be prepared that meets current USEPA, MassDEP, Cape Cod Commission ("CCC"), and Town of Sandwich requirements and guidelines. During operation, the Project will control stormwater through installation of three vegetated infiltration basins. Any overflow from the infiltration basins will be directed to the two existing discharge points associated with the existing Station. The quality of stormwater runoff from the Project Site will be improved compared to existing conditions through the introduction of structural and non-structural Best Management Practices ("BMPs") including deep sump catch basins, vegetated water quality swales, vegetated strips and infiltration basins with sediment forebays, and leaching catch basins. The design emphasizes infiltration and pretreatment pollutant removal efficiencies through the introduction of vegetation.

With respect to water and wastewater impacts, the Project has been designed to have insignificant impacts on water resources by utilizing a technology (simple-cycle combustion turbine) with inherently low water demand. Cumulative water demand for the Project and the existing Station will be met using the two existing groundwater wells on the Station Property, within the currently registered volumes. A near-zero liquid discharge design will avoid direct discharge of wastewater. Any liquid process streams that cannot be treated on-site will be collected and trucked off-site for treatment and disposal. Additionally, no new sanitary wastewater will be discharged, as the Project will utilize existing infrastructure currently serving the Station.

With respect to construction traffic, a traffic-construction management plan will be implemented to accommodate the specific needs of the site and to provide coordination with Town of Sandwich officials throughout the construction period.

Conclusion of the Alternatives Analysis

The Applicant's evaluation of Projects benefits as compared to the environmental and social costs concludes that the Project benefits significantly outweigh the environmental and social costs.

Based upon review of this demonstration provided in the Application, MassDEP agrees that the benefits of this project do significantly outweigh this project's environmental and social costs. The Project will provide increased electric grid reliability, support renewable sources. This is particularly for Cape Cod, where this will be the only quick-start source of electricity available. The Project will provide jobs to a significant number of construction workers and over the long-term, will provide a significant increase to the tax base of the Town of Sandwich. There will be environmental and social costs. There will be new emissions to the ambient air, which will be minimized through addition of control technology, the use of clean-burning fuels, and a highly efficient combustion turbine. Additionally, there will be an annual declining GHG emission limit, GHG mitigation measures as identified in the Section 61 Findings, the purchase of NOx emission offsets and Regional Greenhouse Gas Initiative (RGGI) allowances. Further, the impacts to the ambient air and to neighborhood noise are, with adequate mitigation, within the standards and guidelines designed to protect public health and welfare.

NNSR Applicant Demonstrations

In accordance with the requirements of 310 CMR 7.00: Appendix A: (7) (a) through (c), the Applicant must make the following demonstrations to the satisfaction of MassDEP:

- (7)(a) "the emissions offsets required under 310 CMR 7.00: *Appendix A*(6), when considered in conjunction with the proposed emissions increase will have a net air quality benefit in the affected area"

  The Applicant has identified enforceable emissions offsets for the Project's nitrogen oxide emissions at a rate of 1.26 tons of offsets for each ton of nitrogen oxide emitted. The enforceable NO_x emissions reductions that enabled creation of the offsets consisted of a plant shutdown that occurred in the ozone transport region. Nitrogen oxide emissions are precursors to photochemical reactions that lead to ozone formation. It is reasonable to conclude that the net reduction of nitrogen oxide emissions will result in a net air quality benefit in terms of reduced potential for ozone formation in the Ozone Transport Region.

- (7)(b) "the emissions from the proposed new major stationary source or major modification will not contribute to nonattainment in, or interfere with maintenance by any other state of any national primary or secondary ambient air quality standard."

  Emissions from Massachusetts do not now contribute to nonattainment or interfere with maintenance in any other state. The NOx emissions from the Project will not contribute to nonattainment or interfere with maintenance in any other state, as confirmed by the results of the air quality impact analysis that follows herein.

- (7)(c) "the emissions from the proposed new major stationary source or major modification will not interfere with measures required to be included in the applicable implementation plan for any other State under a program for the prevention of significant deterioration or for the protection of visibility."

  The Applicant has demonstrated the Project will not contribute to nonattainment in the area around the Project; it will not interfere with measures in the implementation plan of any other State for the prevention of significant deterioration. The Applicant has demonstrated the Project will not interfere with measures in the implementation plan of any other State for the protection of visibility.

NNSR Additional Conditions for Approval

In accordance with the requirements of 310 CMR 7.00: Appendix A (8)(a), all major stationary sources in Massachusetts (Sandwich and Martha's Vineyard) controlled by NRG are in compliance with all applicable emission standards under the federal Clean Air Act.

In accordance with the requirement of 310 CMR 7.00: Appendix A (8)(c), the Administrator of EPA has not determined that the Massachusetts State Implementation Plan is not being adequately implemented in the nonattainment area in which the Project is proposed.

3. BACT Analysis

Pursuant to 310 CMR 7.02(3)(j)6., the emissions limits in MassDEP's approval of the Project must represent the most stringent emission limit as specified in 310 CMR 7.02(8). Under 310 CMR 7.02(8)(a)2., such limits must represent BACT. Under 310 CMR 7.00 Definitions,

> BEST AVAILABLE CONTROL TECHNOLOGY means an emission limitation based on the maximum degree of reduction of any regulated air contaminant emitted from or which results from any regulated facility which the Department, on a case-by-case basis taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques for control of each such contaminant. The best available control technology determination shall not allow emissions in excess of any emission

> standard established under the New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants or under any other applicable section of 310 CMR 7.00, and may include a design feature, equipment specification, work practice, operating standard, or combination thereof.

The Application includes analyses that propose BACT for each of the Project's emission sources, that is, the combustion turbine, the emergency generator engine, and the emergency fire pump engine. The analyses use a 'top-down' approach, where the analyst ranks all feasible control technologies in order of stringency and emissions limits associated with the most stringent technology is BACT unless the analyses eliminates it because of its economic, energy or environmental impacts.

The basis for the top-down BACT analysis procedure are EPA's October 1990 Draft New Source Review Workshop Manual[3], EPA's March 2011 PSD and Title V Permitting Guidance for Greenhouse Gases[4], and MassDEP's June 2011 Best available Control Technology ("BACT") Guidance[5].

The Application includes Top-Down BACT analyses for emissions of nitrogen oxides, particulate matter, carbon monoxide, volatile organic compounds, greenhouse gases, sulfur dioxide and sulfuric acid mist. As part of the BACT analyses, the Application includes fuel selection as a control option for the Project's emission sources.

Combustion Turbine

Fuel Selection

The Applicant proposed to burn primarily natural gas with ULSD as a back-up fuel.

The Applicant's analysis for fuel selection examined the use of natural gas as the exclusive fuel and natural gas with the use of either liquefied natural gas ("LNG") or ULSD as a backup fuel. The Applicant found that the use of LNG was not technically feasible because of the necessary infrastructure upgrades required. The Applicant also indicated the Facility was not large enough to accommodate the required exclusion zone associated with LNG storage tanks.

Since natural gas is lower emitting than ULSD for most pollutants, using only natural gas ranks higher as BACT than using natural gas with ULSD back up.

MassDEP reviewed and considered the energy, economic and environmental impacts of the Applicant's fuel selection proposal. The interstate natural gas pipeline servicing the area is highly constrained and does not have sufficient latent capacity to reliably support quick start

3 https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf
4 https://www.epa.gov/sites/production/files/2015-12/documents/ghgpermittingguidance.pdf
5 http://www.mass.gov/eea/docs/dep/air/approvals/bactguid.pdf

capability for the Project. The Pipeline does provide no-notice service but it is fully subscribed to by regional distribution companies and is not available to the Applicant at any price. Having no-notice service is essential to support this Project, which is designed to provide peak electric capacity within 10-minutes of dispatch notice from ISO-NE. The 10-minute dispatch plays an important role in ensuring the reliability of the regional power infrastructure. Therefore, natural gas as the sole fuel is not feasible for this project. With regard to environmental impacts, burning any ULSD will increase emissions over burning natural gas, but not result in an unacceptable air quality impact.

Upon review, MassDEP determined that the emission limits associated with the use of natural gas with ULSD backup represent BACT for the Project.

For purposes of complying with the New Source Performance Standards at Subpart TTTT, as a multi-fuel non-baseload unit, the Project can be operated up to 4,380 full load hours (50% CF) in any specific 12-month period with up to 720 full-load hours in this 12-month period on ULSD. The Project will comply with a maximum three-year rolling average capacity factor of no more than 40% so as to qualify as a non-baseload unit under Subpart TTTT.

Natural gas will be fired at all times that it is available. Natural gas will be deemed unavailable when its supply and/or delivery cannot be contracted for within the timeframe necessary to start the unit or when emergency conditions or scarcity conditions are declared by ISO-NE. ULSD firing will also occur to ensure that the unit is properly maintained and the ULSD quality is high enough to support unit availability and to meet the BACT and LAER emission rates. The use of ULSD will be limited to when any of the following conditions apply:

a) When ISO-NE declares an Emergency, as defined in ISO New England's Operating Procedure No. 21, No. 4, and No. 7, or declares a Scarcity Condition.
b) When the operator of the natural gas transmission line issues a critical notice that disallows increases in nominations from where gas is received on their pipeline system to the point of delivery for the Project.
c) When gas supplies cannot be procured or delivered at any price or are not available for purchase or delivery within the timeframe required to support operation of the Project. The Project will use all commercially reasonable efforts to switch to natural gas operation as soon as possible without jeopardizing the safety of equipment or operating personnel.
d) If the Project is operating on natural gas and the supply or delivery is curtailed by the pipeline operator. In this situation, the Project will use all commercially reasonable efforts to switch back to natural gas operation as soon as it is again available without jeopardizing the safety of equipment or operating personnel.
e) Any equipment (whether on-site or off-site) required to allow the turbine to operate on natural gas has failed including a physical blockage of the supply pipeline.
f) During commissioning when the combustion turbine is required to operate on ULSD pursuant to the turbine manufacturer's written instructions.
g) For emission testing purposes as specified in the Project's Plan Approval, PSD Permit or as required by MassDEP or other regulatory agencies with relevant authority.

h) During routine maintenance if any equipment requires ULSD operation.
i) In order to maintain an appropriate turnover of the on-site fuel oil inventory, ULSD can be used when the age of the fuel in the tank is greater than six months. A new waiting period for when ULSD can be used pursuant to this condition will commence once ULSD firing is stopped. In addition, the use of ULSD burned pursuant to this condition (ix) will be limited to 4,000,000 gallons per rolling four-year period (rolling calendar years). This corresponds to 160 hours of 100% load operation over four years at the 0^{o}F firing rate on ULSD.

Additionally, the Project will not to operate on ULSD pursuant to conditions (g), (h) and (i) on any day when the air quality index for the area including Sandwich, MA is, or is forecast to be, 101 or greater. This limitation does not apply to conditions (a) through (f).

Nitrogen Oxides

For nitrogen oxides emissions from the combustion turbine, the analysis proposed that of the available options, only Selective Catalytic Reduction (SCR), Low-NOx burners, and the use of clean fuels and good combustion control were technically feasible. The Applicant concluded that using all three would be necessary to achieve BACT.

The Applicant has proposed dry low NOx ("DLN") combustors during natural gas firing and water injection when firing ULSD to minimize NOx formation.

The Applicant proposed an emission limit of 2.5 ppmvd at 15% O_2 firing natural gas and 5.0 ppmvd at 15% O_2 when firing ULSD. Upon review, MassDEP determined that the proposed emission limits represent BACT for the simple-cycle combustion turbine fired with the fuels proposed.

Particulate Matter

The BACT analysis reviewed emission rates and control technologies for particulate matter using the conservative assumption that all particulate matter emissions are 2.5 microns aerodynamic particle diameter or smaller. Emissions of PM from combustion can occur as a result of trace inert solids contained in the fuel and products of incomplete combustion, which may agglomerate or condense to form particles. PM emissions from CTGs equipped with SCR can also result from the formation of salts due to the conversion of SO_2 to sulfur trioxide, which is then available to react with NH_3 to form ammonium sulfates. All of the PM emitted from this CTG is assumed less than 2.5 microns in diameter, i.e. $PM_{2.5}$. Therefore, PM, PM_{10} and $PM_{2.5}$ are assumed to be the same.

The evaluation did not identify any $PM/PM_{10}/PM_{2.5}$ post-combustion control technologies available for simple cycle turbines. The use of fabric filters, electrostatic precipitation, or wet scrubbers is not technically feasible since these devices impose an unacceptable level of backpressure for proper turbine operation. The Applicant proposed the emission limits

associated with the use of clean fuels and good combustion control as BACT for the combustion turbine. MassDEP determined that the following emission limits represent BACT for PM:

- 0.012 lb/MMBtu, not to exceed 18.1 lb/hr on when operating at reduced load, from 75% load down to MECL on natural gas. MECL is the Minimum Emission Compliance Load, as determined by the stack NOx and CO monitoring data, which ranges between 30 and 40% load based on ambient temperature.
- 0.0073 lb/MMBtu, not to exceed 18.1 lb/hr when operating above 75% load on natural gas.
- 0.046 lb/MMBtu, not to exceed 65.8 lb/hr, when operating at reduced load, from 75% load down to MECL on ULSD. MECL is the Minimum Emission Compliance Load, as determined by the stack NOx and CO monitoring data, which ranges between 30 and 40% load based on ambient temperature.
- 0.026 lb/MMBtu, not to exceed 65.8 lbs/hr above 75% load on ULSD

Carbon Monoxide

For carbon monoxide emissions, the available control options are the use of an oxidation catalyst for post-combustion control and the use of clean fuels and good combustion control. All of these options are technically feasible. The Applicant proposed the emission limits associated with the use of clean fuels and good combustion control and with the use of an oxidation catalyst with a nominal 75% removal efficiency as BACT for CO emissions from the combustion turbine. MassDEP determined that emission limits of 3.5 ppmvd corrected to 15% O_2 for natural gas and 5.0 ppmvd corrected to 15% O_2 for ULSD represent BACT.

Volatile Organic Compounds

The Applicant proposed the emission limits associated with the use of an oxidation catalyst and clean fuels and good combustion control as BACT for VOC emissions, including VOC HAP. The Applicant found both of these technologies to be technically feasible for the Project's combustion turbine, and that an oxidation catalyst is capable of a 37.5% VOC reduction during natural gas firing, and a nominal 55% VOC reduction during ULSD firing. Accordingly, the Applicant proposed VOC emissions limits of 2.0 ppmvd at 15% O_2 during natural gas firing and 2.0 ppmvd at 15% O_2 during ULSD firing. Upon review, MassDEP determined that these emissions limits represent BACT.

Greenhouse Gases

Massachusetts regulations define GHG as including, but not limited to, carbon dioxide, methane, nitrous oxide, perfluorocarbons, sulfur hexafluoride, and hydrofluorocarbons. Nitrous oxide emissions from uncontrolled and SCR-controlled combustion turbine are inherently low. Hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride are not products of combustion and will not be emitted by the Facility combustion equipment. The Applicant will comply with

310 CMR 7.72 Reducing Sulfur Hexafluoride Emissions from Gas-insulated Switchgear to reduce sulfur hexafluoride emissions.

The combustor design controls nitrous oxide and methane emissions, as a constituent of products of incomplete combustion, that is, uncombusted fuel. The GHG BACT analysis focused on CO_2 emissions as the primary GHG component. Emissions calculations are as CO_2-equivalent, or CO_2e[6]. Potential available control options were carbon capture and sequestration, alternative electric generation technologies, the use of clean fuels, good combustion control, and efficient operation. Only the use of clean fuels, good combustion control, and efficient operation were determined to be technically feasible. The Applicant proposed GHG emission limitations of 1,178 lb CO_{2e} per megawatt hour (lb/MW-hr) (gross) at full load ISO conditions while firing natural gas and 1,673 lb CO_{2e} /MW-hr (gross) at full load ISO conditions while firing ULSD. These values include a performance design margin of 5% and an equipment degradation margin of 2% for a total adjustment factor of 7.1% (1.05 x 1.02 = 1.071) to account for design uncertainty, turbine degradation, and variations in fuel quality.

Based on review, MassDEP determined that these GHG emissions limitations represent BACT. All Project GHG emissions are also subject to an annual declining limit. See Condition 20 in Table 13.

Sulfur Dioxide and Sulfuric Acid Mist

The oxidation of sulfur in the fuels generates sulfur dioxide emissions. SO_2 may convert to sulfuric acid when oxidation of the fuel sulfur also generates small amounts of sulfite (SO_3) in the turbine as well as in the oxidation catalyst and the SCR catalyst. The sulfite can react with the moisture in the exhaust to form sulfuric acid. The use of post-combustion control technologies is not technically feasible since these devices impose an unacceptable level of backpressure for proper turbine operation.

The Applicant proposed the following emissions limitations associated with the use of low sulfur fuels:

- SO_2 - 0.0015 lb/ MMBtu, firing natural gas or ULSD
- H_2SO_4 - 0.0016 lb/MMBtu, while firing natural gas
- H_2SO_4 - 0.0018 lb/MMBtu, while firing ULSD

MassDEP determined that these emissions limitations represent BACT for the respective sulfur compounds.

6 That is, the Applicant converts emissions of individual GHG chemicals to an equivalent amount of CO_2 emissions based on the chemical's particular global warming potential relative to CO_2.

Ammonia (NH_3)

NH_3 emissions are a byproduct of its use as a reagent in the SCR system, which is used to control NOx emissions. NH_3 is injected into the exhaust at slightly above stoichiometric requirements to maximize conversion of NOx and ensure the NOx LAER emission rate can be met. Unreacted NH_3 that is exhausted to the atmosphere is referred to as ammonia "slip." The only technologies available to control ammonia slip SCR design and ammonia injection control. The Applicant will implement both these technologies to achieve a maximum ammonia slip of 5 ppmvd corrected to 15% O_2, which MassDEP agrees represents BACT while firing either natural gas or ULSD. The Applicant will implement an optimization program to attempt to achieve a limit of 2 ppmvd corrected to 15% O_2 while firing natural gas.

Formaldehyde

Formaldehyde is a VOC that is formed as a result of incomplete combustion of organic compounds in the fuel. Formaldehyde emissions can be can be minimized by combustion controls and post combustion controls, which are both technically feasible. The Applicant will use a lean pre-mix combustor for natural gas firing in conjunction with an oxidation catalyst to achieve an emission rate of 0.091 ppmvd corrected to 15% O_2, which MassDEP agrees represents BACT.

De minimis air contaminant emissions

MassDEP has determined that non-VOC HAP emissions from the combustion turbine, including metals from ULSD combustion and acid gases other than sulfuric acid mist, may be omitted from BACT analysis.

Emergency Generator and Emergency Fire Pump Engines

The Project includes an emergency generator engine and an emergency fire pump engine. Both engines will operate on ULSD fuel. The proposed emergency generator engine will be a 500-kilowatt (electrical) Caterpillar C-15 (or equivalent) ULSD-fired engine. The emergency fire pump engine will be a 135 brake horsepower John Deere / Clarke JU4H-UFAD5G (or equivalent) ULSD-fired engine. Both engines will be used in emergencies only (with the exception of periodic maintenance and testing and use in non-emergency situations allowed under 40 CFR 60.4211(f)) and will be limited to a maximum of 300 hours per consecutive 12-month period of operation. Each engine is subject to the operating limitations specified in 40 CFR 60, Subpart IIII for emergency engines (including a 100-hour limit for non-emergency operation per calendar year.).

The BACT analysis for both engines included a fuel selection BACT and BACT analyses for NOx, CO, VOC, HAP, PM, SO_2/Sulfuric Acid Mist, and GHG emissions.

Fuel Selection

The BACT analysis for the engines concluded that ULSD is the only justifiable fuel choice for the emergency engines due to the requirement for the engines to have a fuel supply that is directly available without interruption. The use of propane was eliminated as technically infeasible.

Upon review, MassDEP concurs that ULSD is the best fuel choice for the Project's emergency engine. This has the effect of limiting emergency engine selection to compression ignition reciprocating internal combustion engines (CI RICE).

Nitrogen Oxides

With respect to NOx emissions from the emergency engines, the applicant identified two candidate technologies. These two technologies are selective catalytic reduction (SCR) and the use of a low-NOx engine design. The BACT analysis concluded that both of these technologies are technically feasible. The use of SCR on an emergency engine was not identified in practice. Based on an economic analysis for SCR-equipped emergency engines, they concluded that SCR is not cost-effective. The applicant proposed the emission limits associated with the use of low-NOx engines was as BACT. A low-NOx engine refers to an engine that complies with 40 CFR part 1039 Tier 4 Alternate FEL Cap engine standards for the emergency engine and Tier 3 standards for the fire pump engine (referenced by 40 CFR 60 Subpart IIII for emergency engines).

Based on MassDEP review, new CI RICE selection is constrained by the applicable federal emissions standards that apply to manufacturers, or, for fire pump engines, an engine that complies with the applicable emission standards in Table 4 of 40 CFR 60 Subpart IIII. There is limited opportunity for owners to deviate from the standard offerings for either emergency or fire pump stationary CI RICE, without jeopardizing the required manufacturer emissions certifications.

Therefore, MassDEP determined that the NOx emissions performance of the applicant's proposed emergency and fire pump stationary CI RICE represent BACT.

Carbon Monoxide, Volatile Organic Compounds, and VOC Hazardous Air Pollutants

For products of incomplete combustion (CO, VOC, and VOC HAP) the applicant proposed the emission limits associated with the use of clean fuels and good combustion control as BACT, consistent with 40 CFR 89 Tier 4 engine standards for the emergency engine and Tier 3 standards for the fire pump engine (referenced by 40 CFR 60 Subpart IIII for emergency engines), MassDEP BACT guidance, and with past MassDEP BACT determinations for similar emission units.

After review, MassDEP concurs that the emission limits imposed for the latest available model-year NSPS-compliant emergency stationary CI RICE represent BACT for these emissions.

Particulate Matter

The applicant identified two control technologies as available to control particulate matter from the emergency engines. These two control technologies are an active diesel particulate filter (DPF) and low-PM engine design. DPF was technically feasible, but ruled out as BACT due to the excessive pollutant removal cost. The review of other RBLC precedents supports the proposal of low-PM engine design as BACT. A low-PM engine design refers to an engine that complies with 40 CFR 89 Tier 4 Alternate FEL Cap engine standards for the emergency engine and Tier 3 standards for the fire pump engine (referenced by 40 CFR 60 Subpart IIII for emergency engines).

MassDEP concurs that the PM emissions limits imposed for the latest available model-year NSPS-compliant emergency stationary CI RICE represents BACT for PM.

Sulfur Dioxide and Sulfuric Acid Mist

The only control technology identified for sulfur emissions (sulfur dioxide and sulfuric acid mist) from the emergency engines is the use of clean fuels, which is technically feasible for emergency engines. An economic analysis of the cost effectiveness for emission control was not conducted for use of clean fuels since the use of ULSD is already inherent to the project design and represents "top-case" BACT for emergency engines. The applicant has proposed and MassDEP concurs that the emission limits associated with the use of clean fuels (ULSD) represents BACT for SO_2 and sulfuric acid mist.

Greenhouse Gases

The applicant identified the use of clean fuels as the only technically feasible option for the control of GHG emissions.

The Applicant has determined and MassDEP agrees that the emissions associated with the use of ULSD represent BACT for the emergency stationary CI RICE. Additionally, the operation of the engines will be limited to emergencies, non-emergency situations allowed under the NSPS and for maintenance and testing. All GHG emissions from the Project are also subject to a declining cap. See Condition 20 in Table 13.

Emergency Engine BACT Emission Limits

Upon review, MassDEP determined the specific emergency generator engine and emergency fire pump engine emission limits from 40 CFR 89 and 40 CFR 60 Subpart IIII Table 4 and listed in Table 2, below, represent BACT.

Table 2				
Emergency Diesel Generator Engine BACT Emission Limits				
Pollutant	**EPA Tier 4 Standard (g/kW-hr)**	**Emissions (lbs/hr)**	**Emissions (lb/MMBtu)**	**Emissions (tpy)**
NOx	3.5[1]	4.48		0.67
CO	3.5	4.48		0.67
$PM/PM_{10}/PM_{2.5}$	0.1[1]	0.17		0.03
VOC	0.19	0.24		0.04
SO_2	N/A	0.0075	1.5×10^{-3}	1.1×10^{-3}
H_2SO_4 [3]	N/A	5.78×10^{-4}	1.2×10^{-4}	8.7×10^{-5}
CO_2e	N/A	819	162.85	123
Emergency Fire Pump Engine BACT Emission Limits				
Pollutant	**EPA Tier 3 Standard (g/kW-hr)**	**Emissions (lbs/hr)**	**Emissions (lb/MMBtu)**	**Emissions (tpy)**
NOx	4.0[2]	0.89		0.13
CO	5.0	1.113		0.17
$PM/PM_{10}/PM_{2.5}$	0.30	0.074		0.01
VOC	0.13[3]	0.29		0.04
SO_2	N/A	0.0018	1.5×10^{-3}	2.7×10^{-4}
H_2SO_4 [3]	N/A	1.38×10^{-4}	1.2×10^{-4}	2.1×10^{-5}
CO_2e	N/A	195	162.85	29

1. Tier 4 Alternate FEL Cap limit for generator engines under 40 CFR 1039.104(g), Table 1.
2. Tier 3 limit and 40 CFR 60 Subpart IIII for fire pump engines limit NO_x + NMHC to 4.0 g/kW-hr. Mass emission limits in this row (for NO_x) assume all 4.0 grams/kW-hr are NO_x.
3. Tier 3 and 40 CFR 60 Subpart IIII for fire pump engines do not have a separate VOC limit. The value for 0.13 gram/kW-hr is from the Tier 1 requirements.

Table 2 Key:

CO_2e = Carbon dioxide equivalents
g/kWh = grams per Kilowatt-hour
GHG = Greenhouse gases
lb/hr = pounds per hour
lb/MMBtu = pounds per million British thermal units
NOx = Nitrogen oxides
NMHC = Non-methane hydrocarbons
PM =Particulate matter
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
CO= carbon monoxide
SO_2 = sulfur dioxide
VOC = volatile organic compounds
H_2SO_4 = Sulfuric acid (mist)
tpy = tons per consecutive 12-month

4. Air Quality Impact Analysis

The EPA has promulgated National Ambient Air Quality Standards ("NAAQS") for six air contaminants known as criteria pollutants for the protection of public health and welfare.

MassDEP has promulgated Massachusetts Ambient Air Quality Standards ("MAAQS"), for the same six pollutants, but has not updated the MAAQS recently. The criteria pollutants are nitrogen dioxide, sulfur dioxide, particulate matter, carbon monoxide, ozone, and lead. The NAAQS and MAAQS include both primary and secondary standards of various averaging periods. The primary NAAQS standards are designed to protect public's health against health effects of air pollutants with a margin of safety. The secondary NAAQS standards are designed to protect public welfare, such as damage to property or vegetation.

MassDEP holds that a demonstration of compliance with the NAAQS is sufficient to assure compliance with the MAAQS, except for the annual and 24-hour SO_2 MAAQS, which averaging periods are no longer regulated by the NAAQS.

Pursuant to 310 CMR 7.02(3)(j)1., the emissions limits in MassDEP's approval of the Project must ensure that the emissions from the Project and the Facility do not result in air quality exceeding either the Massachusetts or National Ambient Air Quality Standards.

Under PSD review, new major sources and major modifications of existing sources are required to use air quality dispersion modeling to predict the air quality impact of their new emissions with respect to pollutants subject to PSD review. MassDEP's June 2011 Modeling Guidance for Significant Stationary Sources of Air Pollution establishes thresholds for prescriptive modeling requirements that apply to the Project, regardless of PSD review. Furthermore, for PSD review and for non-PSD pollutants, modeling related to 310 CMR 7.02 Plan Approvals, as the Massachusetts EPA-approved new source review regulation, must conform to 40 CFR 51 Appendix W, "Guideline on Air Quality Models," and associated EPA guidance. Emissions from new major sources and major modification must not cause or contribute to an exceedance of the NAAQS or MAAQS.

The Application includes the analyses required to demonstrate compliance with NAAQS and the MassDEP Ambient Air Toxics Guidelines, as well as an analysis of the offsite consequences of a failure of aqueous ammonia storage. The sections below describe those analyses.

Modeling Approach and Significant Impact Analysis

The Applicant used air quality dispersion modeling analyses to predict ambient air concentrations of criteria air pollutants and air toxics that would result from the Project's emissions of these substances, and compare these predicted concentrations to the corresponding significant impact levels ("SILs"), NAAQS and MAAQS, and MassDEP's Allowable Ambient Levels ("AALs") and Threshold Effects Exposure Limits ("TELs") Guidelines for air toxics. Air quality dispersion modeling uses mathematical formulations to simulate how a pollutant emitted by a source will disperse in the atmosphere to predict concentrations at downwind receptor locations. The modeling analyses were conducted in accordance with EPA's "Guideline on Air Quality Models" (November 2005) and MassDEP's "Modeling Guidance for Significant Stationary Sources of Air Pollution" (June 2011) and as described in the Air Quality Modeling

Protocol submitted to MassDEP on October 13, 2015. MassDEP approved the Modeling Protocol on January 22, 2016.

The Applicant used the EPA-recommended AERMOD model (AERMOD version 15181, AERMAP version 11103, and AERMET version 15181) to perform the dispersion modeling analyses of emissions from a range of operating conditions in an effort to identify the worst case operating conditions, that is, those that result in the highest ambient impact for each pollutant and averaging period.

The Applicant used five years (2008 through 2012) of site-specific meteorological data from nearby Telegraph Hill monitor, which is approximately 2.9 miles south southeast of the proposed project, as well as concurrent surface observations from Barnstable Municipal Airport and upper air data from Chatham Municipal Airport. The five-year period of 2008 through 2012 was chosen because the Telegraph Hill data for the period through 2014 did not meet the data completeness requirements for modeling. In particular, the data recovery of wind direction for the first quarter of 2013 was less than 60 percent.

AERMET and AERSURFACE (version 13016) were employed to prepare the meteorological files. The 30-year precipitation data set used in this modeling was taken from the National Climatic Data Center for Chatham, MA.

The applicant characterized land use within a 3-kilometer radius of the Facility as rural and therefore used rural dispersion coefficients in the dispersion modeling.

The modeling analyses included emissions from all proposed combustion equipment, which consists of the combustion turbine, the emergency generator, and the emergency fire pump. Additionally, the modeling analysis included Canal Station's existing boilers, units 1 and 2, emergency generators 1 and 2, the existing emergency fire pump, and the existing gas heater. Modeling for the Project was conducted in a manner that used the worst-case operating conditions for the proposed new combustion turbine in combination with the ancillary sources impacts in an effort to predict the highest impact for each averaging period. The Project is requesting a permit that will allow up to 4,380 hours per year of operation for the new simple-cycle turbine. Turbine operation could range from up to 4,380 hours per year on natural gas alone to 3,660 hours per year on natural gas and 720 hours per year on ULSD. However, the modeling analyses conservatively assumed the CTG would operate up to 1,440 hours per year on ULSD.

The Applicant evaluated emissions associated with three operating loads (30-40%, 75%, and 100%) at five ambient temperatures (0°F, 20°F, 50°F, 59°F, and 90°F). For each turbine load, the highest pollutant-specific emission rate paired with the lowest exhaust temperature and exhaust flow rate was selected. The proposed combustion turbine will be operated as a peaking unit; therefore, in addition to estimating the steady-state operational impacts, the proposed new combustion turbine's startup / shutdown conditions were also included in the emissions modeling for the pollutants that have short-term standards (SO_2, PM_{10}, $PM_{2.5}$, NO_2, and CO). The

modeling was based on an hourly emission profile, which includes one startup and one shutdown event.

The first part of the analysis was to predict which pollutants at which averaging times have more than a 'significant' impact on air quality. To identify new pollution sources with the potential to alter significantly ambient air quality, the EPA and MassDEP have adopted "significant impact levels" for the criteria pollutants except ozone and lead. If the predicted impact of the new or modified emission source is less than the SIL for a particular pollutant and averaging period, and the difference between background ambient air quality and the NAAQS is greater than the SIL, then no further evaluation is needed for that pollutant and averaging period. However, if the predicted impact of the new or modified emission source is equal to or greater than the SIL for a particular pollutant and averaging period, then further impact evaluation is required. This additional evaluation must include measured background levels of pollutants, as well as emissions from both the proposed new or modified source and any existing emission sources that may interact with emissions from the proposed new emissions source (referred to as cumulative modeling).

Table 3 presents the maximum predicted ambient air quality impact concentrations for the new sources at the Project. The analysis predicted that maximum ambient air quality impact concentrations from new sources at the Project are below SILs for all pollutants and averaging periods, except for the 1-hour NO_2, the 24-hour PM_{10}, and the 24-hour $PM_{2.5}$ NAAQS.

Table 3

Results of Significant Impact Level Analysis

Criteria Pollutant	Averaging Period	Significant Impact Level (µg/m^3)	Maximum Predicted Project Impact (new sources only) (µg/m^3)	Less than the SIL?
NO_2	Annual	1	0.71	Yes
	1-hour[2]	7.5	**53.35**	**No**
SO_2	Annual	1	0.0037	Yes
	24-hour	5	0.4	Yes
	3-hour	25	0.64	Yes
	1-hour[2]	7.8	0.61	Yes
$PM_{2.5}$	Annual[3]	0.3	0.05	Yes
	24-hour[4]	1.2	**8.25**	**No**
PM_{10}	Annual	1	0.06	Yes
	24-hour	5	**11.98**	**No**
CO	8-hour	500	45.31	Yes
	1-hour	2,000	197.57	Yes

Table 3 Key:

µg/m^3 = micrograms per cubic meter
CO = Carbon monoxide

NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
SIL = Significant Impact Level
SO_2 = Sulfur dioxide

Table 3 Notes:

1. For comparison with the Significant Impact Levels, all predicted concentrations are the maximum at any receptor in any single year, except as noted below.
2. High 1st High daily maximum 1-hr concentrations averaged over 5 years.
3. Maximum annual concentrations averaged over 5 years.
4. High 1st High maximum 24-hour concentrations averaged over 5 years.

Cumulative Dispersion Modeling

Existing Facility Sources

The Applicant used air dispersion modeling (AERMOD v. 15181) to assess the air quality impacts from the entire Facility, all pollutants over all averaging times, including both the existing emission sources and all proposed new emission sources. The predicted impacts were then added to monitored background air quality.

NRG operates an ambient monitoring station, Shawme Crowell Monitoring Station, in Shawme Crowell State Park, which is located approximately 1 mile southwest of the Project site. The Shawme Crowell monitoring site is a source specific location designed to capture impacts from the existing Canal Station, and was put into operation to provide data on the existing air quality conditions near the Station. This monitor measures concentrations for SO_2, NO_2, PM_{10}, and $PM_{2.5}$. For background concentrations of CO and lead (Pb), the Francis School monitor in East Providence, which is located 43.6 miles to the west-northwest of the Project site was used.

There are no major sources of emissions within 5 kilometers of Canal Station, so interactive modeling to assess the cumulative impact of additional sources was not necessary.

The results of the cumulative Facility impact analysis, presented in the table below, show that the Facility's worst-case emissions from the proposed new emission sources in combination with emissions from the existing Facility sources plus measured background levels did not result in concentrations that exceeded the applicable NAAQS.

Table 4						
Results of Cumulative Impact Analysis of the Facility						
Criteria Pollutant	**Averaging Period**	**Predicted Facility Impact (µg/m^3)**	**Background (µg/m^3)**	**Predicted Facility Impact plus Background (µg/m^3)**	**Primary/ Secondary NAAQS (µg/m^3)**	**Less than Primary/ Secondary NAAQS?**
NO_2	Annual[1, 6] 1-hour[2]	10.04 91.23	15 40	25.04 131.23	100/100 188/None	Yes/Yes Yes/NA
SO_2	Annual[1, 3, 6] 24-hour[3, 4] 3-hour[4] 1-hour[5]	4.2 45.92 133.79 128.33	5 12 58 22	9.2 57.92 191.79 150.33	80/None 365/None None/1,300 196/None	NA/NA NA/NA NA/Yes Yes/NA
$PM_{2.5}$	Annual[7] 24-hour[8]	0.79 3.87	5 11	5.79 14.87	12/15 35/35	Yes/Yes Yes/Yes
PM_{10}	Annual [3, 6] 24-hour[9]	1.01 8.71	9 23	10.01 31.71	50/50 150/150	Yes/Yes Yes/Yes
CO	8-hour[4] 1-hour[4]	167.86 678.94	1,495 2,346	1,662.86 3,024.94	10,000/None 40,000/None	Yes/NA Yes/NA
Pb[10]	3-month rolling	0.00228	0.01	0.012	0.15/ 0.15	Yes/Yes

Table 4 Key:

CO = Carbon monoxide
µg/m^3 = micrograms per cubic meter
NAAQS = National Ambient Air Quality Standards
NO_2 = Nitrogen dioxide
NA = Not applicable
Pb = Lead
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
SO_2 = Sulfur dioxide

Table 4 Notes:

1. Not to be exceeded.
2. Compliance based on 3-year average of the 98th percentile of the daily maximum 1-hour average concentration. The 1-hour NO_2 standard was effective April 12, 2010.
3. The Environmental Protection Agency has revoked that the 24-hour and annual average primary standards for SO_2 and annual PM_{10}
4. Not to be exceeded more than once per year.
5. Compliance based on 3-year average of 99th percentile of the daily maximum 1-hour average concentration.
6. Annual mean.
7. Compliance based on 3-year average of weighted annual mean $PM_{2.5}$ concentrations.
8. Compliance based on 3-year average of 98th percentile of 24-hour concentrations.
9. Not to be exceeded more than once per year on average over 3 years.
10. Compliance with the Air Toxics Threshold Effects Exposure Limit (see Table 5-A), which is based on a 24-hour averaging period was used to conservatively determine compliance with the Pb NAAQS standards, which are

based on a longer 3-month averaging period. The background data for Pb is based on a 3-month averaging period as determined from PM-10 sample data.

Air Toxics Analysis

MassDEP has established health based ambient air guidelines for a variety of toxic air contaminants. These air guidelines establish two limits for each air toxic listed: an Ambient Air Level ("AAL"), which is based on an annual average concentration; and a Threshold Effect Exposure Limit ("TEL"), which is based on a 24-hour time period. In general, AALs represent the concentration associated with a one in one million excess lifetime cancer risk, assuming a lifetime of continuous exposure to that concentration. The TELs protect the general population from non-cancer health effects. For air toxics that do not pose cancer risks, the AAL is equal to the TEL.

Tables 5-A and 5-B present the projected maximum impacts for each air toxic that will potentially be emitted by the Project's new emission sources for which a TEL (Table 5-A) or AAL (Table 5-B) has been established. The worst-case emission scenarios were used to predict these maximum impacts. As shown in Tables 5-A and 5-B, the Project's maximum predicted ambient air quality impact concentrations were below applicable AALs and TELs for all of the air toxics modeled.

Table 5-A

Predicted Air Toxics Impacts

Pollutant	TEL ($\mu g/m^3$)	Maximum Predicted Project Impact (Proposed plus existing sources) ($\mu g/m^3$)	Less than TEL?
Acetaldehyde	30	2.44E-02	Yes
Acrolein	0.07	3.06E-03	Yes
Ammonia	100	2.14E+00	Yes
Antimony	0.02	3.28E-03	Yes
Arsenic	0.003	1.01E-03	Yes
Benzene	0.6	3.61E-02	Yes
Beryllium	0.001	2.78E-05	Yes
1,3-Butadiene	1.20	5.00E-03	Yes
Cadmium	0.002	1.20E-03	Yes
Chromium (metal)	1.36	7.72E-03	Yes
Chromium (VI) Compounds	0.003	2.43E-04	Yes
Copper	0.54	1.84E-03	Yes
o-Dichlorobenzene	81.74	1.04E-03	Yes
p-Dichlorobenzene	122.61	1.04E-03	Yes
Ethylbenzene	300	8.00E-03	Yes
Formaldehyde	2.0	1.7E-01	Yes
Hydrogen Chloride	7	2.26E-01	Yes
Hydrogen Fluoride	0.68	2.49E-02	Yes
Lead	0.14	2.28E-03	Yes
Mercury (elemental)	0.14	2.99E-04	Yes

Table 5-A Predicted Air Toxics Impacts			
Pollutant	**TEL ($\mu g/m^3$)**	**Maximum Predicted Project Impact (Proposed plus existing sources) ($\mu g/m^3$)**	**Less than TEL?**
Mercury (inorganic)	0.14	2.99E-04	Yes
Naphthalene (including 2-methylnaphthalene)	14.25	1.25E-02	Yes
Nickel (metal)	0.27	5.73E-02	Yes
Nickel Oxide	0.27	7.29E-02	Yes
Phosphoric Acid	0.27	1.90E-02	Yes
Propylene Oxide	6	8.39E-02	Yes
Selenium	0.54	5.21E-04	Yes
Sulfuric Acid	2.72	2.43E+00	Yes
Toluene	80	4.76E-02	Yes
1,1,1-Trichloroethane	1038.37	1.50E-04	Yes
Vanadium	0.27	2.18E-02	Yes
Vanadium Pentoxide	0.14	3.90E-02	Yes
Xylenes (m-,o-,p- isomers	11.80	2.18E-02	Yes

Table 5-A Key:

$\mu g/m^3$ = micrograms per cubic meter
TEL = Threshold Effects Exposure Limits

Table 5-A notes:

Proposed project alone impacts were based on either 24-hrs/day of operation on gas or ULSD for the combustion turbine, plus 1-hr/day for the emergency engine and firewater pump. The Project impacts were then combined with existing sources assuming oil firing in Canal Station Units 1 and 2.

Table 5-B Predicted Air Toxics Impacts				
Pollutant	**AAL ($\mu g/m^3$)**	**Maximum Predicted Project Impact (Proposed plus existing sources) ($\mu g/m^3$)**		**Less than AAL?**
		Natural Gas only	**Natural Gas & Oil**	
Acetaldehyde	0.4	1.50E-03	1.47E-03	Yes
Acrolein	0.07	1.88E-04	1.82E-04	Yes
Ammonia	100	3.32E-02	3.34E-02	Yes
Antimony	0.02	2.35E-04	2.35E-04	Yes
Arsenic	0.0003	8.37E-05	8.37E-05	Yes
Benzene	0.1	2.36E-03	2.40E-03	Yes
Beryllium	0.0004	2.71E-06	2.71E-06	Yes
1,3-Butadiene	0.003	7.20E-05	8.46E-05	Yes
Cadmium	0.0002	1.53E-04	1.53E-04	Yes

Table 5-B Predicted Air Toxics Impacts				
Pollutant	**AAL ($\mu g/m^3$)**	**Maximum Predicted Project Impact (Proposed plus existing sources) ($\mu g/m^3$)**		**Less than AAL?**
		Natural Gas only	**Natural Gas & Oil**	
Chromium (metal)	0.68	2.59E-04	2.76E-04	Yes
Chromium (VI) Compounds	0.0001	2.35E-05	2.35E-05	Yes
Copper	0.54	1.83E-04	1.83E-04	Yes
o-Dichlorobenzene	81.74	1.47E-04	1.47E-04	Yes
p-Dichlorobenzene	0.18	1.47E-04	1.47E-04	Yes
Ethylbenzene	300	8.33E-05	5.69E-05	Yes
Formaldehyde	0.08	1.34E-02	1.34E-02	Yes
Hydrogen Chloride	7	1.62E-02	1.62E-02	Yes
Hydrogen Fluoride	0.34	1.79E-03	1.79E-03	Yes
Lead	0.07	1.36E-04	1.39E-04	Yes
Mercury (elemental)	0.07	3.69E-05	3.69E-05	Yes
Mercury (inorganic)	0.01	3.69E-05	3.69E-05	Yes
Naphthalene (including 2-methylnaphthalene)	14.25	3.46E-04	3.73E-04	Yes
Nickel (metal)	0.18	4.06E-03	4.07E-03	Yes
Nickel Oxide	0.01	5.17E-03	5.18E-03	Yes
Phosphoric Acid	0.27	1.36E-03	1.36E-03	Yes
Propylene Oxide	0.3	8.39E-03	8.37E-03	Yes
Selenium	0.54	3.41E-05	3.43E-05	Yes
Sulfuric Acid	2.72	1.74E-01	1.74E-01	Yes
Toluene	5.31	1.90E-03	1.80E-03	Yes
1,1,1-Trichloroethane	1038.37	1.07E-05	1.07E-05	Yes
Vanadium	0.27	1.71E-03	1.71E-03	Yes
Vanadium Pentoxide	0.03	3.04E-03	3.04E-03	Yes
Xylenes (m-,o-,p- isomers	11.80	7.76E-04	7.23E-04	Yes

Table 5-B Key:

$\mu g/m^3$ = micrograms per cubic meter
AAL = Ambient Air Level

Table 5-B notes:
Annual Project impacts shown include both fuel scenarios, i.e. either 4,380 hours of gas firing or 2,940 hours gas firing and 1,440 hours firing ULSD in the combustion turbine plus 300 hours for the emergency engine and firewater pump. Annual Project impacts were then also combined with existing sources assuming oil firing in Units 1 and 2 (existing boilers).

Preconstruction Monitoring Analysis

As described in the "Cumulative Dispersion Modeling" section above, the Applicant used ambient background monitoring data from Shawme-Crowell Monitoring Station, in Shawme-Crowell State Park and from the Francis School Monitor in East Providence. For non-PSD

pollutants, MassDEP Guidance states, "a technical justification for the background air quality concentrations should be provided."

The Shawme-Crowell monitor is a source specific location designed to capture impacts from the existing Canal Station. This monitor was used to provide the data for SO_2, NO_2, PM_{10}, and $PM_{2.5.}$ The East Providence monitor site, which was used to provide background data for CO is conservative because it is affected by more development, since it is in a more urban environment than Sandwich.

Accidental Release Modeling of Aqueous Ammonia (NH_3)

The Project's SCR system will use aqueous ammonia as the reducing agent to control NOx emissions from the combustion turbine. A 19% solution of aqueous ammonia is currently stored in two (2) aboveground 60,000-gallon single-walled steel tanks, each located within their own concrete containment structure designed to contain 110 percent of the volume of the tank. In order to minimize the exposed surface area of any aqueous NH_3 that enters the diked area, passive evaporative controls (plastic spheres) are located in each diked area to reduce the surface area by 90%. To minimize the potential impacts of an accidental NH_3 release, it is planned to install a structure to enclose the two tanks and diked area. In the event of a tank failure, the structure to enclose the tanks and diked area will be ventilated to the atmosphere through a roof vent.

The same AERMOD dispersion model used to predict Facility impacts for comparison with the SILs and NAAQS was used for this analysis. Modeling was used to identify the maximum NH_3 concentration using release conditions assuming a full failure of one of the NH_3 storage tanks. A comparison of the maximum predicted concentration to applicable levels and thresholds was made.

The concentrations of NH_3 predicted at the fence line and nearby locations are compared against the American Industrial Hygiene Association ("AIHA") Emergency Response Planning Guideline Levels (EPRG), EPRG-1, 25 ppm (17,414.1 µg/m 3), and EPRG-2, 150 ppm (104,484.7 µg/m). The EPRG-1 is defined as "the maximum airborne concentration below which nearly all individuals could be exposed to for up to 1 hour without experiencing other than mild, transient adverse health effects or perceiving a clearly defined objectionable odor. The EPRG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms, which could impair an individual's ability to take protective action."

The AERMOD modeling assumed a release from the complete failure of one of the aqueous NH_3 tanks inside the structure. The maximum-modeled impact of 4,275.5 µg/m^3 is less than the EPRG-1 and EPRG-2 at all locations at or beyond the Station fence line. The maximum 1-hour concentration is predicted at a fence-line receptor; therefore, there are no residences or sensitive

receptors that would be subject to NH_3 concentrations approaching the EPRG thresholds. Therefore, the storage plans for aqueous NH_3 adequately minimize the potential impacts at and beyond the fence line of Canal Generating Station in the event of the complete failure of an aqueous NH_3 tank.

5. Sound

Background sound level survey data was obtained for seven short-term (ST) locations representing the nearest receptor locations in all relevant directions from the Project. Additionally, two monitors were positioned on site to document diurnal variation of noise levels.

Background sound data for all of the short-term locations except ST7 are based on ambient sound measurements made on December 15-16, 2014. The weather conditions during these measurements were seasonal and were suitable for ambient sound measurements. The conditions varied from an air temperature of 40 °F, sunny sky, and light breeze from the northwest during the day to an air temperature of 33°F, overcast sky, and slight breeze from the northwest during the night. Data for ST1, ST2, and ST3 were measured manually over 15 minute intervals during the day and night using a hand-held Rion Model NA-28 Class 1 Precision Sound Level Meter and Octave Band Analyzer. The daytime measurements were made between 11 AM and 3:30 PM, and the nighttime measurements were made between 11 PM and 2 AM.

Background sound data for ST4, ST5, and ST6 are based on continuous 24-hr measurement data from approximately noon on December 15, 2014 to noon on December 16, 2014. Rion Model NL-52 Class 1 Precision Sound Level Meters were programmed to collect overall A-weighted sound levels and spectral data (1/3-octave band sound pressure levels) and to store statistical values (L1, L10, L50, L90, and Leq) at 15-minute intervals. These continuous monitors characterized the variation in the residual (L90) ambient sound levels at ST4, ST5, and ST6 during the daytime and nighttime periods. The microphone for each continuous monitor was fitted with a windscreen and mounted on a tripod at a nominal height of 4 ft.

For the December 15-16, 2014 surveys, both the hand-held and continuous monitors were laboratory-calibrated within the past year and their calibrations were checked with an acoustic calibrator in the field both before and after the surveys.

Background sound data (nighttime levels) for ST-7 are based on ambient sound measurements made on June 12, 2015, from 12:30 AM to 1 AM. The weather conditions were clear with light winds and were suitable for ambient sound measurements. The air temperature was in the range of 65°F. A sound level analyzer meeting the requirements of ANSI S1.4-1983 and ANSI S1.43-1997 for precision Type 1 sound level analyzers was used. The microphone was fitted with a windscreen. All one-third octave band measurements included the frequencies from 16 Hz through 16,000 Hz. The sound level analyzer was calibrated in the field immediately before and after the measurement period. As required by ANSI S12.9/Part 3, a precision calibrator that complies with the accuracy requirements of ANSI S1.40 was utilized.

The impact of Facility sound emissions on ambient sound levels was modeled using the Cadna/A noise calculation software (DataKustik Corporation, 2015). The outdoor noise propagation model is based on ISO 9613, Part 1: "Calculation of the absorption of sound by the atmosphere," (1993) and Part 2: "General method of calculation," (1996).

ISO 9613 was used to calculate propagation and attenuation of sound energy with distance, surface and building reflection, and shielding effects by barriers, buildings, and ground topography. Offsite topography was determined using USGS digital elevation data for the study area. Model predictions are accurate to within ±1 dB of calculations based on the ISO 9613 standard.

Table 6, below, provides a summary of the predicted nighttime sound level impacts predicted from 100% load operation of the Project:

Table 6

Predicted Nighttime Sound Level Impacts of the Project (dBA)

Receptor ID	Measured Ambient (No units operating)[1]	CTG plus Ambient		Cumulative – CTG, both existing boilers plus Ambient	
		Modeling Results	Increase Above Background[2]	Modeling Results	Increase Above Background[2]
ST1	41	47	6	50	9
ST2	40	47	7	50	10
ST3	40	43	3	46	6
ST4	36	39	3	43	7
ST5	33	35	2	42	9
ST6	34	39	5	42	8
ST7	39	41	2	49	10

Table 6 Key:

dBA = Decibel A weighted
CTG = Combustion turbine generator
ID = identifier

Table 6 Notes:

1. The background levels observed where the sound level is exceeded 90 percent of the time (L_{90}).
2. MassDEP Noise regulation prohibits unnecessary sound emissions that cause noise. MassDEP Policy 90-001 establishes a sound level increase of 10 dBA over the ambient L_{90} level or pure tone conditions or tonal sounds, defined as any octave band level that exceeds the levels in adjacent octave bands by 3 dBA or more, as indicators of a condition of noise.

The cumulative impacts from the simultaneous operation of the proposed combustion turbine generator and both Units 1 and 2 at the existing Canal Station will meet the 10 dBA threshold contained in MassDEP's Noise Policy at all monitoring locations. In order to meet the 10-dBA threshold contained in MassDEP's Noise Policy, noise mitigation will be included for Canal Station Units 1 and 2. The noise mitigation for Units 1 and 2 may include lagging or partial enclosures for the Units 1 and 2 hopper vibrator systems, refurbishment of lined inlet and noise baffling system for Unit 2 forced draft fans, and noise barrier walls for the Units 1 and 2 service and main transformers.

The Town of Sandwich Bylaws (Section 3.55 Noise) includes a noise nuisance clause and an accompanying complaint resolution procedure, but do not stipulate numerical dB limits. The Town of Sandwich Zoning Bylaw (Section 3420 Noise) limits construction hours to between 7 a.m. and 7 p.m., except as allowed by permit. No numerical dB limits apply to construction activity.

Reasonable efforts will be made to minimize the impact of noise resulting from construction activities. The following is a list of planned noise mitigation measures.

- Construction activities that produce significant noise will be limited to the daytime hours listed in the Town of Sandwich Zoning Bylaw.
- Construction equipment will be well maintained and vehicles using internal combustion engines equipped with mufflers will be routinely checked to ensure they are in good working order.
- Quieter-type adjustable backup alarms will be used for vehicles.
- Portable noise barriers and enclosures will be used when appropriate.
- Noisy equipment on-site will be located as far from possible from sensitive areas.
- A noise complaint hotline will be made available to address any noise-related issues.

Based on the results of the noise assessment, a comprehensive set of noise mitigation measures has been incorporated into the design of the Project to minimize noise impacts. The principal noise mitigation measures that will be incorporated into the Project design are as follows:

- increased casing thickness for the SCR and an acoustic shroud that will envelop the exhaust gas diffuser and the transition duct from the GT exhaust to the SCR casing;
- additional exhaust silencing to reduce stack outlet noise;
- enclosures around the gas turbine, lube oil skid, and generator;
- lowered height of the tempering air fan inlet plenum box from 50 feet above grade to 35 feet above grade;
- orientation of the tempering air inlet away from sensitive receptor locations;
- a noise barrier near the tempering air fans;
- low-noise fans for the cooling module, with a noise barrier near the module;
- acoustically treated walls for the fuel gas compressor enclosure;
- low-noise generator step-up transformer; and
- turbine inlets equipped with an 8-foot silencer with an acoustically lined weather hood.

Additional sound mitigation was evaluated, which included adding a larger CTG building that encloses the entire SCR and exhaust diffuser, and addition of fin fan cooler baffle silencers. The estimated incremental cost over the proposed acoustic controls is in excess of 7 million dollars. This additional mitigation would provide up to 3-dBA additional sound impact reduction at some receptors but only 1 dBA reduction in the more populated area of Town Neck, east of the Project. A 3-dBA increase in sound is typically considered the threshold of hearing for the average person and a 1-dBA change in sound would be unperceivable.

Post-construction noise monitoring will be conducted to demonstrate compliance with the noise impact analysis results. This will include near-field measurements of sound levels from major equipment sources and at the Property boundary. This will enable isolation of sound contributions from the Project and existing Units 1 and 2, without interference from variable non-Project-related sources. The measured near-field sound levels will be used to confirm compliance with the noise impact analysis levels.

6. Applicable Regulations

New Source Performance Standards

The NSPS at 40 CFR part 60 subpart KKKK – "Standards of Performance for Stationary Combustion Turbines," apply to stationary combustion turbines with a heat input rating greater than or equal to 10 MMBtu/hr, and which commenced construction, reconstruction, or modification after February 18, 2005. Therefore, 40 CFR part 60 subpart KKKK, applies to the proposed combustion turbine at the Project.

The Applicant will comply with all applicable emission standards, monitoring, record keeping, and reporting requirements of Subpart KKKK.

The NSPS allows the turbine owner or operator the choice of either a concentration based or output based NOx emission standard. The concentration-based standard is in units of ppmvd at 15% O_2. The output based emission standard is in units of mass emissions per unit of useful recovered energy, lb/MW-hr. The applicable NOx emission standards for the turbine are 15 ppmvd at 15% O_2 or 0.43 lb/MW-hr. The Permittee will comply with these limits by using dry-low-NOx combustion technology during natural gas firing and combustor water injection during ULSD firing. In addition, during the firing of either natural gas or ULSD, the turbine will be equipped with SCR to control NOx emissions in the combustion turbine exhaust.

Subpart KKKK SO_2 emissions standard is the same for all turbines located in the continental area regardless of size or fuel type. Subpart KKKK prohibits the discharge into the atmosphere of any gases that contain SO_2 in excess of 0.90 lb/MW-hr gross energy output. The owner or operator of the turbine can choose to comply with either the SO_2 limit or the limit on the sulfur content of the fuel burned. The applicable fuel sulfur content limit is 0.060 lb SO_2/MMBtu heat

input. The Project will meet the applicable subpart KKKK SO_2 standards by using pipeline natural gas (no greater than 0.0015 lb SO_2/MMBtu) and ULSD (no greater than 0.0015 lb SO_2/MMBtu).

The Project is subject to the NSPS at 40 CFR part 60 subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units because the stationary combustion turbine has a base load heat input rating greater than 250 MMBtu/hr and because the Project is capable of generating greater than 25 MW of electricity.

The emergency generator engine and emergency fire pump engine serving the Project are both subject to the NSPS under 40 CFR part 60 subpart IIII – "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines." Subpart IIII requires emergency generator engines to meet the non-road engine emission standards identified in 40 CFR part 89, sections 89.112 and 89.113. The emergency fire pump engine is subject to the emission standards identified in Subpart IIII, Table 4. Subpart IIII requires engine manufacturers to produce engines that comply with these standards. The Permittee will install and operate an emergency generator engine and an emergency fire pump engine that comply with the Subpart IIII requirements.

The Applicant will comply with all applicable emission standards, operating restrictions, monitoring, recordkeeping, and reporting requirements of Subpart IIII for the emergency generator engine and emergency fire pump engine.

National Emission Standards for Hazardous Air Pollutants

Canal Station is an existing major source of HAP emissions; therefore, the Project includes an affected facility with respect to 40 CFR part 63 subpart YYYY for Stationary Combustion Turbines, which was promulgated on March 5, 2004. On August 18 2004, USEPA stayed the effectiveness of the subpart YYYY emission and operating limitations for lean-premixed gas fired and diffusion flame gas-fired combustion turbines, which includes units that fire oil less than 1,000 hours per calendar year[7]. Since the Project is proposing to fire no more than 720 hours of oil in any calendar year, the stay is applicable to the Project.

Under this stay, new sources in the in the lean premix gas-fired turbines and diffusion flame gas-fired turbines subcategories, sources constructed or reconstructed after January 14, 2003, are temporarily relieved of the obligation to apply pollution controls and to comply with associated operating, monitoring, and reporting requirements. However, such sources must continue to submit Initial Notifications pursuant to 40 CFR part 63 section 63.6145.

As of this date, EPA has not made a final decision on deleting these subcategories. Even though the emission and operating limitations of Subpart YYYY do not apply to the Project, the Project

7 Federal Register Vol. 69, No. 159, page 51184.

will be equipped with a lean pre-mix combustor for natural gas firing that effectively limits products of incomplete combustion such as formaldehyde. In addition, the proposed oxidation catalyst will control formaldehyde emissions in the turbine exhaust, when firing either natural gas or ULSD.

National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, at 40 CFR part 63 subpart ZZZZ, applies to emergency and non-emergency engines at major and area sources of HAP emissions. Both the emergency generator engine and the emergency fire pump engine are RICE units that must comply with Subpart ZZZZ. Per 40 CFR part 63 section 63.6590(c), for new stationary emergency engines that began construction or reconstruction after June 12, 2006, compliance with subpart ZZZZ is satisfied if the engines comply with the NSPS requirements under 40 CFR part 60 Subpart IIII. The Permittee will install emergency generator and fire pump engines that comply with Subpart IIII.

Allowance Trading

Emission allowance programs are market based air quality regulatory programs for which particular classes of emission sources are required to obtain, secure, and/or hold a sufficient number of allowances to cover the Project's actual reported emissions. One allowance equals one ton of emissions. At specified intervals, "true-up" occurs, at which time allowances in the Permittee's account are surrendered to cover actual emissions over a specified period. The true-ups may be on a facility-wide basis, for emissions from all subject emission units at the facility.

The Project is subject to emission allowance trading programs for SO_2 (federal acid rain program) and CO_2 (Regional Greenhouse Gas Initiative, or RGGI). True-up for annual SO_2 emissions is required annually. True-up for CO_2 emissions is required every three years. A partial true-up for CO_2 emissions is required annually.

The existing steam-electric units at Canal Station were subject to ozone season NOx allowance requirements under 310 CMR 7.32 – the Massachusetts Clean Air Interstate Rule (Mass CAIR). In January 2015, the federal Clean Air Interstate Rule program ended and thus the Mass CAIR program ended as well. However, MassDEP requires affected facilities (including Canal's existing units) to continue to monitor and report NOx mass emissions and heat input date to the EPA and report ozone season net output data to MassDEP. The new CTG unit is not subject to these provisions, *per se*.

The federal Acid Rain program requires monitoring and reporting of actual facility emissions of SO_2, NOx, and CO_2 pursuant to documented monitoring plans and the applicable provisions of 40 CFR part 75.

Table 7, below, contains the Permittee's applicable allowance programs for each pollutant and the applicable regulation covered in this Plan Approval.

Table 7			
Applicable Allowance Programs			
Pollutant	**Program**	**Applicable Regulations**	**Required Submittals**
SO_2	Acid Rain Program (ARP)	40 CFR Parts 72, 73, and 75	Phase II Acid Rain Permit Application 24 months to EPA before commencement of operation
NO_x	NOx Ozone Season Clean Air Interstate Rule (CAIR)[1]	310 CMR 7.32 (for monitoring and reporting)	Monitor and report NOx mass emissions and applicable supporting parameters to the EPA and report ozone season net output data to MassDEP.
CO_2	Regional Greenhouse Gas Initiative CO_2 Budget Trading Program	310 CMR 7.70	CO_2 Budget Emission Control Plan 12 months before commencement of operation

Table 7 Key:

CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CO_2 = Carbon dioxide
EPA = Environmental Protection Agency
NOx = Nitrogen oxides
SO_2 = Sulfur dioxide

Table 7 Notes:

1. 310 CMR 7.32 is presently enforced as the state-level "SIPNOX" program, per MassDEP's correspondence dated December 31, 2014 and May 29, 2015. Ozone season NOx emission trading requirements for new units may terminate upon MassDEP's pending issuance of 310 CMR 7.34: Massachusetts NOx Ozone Season Program (MassNOx).

7. Public Participation

On January 5, 2017, MassDEP issued a Proposed Plan Approval and Draft Prevention of Significant Deterioration (PSD) Permit and a PSD Fact Sheet for this Application. Issuance of the Proposed Plan Approval and Draft PSD Permit begins a public comment period that will continue until Thursday February 9, 2017. MassDEP will hold a public hearing on the proposed actions on Wednesday, February 8, 2017 at 7:00 PM at Sandwich Town Hall, 130 Main Street in Sandwich, Massachusetts. MassDEP published the Notice of Public Hearing and Public Comment Period in The Environmental Monitor, the Cape Cod Times, and the Boston Globe. Copies of Canal 3's applications for a Plan Approval and a PSD Permit, as well as the Proposed Plan Approval, Draft PSD Permit and PSD Fact Sheet are available at:

- Websites of the MassDEP Public Events and Hearing Calendar
- NRG's website www.canalnewgeneration.com/
- The Security Guard building at Canal Station,
- By contacting MassDEP

Oral and written testimony received at the public hearing and written comments received during the public comment period will be considered before the issuance of any final Plan Approval or PSD Permit).

8. Environmental Justice

Title VI of the federal Civil Rights Act of 1964 applies to all recipients of federal financial assistance. The Executive Office of Energy and Environmental Affairs (EOEEA) is a recipient of federal financial assistance for the administration of MassDEP's air pollution control program. Section 601 of Title VI provides that:

> No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving federal financial assistance.

To comply with Title VI of the Civil Rights Act, on October 2, 2002, EOEEA adopted an Environmental Justice Policy (EJ Policy) that requires the Department to make environmental justice an integral consideration in the implementation and enforcement of laws, regulations, and policies. The Policy bases environmental justice on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. Environmental justice is the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies, and the equitable distribution of environmental benefits.

The nearest Environmental Justice (EJ) community is located to the west of the Project site, in Onset MA, approximately 7.5 miles from the project. Although the Project exceeds an Environmental Notification Form threshold for air, it is not located within five miles of an EJ community; therefore, EOEEA concluded that the project is not subject to the requirements of EOEEA's Environmental Justice Policy. Details on the requirements of the Environmental Justice Policy can be found on the internet here:
http://www.mass.gov/eea/agencies/massdep/service/justice/

Even though the Project is not subject to the requirements of EOEEA's Environmental Justice Policy, the Applicant has developed a comprehensive communications plan that includes a number of approaches designed to keep local residents, abutters, businesses and Town of Sandwich officials updated on significant construction milestones and schedules related to the expansion of the Facility. These approaches include:

- **Electronic mail** - As part of public outreach during the permitting process, the Company developed e-mail lists to reach specific targeted audiences, including direct abutters, nearby neighbors within 1 mile, local businesses and key external stakeholders. These lists will be used to deliver targeted traffic and construction messages to affected audiences during the construction phase of the Project.

- **Mailings** – as part of initial communications announcing and describing the Proposed Facility, the Company developed and utilized mailing lists to communicate information on public hearings related to the Project. Those lists will be utilized to provide traffic, parking, delivery and construction related updates and notifications during the next phase of Project development.
- **Website** – The Company has established a website at www.canalnewgeneration.com that will be updated as appropriate. From the website, visitors will see the latest information, and can download a printable fact sheet. The website has a provision for visitors to sign up for periodic emails, as well as renderings of how the station will look before and after completion of the Project. The website is being promoted through local media via announcements, emails, and phone calls to working journalists and media outlets as well as advertising in selected local publications.
- **Routine updates with Town of Sandwich officials** – The Company has established routine communication networks with local officials including traffic, fire, police and others regarding the Project particularly concerning traffic management, construction, delivery, noise and all other potential issues of concern to the Town and residents during the construction phase.

9. Section 61 Findings (MEPA)

MassDEP carefully considered the Applicant's Final Environmental Impact Report ("FEIR") prior to taking action on its Comprehensive Plan Application. MassDEP, in issuing this Proposed Plan Approval, requires the Permittee to use all feasible means and measures to avoid or minimize adverse environmental impacts. Measures MassDEP deems necessary to mitigate or prevent harm to the environment that are related to air quality or GHG emissions are included as enforceable conditions in this Plan Approval and are listed in Section 14, below. MassDEP made its decision under applicable law based on a balancing, where appropriate, of environmental and socioeconomic objectives, as mandated by 301 CMR 11.01(4).

In the issuance of this Plan Approval, MassDEP considered the reasonably foreseeable climate change impacts, including GHG emissions and effects as addressed in the FEIR through the MEPA Greenhouse Gas Emissions Policy and Protocol and the GHG emission mitigation / adaptation measures adopted by the Applicant in the FEIR as referenced in the Secretary's Certificate of finding on the FEIR, dated August 26, 2016 (EEA #15407).

Pursuant to M.G.L. Chapter 30 Section 61 of the Massachusetts Environmental Policy Act, (MEPA), 301 CMR 11.12 of the MEPA regulations, and the Secretary's Certificate of finding on the FEIR, MassDEP's Section 61 Findings on the Project determining that all feasible measures have been taken to avoid or minimize impacts to the environment are presented in Section 14, below.

Summary of Section 61 Findings

With respect to air quality, the Project will implement of Best Available Control Technology and Lowest Achievable Emission Rates, by using state-of-the-art equipment and control technology and by using natural gas and ultra-low sulfur diesel, the cleanest burning fossil fuels available. Emissions of NO_x will be controlled using dry-low NOx combustors and SCR during natural gas firing and water injection and SCR during ULSD firing. CO and VOC emissions will be controlled with an oxidation catalyst system. Emissions of other criteria pollutants will be controlled by using low-sulfur fuels and best combustion practices. The Project will offset its NOx emissions by using offsets. The Project will also surrender CO_2 and SO_2 allowances under the RGGI and the federal Acid Rain Program, respectively. The Project will have a continuous emission monitoring system for NOx and CO to ensure continuous documentation of emission compliance.

With respect to Greenhouse Gas (GHG) emissions, the Project will minimize GHG emissions by incorporating a high-efficiency combustion turbine and use of premium high-efficiency motors in the Project design. The Project will use waste heat from the turbine exhaust gas for dew point heating of natural gas fuel, as well as for ammonia vaporization for the SCR system. The Project will also make efficiency, insulation, and heating, ventilation and air conditioning (HVAC) system improvements to the existing Training Building following Project construction. The Applicant will construct, operate, and maintain the on-site natural gas pipeline in accordance with all applicable regulatory requirements to reduce potential fugitive methane emissions. Although it was not required in the Section 61 findings in the FEIR, MassDEP has included in the Section 14 below the requirement for declining annual CO_2e emission limits as an additional mechanism for minimizing GHG emissions.

In addition, by displacing the operation of older, less efficient generators, MassDEP anticipates that operation of the Project will result in a net decrease in overall generating grid GHG emissions. NRG is also pursuing the development of a 1.5-MW community solar project on the Station Property, which is expected to displace 734 tons per year of GHG.

With respect to construction noise, most construction activities will be limited to daytime hours, Construction equipment will be properly maintained, and including ensuring that mufflers are in good working order. Quieter adjustable backup alarms on vehicles will be used. Portable noise barriers will be used when appropriate, and noisier equipment will be located within the interior portions of the site to the extent practicable.

With respect to operational noise, a comprehensive set of noise mitigation measures has been incorporated into the design of the Project. This includes the use of combustion turbine air inlet and exhaust silencing, equipment enclosures and noise barriers, low noise fans and transformers, and appropriate equipment orientation. Noise mitigation for the existing Canal Station Units 1 and 2 may include lagging or partial enclosures for the Units 1 and 2 hopper vibrator systems, refurbishment of lined inlet and noise baffling system for Unit 2 forced draft fans, and noise barrier walls for the Units 1 and 2 service and main transformers.

With respect to air quality during construction, the Project will comply with MassDEP's Clean Air Construction Initiative, including: use of ULSD in all diesel-powered non-road vehicles; ensuring that all non-road engines meet applicable emission standards pursuant to 40 CFR 89.112; ensuring that all diesel powered non-road engines greater than 50 hp to be used for 30 or more days over the course of the construction period have USEPA-verified (or equivalent) emissions control devices; ensuring that all diesel engines on equipment not in active use are turned off; ensuring that all dump trucks that are idling for 5 minutes or more are turned off; and establishing a staging area for trucks waiting to load or unload material in a location where diesel emissions from the trucks will not be noticeable to the public. The Applicant will control fugitive dust during earth moving through use of suppression measures, including use of water trucks to wet surfaces, stabilization of soils, creation of windbreaks, and use of stabilized entrance and exit points.

Based upon its review of the MEPA documents, the Comprehensive Plan Application and amendments thereof submitted to date and MassDEP's regulations, MassDEP finds that the terms and conditions of this Plan Approval constitute all feasible measures to avoid damage to the environment and will minimize and mitigate such damage to the maximum extent practicable. Implementation of the mitigation measures will occur in accordance with the terms and conditions set forth in this Plan Approval.

10. Energy Facility Siting Board (EFSB)

The Energy Facilities Siting Board (EFSB) has not, as the issuance of this Proposed Air Quality Plan Approval, issued a Final Decision under M.G.L. Chapter 164, § 69J¼ of the Applicant's Petition for approval to construct the Project. MassDEP is issuing this Proposed Air Quality Plan Approval and, concurrently, the Proposed PSD Permit, but will not issue a final Plan Approval or PSD Permit until and unless EFSB issues a Final Decision.

11. Emission Unit Identification

Each Emission Unit ("EU") identified in Table 12 is subject to and regulated by this Plan Approval:

Table 8
Emission Unit Identification

EU[1]	Description	Design Capacity	Pollution Control Device (PCD)
10	GE 7HA.02 Combustion Turbine Generator or equivalent	3,471,000,000 Btu/hr (0ºF ULSD firing) 3,425,000,000 Btu/hr (0°F firing natural gas)	Selective Catalytic Reduction Oxidation Catalyst
11	Caterpillar Tier 4 Alternate FEL C-15 ATAAC Diesel Emergency Generator or equivalent	5,030,000 Btu/hr 500 Kilowatt (electrical)	None
12	John Deere/Clarke JU4H-UFAD5G Emergency Diesel Fire Pump or equivalent	1,200,000 Btu/hr 135 brake-horsepower	None

Table 8 Key:

EU = Emission Unit
Btu/hr = British thermal units per hour
ULSD = ultralow sulfur diesel
PCD = pollution control device
NOx = oxides of nitrogen

12. Applicable Requirements

Operational, Production and Emission Limits

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Tables 9 and 9-A:

Table 9
Operational / Production and Emission Limits

EU	Operational / Production Limit	Air Contaminant		Emission Limit[1, 3]
10	1. Emission limits apply from first combustion of fuel until flame out except that NOx, CO, VOC and	NOx	Natural gas	31.5 lb/hr 0.0092 lb/MMBtu 2.5 ppmvd @ 15% O_2

Table 9				
Operational / Production and Emission Limits				
EU	**Operational / Production Limit**	**Air Contaminant**		**Emission Limit[1, 3]**
	$PM/PM_{10}/PM_{2.5}$ limits don't apply during startups and shutdowns [9] 2. Maximum Fuel Heat Input: 14,554,740 MMBtu, HHV per consecutive 12-month period firing natural gas[4] and 2,499,120 MMBtu, HHV per consecutive 12-month period firing ULSD[4] 3. Maximum Hours of Operation: 4,380 hours per consecutive 12-month period total operation 720 hours per consecutive 12-month period firing ULSD		ULSD	67.3 lb/hr 0.0194 lb/MMBtu 5.0 ppmvd @ 15% O_2
		CO	Natural gas	25.9 lb/hr 0.0079 lb/MMBtu 3.5 ppmvd @ 15% O_2
			ULSD	41.0 lb/hr 0.0118 lb/MMBtu 5.0 ppmvd @ 15% O_2
		VOC as methane	Natural gas	8.9 lb/hr 0.0026 lb/MMBtu 2.0 ppmvd @ 15% O_2
			ULSD	9.4 lb/hr 0.0027 lb/MMBtu 2.0 ppmvd @ 15% O_2
		Sulfur in Fuel		0.5 grains/100 scf natural gas 0.0015% sulfur by weight in ULSD
		SO_2	Natural gas	5.14 lb/hr 0.0015 lb/MMBtu
			ULSD	5.21 lb/hr 0.0015 lb/MMBtu
		H_2SO_4	Natural gas	5.48 lb/hr 0.0016 lb/MMBtu
			ULSD	6.25 lb/hr 0.0018 lb/MMBtu
		$PM/PM_{10}/PM_{2.5}$[5]	Natural gas at >= 75% load	18.1 lb/hr 0.0073 lb/MMBtu
			Natural gas at <75% load	18.1 lb/hr 0.012 lb/MMBtu

Table 9				
Operational / Production and Emission Limits				
EU	**Operational / Production Limit**	**Air Contaminant**		**Emission Limit[1, 3]**
			ULSD at >= 75% load	65.8 lb/hr 0.026 lb/MMBtu
			ULSD at < 75% load	65.8 lb/hr 0.046 lb/MMBtu
		NH_3	Natural gas	23.3 lb/hr (initial) 9.3 lb/hr (goal) 0.0068 lb/MMBtu (initial) 0.0027 lb/MMBtu (goal) 5.0 ppmvd @ 15% O_2 (initial) 2.0 @ 15% O_2 (goal)
			ULSD	25.5 lb/hr 0.0072 lb/MMBtu 5.0 ppmvd @ 15% O_2
		Greenhouse gases as CO_{2e}	Natural gas	407,575 lb/hr 1,178 lb/MW-hr (gross)
			ULSD	565,252 lb/hr 1,673 lb/MW-hr (gross)
		Single HAP (formaldehyde)	Natural gas	0.75 lb/hr 0.00022 lb/MMBtu
			ULSD	0.80 lb/hr 0.00023 lb/MMBtu
		Total HAP	Natural gas	1.85 lb/hr 0.00054 lb/MMBtu
		Total HAP	ULSD	1.35 lb/hr 0.00039 lb/MMBtu
		Opacity (natural gas, excluding startup/shutdown)		Less than 5%, except 5% to less than 10% for up to 2 minutes during any one hour[2]

Table 9			
Operational / Production and Emission Limits			
EU	**Operational / Production Limit**	**Air Contaminant**	**Emission Limit[1, 3]**
		Opacity (ULSD, excluding startup/shutdown)	Less than 10%, [2]
		Opacity/Smoke (all fuels, startup/shutdown)	310 CMR 7.06(1)(a and b)
		CO_2	The applicable CO_2 emission standard in 40 CFR 60 Subpart TTTT Table 2
11	4. 300 hours of operation per consecutive 12-month period. 5. Ultra-Low Sulfur Diesel shall be the only fuel of use.	NOx and NMHC, Combined Total	4.48 lb/hr 3.5 g/KW-hr
		CO	4.48 lb/hr 3.5 g/KW-hr
		Sulfur in Fuel	0.0015% by weight
		SO_2	0.0075 lb/hr 0.0015 lb/MMBtu
		H_2SO_4	0.000578 lb/hr 0.00012 lb/MMBtu
		$PM/PM_{10}/PM_{2.5}$	0.17 lb/hr 0.1 g/KW-hr
		VOC	0.24 lb/hr 0.19 g/KW-hr
		Greenhouse Gases, CO_2e	819 lb/hr 162.85 lb/MMBtu
		Opacity	less than 5%, except less than10% for up to 2 minutes during any one hour [2]
12	6. 300 hours of operation per consecutive 12-month period. 7. Ultra-Low Sulfur Diesel shall be the only fuel of use.	NOx and NMHC, combined total	0.89 lb/hr 4.0 g/KW-hr
		CO	1.113 lb/hr 5.0 g/KW-hr
		Sulfur in Fuel	0.0015%, by weight

Table 9			
Operational / Production and Emission Limits			
EU	**Operational / Production Limit**	**Air Contaminant**	**Emission Limit[1, 3]**
		SO_2	0.0018 lb/hr 0.0015 lb/MMBtu
		H_2SO_4	0.000138 lb/hr 0.00012 lb/MMBtu
		$PM/PM_{10}/PM_{2.5}$	0.074 lb/hr 0.3 g/KW-hr
		VOC	0.29 lb/hr 1.3 g/KW-hr
		Greenhouse Gases, CO_2e	195 lb/hr 162.85 lb/MMBtu
		Opacity	less than 5%, except 5% to less than 10% for up to 2 minutes during any one hour[2]
Project-wide[8]	NA	NOx	104.3 TPY
		CO	94.8 TPY
		VOC	24.4 TPY
		SO_2	11.1 TPY
		$PM/PM_{10}/PM_{2.5}$[5]	60.5 TPY
		NH_3	50.3 TPY
		H_2SO_4	12.0 TPY
		Single HAP (formaldehyde)	1.6 TPY
		Total HAPs	3.9 TPY
		Greenhouse Gases as CO_2e	934,401 TPY

Table 9 Key:

CO = Carbon monoxide
CO_2 = Carbon dioxide
CO_2e = Carbon dioxide equivalents
CMR = Code of Massachusetts Regulations
EU = Emission Unit
g/bhp-hr = grams per brake horsepower-hour
g/KW-hr = grams per kilowatt-hour
H_2SO_4 = Sulfuric acid mist

HAP = Hazardous Air Pollutant
HHV = Higher heating value
ISO = International Organization for Standardization
lb/hr = pounds per hour
lb/MMBtu = pounds per million British thermal unit
lb/MW-hr = pounds per megawatt-hour
MMBtu = Million British thermal unit
MMBtu/hr = Million British thermal units per hour
NH_3 = Ammonia
NOx = Nitrogen oxides
NMHC = Non-methane hydrocarbons
NA = Not applicable
O_2 = Oxygen
Pb = Lead
PM =Particulate matter
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
ppmvd @ 15% O_2 = parts per million by volume, dry basis corrected to 15 percent oxygen
% = percent
psia = pounds per square inch absolute
scf = Standard cubic feet
SO_2 = Sulfur dioxide
TPY = Tons per consecutive 12-month period
ULSD = Ultra Low Sulfur Diesel
VOC = Volatile organic compounds

Table 9 Notes:

1. Emission limits are the maximum allowed emission and are one-hour block averages unless otherwise noted and apply to any block hour with more than 30 minutes of normal operation.
2. Opacity emission limits are one-minute block averages.
3. Emissions limits for EUs 11 and 12 are consistent with manufacturers' certifications using emission-testing procedures in accordance with 40 CFR Part 89.
4. Maximum fuel heat input natural gas for the combustion turbine calculated using 4,380 hours of operation per consecutive 12-month period at 100% load and 50ºF ambient temperature (3,323 MMBtu/hr, HHV). Maximum total fuel heat input (ULSD) for each combustion turbine calculated using 720 hours of operation per consecutive 12-month period at 100% load and 50ºF ambient temperature (3,471 MMBtu/hr, HHV).
5. Particulate matter emission limits include both filterable and condensable particulate matter.
6. The pound per megawatt-hour emission limits calculated using 100% load using lb/hr emissions and MW-hr gross electrical output.
7. Emission limit calculated using 100% load emissions and gross electrical output, corrected to ISO conditions (59°F, 14.7 psia, 60% humidity). Emissions calculations use a natural gas CO_2e emission factor of 119.0 lb/MMBtu. This emission factor is based on a CO_2 emission factor of 118.9 lb/MMBtu calculated from Equation G-4 of 40 CFR Part 75 Appendix G plus an emission factor of 0.1 lb/MMBtu for other greenhouse gases (methane and nitrous oxide) calculated utilizing the emission factors for these two pollutants from Table C-2 of 40 CFR 98 Subpart C and the global warming potentials for these two pollutants from Table A-1 of 40 CFR 98 Subpart A. Compliance shall be determined during the initial compliance test performed within 180 days after initial firing of the EU. Similarly, ULSD emissions calculated using a ULSD CO_2e emission factor of 162.85 lb/MMBtu.

8. The TPY emissions limits apply to the emissions from EUs 10, 11, and 12 combined and include VOC emissions from ULSD fuel storage working and breathing losses and CO2e emissions from natural gas and SF_6 fugitive emissions.
9. Start-ups include the time from flame-on in the combustor (after a period of downtime) until the minimum emissions compliance load (MECL) is reached. Shutdowns include the time from dropping below the MECL until flame-out.

Table 9-A

Operational/Production and Emission Limits

EU	Operational / Production Limit	Air Contaminant	Emission Limit[1]
10	1. Operation during startups (from first combustion of fuel to MECL, but no more than 30 minutes).	NOx	151 lb/startup event on natural gas 219 lb/startup event on ULSD
		CO	130 lb/startup event on natural gas 163.0 lb/startup event on ULSD
		VOC, as methane	9.0 lb/startup event on natural gas 12.0 lb/startup event on ULSD
		$PM/PM_{10}/PM_{2.5}$	9.1 lb/startup event on natural gas 48.2 lb/startup event on ULSD
	2. Operation during shutdowns (MECL to flame out, but no more than 14 minutes).	NOx	7.0 lb/shutdown event on natural gas 8.0 lb/shutdown event on ULSD
		CO	133.0 lb/shutdown event on natural gas 25.0 lb/shutdown event on ULSD
		VOC, as methane	25.0 lb/shutdown event on natural gas 3.0 lb/shutdown event on ULSD
		$PM/PM_{10}/PM_{2.5}$	4.2 lb/shutdown event on natural gas 48.2 lb/shutdown event on ULSD

Table 9-A Notes:

1. Start-up and shutdown emission limits and duration are subject to revision by MassDEP based on review of compliance testing (stack testing) data and CEMS data generated from the first year of commercial operation.

Table 9-A Key:

EU = Emission Unit
lb = pounds
NOx = Nitrogen oxides
CO = Carbon monoxide
% = percent
ULSD = Ultra Low Sulfur Diesel
VOC = Volatile Organic Compounds
MECL = Minimum Emission Compliance Load

Compliance Demonstration

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 10, 11, and 12:

Table 10	
EU	**Monitoring and Testing Requirements**
10	1. The Permittee shall install, calibrate, certify, maintain, and continuously operate a Continuous Opacity Monitoring System (COMS) to monitor opacity of the emissions from EU 10. The Permittee shall maintain the COMS in an accurate operating condition and shall install, calibrate, certify, and operate the COMS in accordance with 40 CFR 60 Appendix B (Performance Specifications) and apply the quality assurance and quality control procedures in 40 CFR 60, Appendix F, Procedure 3.
	2. The Data Acquisition and Handling System (DAHS) shall collect and record opacity values from the COMS monitor. The DAHS shall continuously record opacity once every 10 seconds and compile 1-minute block opacity averages.
	3. The Permittee shall install the COMS with visible and audible alarms that activates whenever the opacity is within 2% of the emission limit in Table 9 of this Plan Approval.
	4. The Permittee shall construct the Project to accommodate the emissions testing requirements in 40 CFR 60 Appendix A. The two outlet sampling ports (90 degrees apart from each other) for each emission unit must be located at a minimum of one duct diameter upstream and two duct diameters downstream of any flow disturbance. In addition, the Permittee shall facilitate access to the sampling ports and testing equipment by constructing platforms, ladders, or other necessary equipment.

Table 10	
EU	**Monitoring and Testing Requirements**
	5. The Permittee shall conduct initial compliance testing of EU 10 within 180 days of the initial firing of EU 10 to determine the compliance status with the emission limits in Table 9 and 9-A of this Plan Approval (in lb/hr, lb/MMBtu, and ppmvd, as applicable) while firing natural gas and ULSD for the following pollutants: NOx, CO, VOC, total PM^1, NH_3, H_2SO_4, total VOC HAP, single HAP (formaldehyde), and opacity. Initial compliance testing shall be conducted in accordance with MassDEP's "Guidelines for Source Emissions Testing," in accordance with EPA reference test methods in 40 CFR 60, Appendix A, 40 CFR 60 Subpart KKKK, 40 CFR 72 and 75, or by another method that has been approved in writing by MassDEP, and in accordance with the emission testing protocol required by Table 12 Condition 1. The testing shall be conducted: (a) At representative operating conditions, (b) At no less than the following load conditions while testing for NOx, CO, VOC, NH_3 and opacity: while firing natural gas; MECL, 75% and 100%, and while firing ULSD; MECL, 75% and 100%. (c) At no less than the following load conditions while testing for total PM: while firing natural gas; MECL and 100%, and while firing ULSD; MECL and 100%. (d) At no less than the following load conditions while testing for H_2SO_4, VOC HAP, and single HAP (formaldehyde) while firing natural gas: 100%, and while firing ULSD; 100%. (e) During periods of steady state operation of EU 10 of the SCR and the oxidation catalyst.
	6. The Permittee shall sample and analyze the natural gas and ULSD used during the initial compliance testing to determine their compliance status with the sulfur in fuel, SO_2 emission limit in Table 9 of this Plan Approval.
	7. The Permittee shall conduct initial compliance tests of EU 10 to determine their compliance status with the startup and shutdown emission limits for NOx, CO, VOC, and PM. Startup is the period from first combustion of fuel to compliance with the NOx and CO emission limits in Table 9-A of this Plan Approval, but no more than 30 minutes. Shutdown is the period from MECL to flame out, but no more than 14 minutes.
	8. The Permittee shall develop a correlation between CO and VOC emissions for EU 10 during initial compliance testing.
	9. The Permittee shall conduct initial compliance testing to determine compliance with all lb/MW-hr emission limits in Table 13 of this Plan Approval within 180 days of initial firing of each EU. The Permittee shall conduct this initial compliance test at 100% load and calculate lb/MW-hr emissions using gross electrical output.
	10. The Permittee shall install, calibrate, certify, maintain, and continuously operate a DAHS and a Continuous Emission Monitoring System (CEMS) in an accurate operating condition to measure and record emissions of NOx, CO, NH_3, and O_2 in the stacks and to measure and record fuel flow.

Table 10	
EU	**Monitoring and Testing Requirements**
	11. The Permittee shall program a calibration error check sequence for each CEMS unit into the DAHS and perform the error check sequence at least daily.
	12. The Permittee shall install, calibrate, certify, maintain, and operate the CEMS in accordance with 40 CFR 60 Appendix B (Performance Specifications) and 40 CFR 60 Appendix F (Quality Control Procedures).
	13. The Permittee shall not certify the COMS or CEMS during SCR or oxidation catalyst startup, during malfunction or maintenance.
	14. The Permittee shall continuously monitor NOx, CO and NH_3 and compile one-hour block average emission concentrations. The DAHS shall calculate the emissions in lbs/hr, lbs/MMBtu and ppmvd at 15% O_2 to determine compliance with the applicable emission limits in Table 13 of this Plan Approval.
	15. The Permittee shall install, calibrate, certify, maintain and continuously operate fuel flow monitors that monitor the amount of natural gas and ULSD used to fire EU 10.
	16. The Permittee shall conform with the EPA monitoring specifications at 40 CFR 60.13 and 40 CFR 60 Appendices B and F, and all applicable portions of 40 CFR 72 and 75, 310 CMR 7.32, and 310 CMR 7.70 for all emission monitors and recorders serving EU 10.
	17. The Permittee shall conduct Relative Accuracy Test Audits (RATA) on the NOx and CO CEMS units at a frequency determined in accordance with 40 CFR 75.
	18. The Permittee shall equip the CEMS with properly operated and properly maintained audible and visible alarms. The alarms shall be set to activate whenever emissions from the Project are within 5% of the lb/hr emission limits in Table 9 of this Plan Approval.
	19. The Permittee shall obtain and record emissions data from each CEMS unit serving EU 10 at all times EU 10 is firing except for periods of CEMS and COMS calibration error checks, zero and span adjustments, maintenance, and periods of malfunction.
	20. The Permittee shall obtain and record emissions data from each CEMS and COMS serving EU 10 for at least ninety-five percent (95%) of EU 10's operating hours every calendar quarter, except for periods of CEMS and COMS calibration error checks, zero and span adjustments, and preventive maintenance.

Table 10	
EU	**Monitoring and Testing Requirements**
	21. Whenever the NH_3 CEMS unit is not available for more than two hours, the Permittee shall monitor the following parameters to assure that the NH_3 emissions, operating loads, and NH_3 injection rates are consistent with prior NH_3 compliant operation: a. NOx CEMS unit, b. Temperature of SCR and oxidation catalyst inlet, c. Temperature of ammonia injection system, d. Ammonia injection rate, and e. Pressure drop across the SCR and oxidation catalyst.
	22. Whenever the NOx CEMS unit is not available for more than two hours, the Permittee shall monitor the following parameters to assure that the NOx emissions are consistent with prior NOx compliant operation: a. Ammonia CEMS unit, b. Temperature of SCR and oxidation catalyst inlet, c. Temperature of ammonia injection system, d. Ammonia injection rate, and e. Pressure drop across the SCR and oxidation catalyst.
	23. Whenever the CO CEMS unit is not available for more than two hours, the Permittee shall monitor the following parameters to assure that the CO emissions are consistent with prior CO compliant operation: a. Ambient temperature b. Combustion turbine load
	24. Whenever the COMS unit is not available for more than two hours, the Permittee shall monitor the following parameters to assure that opacity is consistent with prior opacity compliant operation: a. Ambient temperature b. Combustion turbine load

Table 10	
EU	**Monitoring and Testing Requirements**
	25. The Permittee shall monitor emissions during all periods that emissions are above the emission limits in Table 9 and 9-A of this Plan Approval, even if the exceedance is attributable to startup, shutdown, malfunction, emergency, equipment cleaning, and upsets or failures associated with the emission control system or the CEMS or COMS. An exceedance of emission limits in Table 9 or 9-A of this Plan Approval due to an emergency or malfunction shall not be deemed a federally permitted release as that term is used in 42 U.S.C. 9601(10).
	26. The Permittee shall use and maintain the CEMS and COMS serving EU 10 as "direct-compliance" monitors to measure opacity and emissions of NOx, CO and NH_3 "Direct-compliance" monitors generate data that legally documents the compliance status of a source.
	27. The Permittee shall develop and implement a quality assurance/quality control program for the long-term operation of the CEMS and COMS serving EU 10 before the commencement of commercial operations so as to conform with 40 CFR 60 Appendices B and F, all applicable portions of 40 CFR 72 and 75, 310 CMR 7.32, and 310 CMR 7.70.
	28. The Permittee shall monitor fuel heat input rate (MMBtu/hr, HHV), natural gas heat input (MMBtu), ULSD heat input (MMBtu), natural gas consumption (scf) and ULSD consumption (gallons) for EU 10.
	29. The Permittee shall monitor the date and hours that EU 10 operates.
	30. The Permittee shall consider the VOC emission rate during startup or shutdown, as occurring at the rate of VOC emissions determined in the most recent emissions test during startup and shutdown.
	31. For periods other than startup and shutdown, when CO emissions are below the CO pound per hour emission limit, the Permittee shall consider the VOC emissions pound per hour emission rate is meeting the VOC emission limits in Table 9 of this Plan Approval, subject to correlation in Table 10 Condition 32.
	32. For periods other than startup and shutdown, when CO emissions are above the CO pound per hour emission limit the Permittee shall consider VOC emissions occurring at a rate determined by the equation: $VOC_{actual} = VOC_{limit} \times (CO_{actual}/CO_{limit})$, until a VOC/CO correlation curve for each combustion turbine is developed and approved by MassDEP. After approval, the approved VOC/CO correlation curved shall be used for determining compliance with the VOC pound per hour emission limit in Table 9 of this Plan Approval
	33. The Permittee shall monitor the sulfur content of the fuel combusted by EU 10 in accordance with 40 CFR 60 Subpart KKKK, or pursuant to any alternative fuel monitoring schedule in accordance with 40 CFR 60 Subpart KKKK unless the Permittee elects not to monitor the sulfur content of the fuel and makes a demonstration required in 40 CFR 60.4365.

Table 10	
EU	**Monitoring and Testing Requirements**
	34. The Permittee shall install and continuously operate monitors fitted with alarms to monitor the temperatures at the inlets to the SCR and oxidation catalyst serving EU 10. The alarms shall be set to activate when temperatures at the inlets to the SCR and oxidation catalysts deviate from normal operating temperatures. In addition, the Permittee shall monitor the ambient temperature.
	35. The Permittee shall install and operate high and low level audible alarm monitors on the ammonia storage tank and shall maintain the monitors according to the manufacturer's recommendations.
	36. The Permittee shall monitor the load, startup and shutdown duration, and mass emissions (lb/event) of NOx and CO during startup and shutdown of EU 10.
	37. The Permittee shall monitor SO_2 and CO_2 emissions in accordance with 40 CFR 75.
	38. The Permittee shall monitor the Greenhouse Gas emission rate using the calculation procedures in 40 CFR 98.
	39. The Permittee shall continuously monitor the gross electrical output of the Project.
	40. The Permittee shall conduct a sound measurement program no later than 180 days after the commencement of commercial operations to determine the compliance status with the requirements of Table 13 Condition 10. The sound measurement program shall measure the sound impact of the Facility while operating EU 10 at 100% load. The Permittee shall conduct the sound measurement program in accordance with the noise testing protocol required by Table 12 Condition 8. The Permittee shall coordinate the scheduling of the sound measurement program with MassDEP for a mutually agreeable time.
11 & 12	41. The Permittee shall equip, operate, and maintain non-resettable hour meters on the emergency generator engine and the emergency fire pump engine.
Project-wide	42. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	43. If MassDEP requires it, the Permittee shall conduct emission testing in accordance with EPA Reference Test Methods and 310 CMR 7.13.
	44. The Permittee shall monitor the sulfur content of each shipment of ULSD received. The Permittee may determine the sulfur content of ULSD by analyzing the sulfur content of the ULSD or by relying on ULSD suppliers to provide the sulfur content of ULSD received. The analysis of sulfur content of ULSD shall be in accordance with the applicable ASTM International test methods or any other method approved by MassDEP and EPA.

Table 10 Key:

CO = Carbon monoxide
CO_2 = Carbon dioxide

CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CEMS = Continuous Emission Monitors
COMS = Continuous Opacity Monitors
DAHS= Data Acquisition and Handling System
EU = Emission Unit
EPA = Environmental Protection Agency
H_2SO_4 = Sulfuric acid mist
HHV = Higher heating value
lb/event = Pounds per event
lb/hr = Pounds per hour
lb/MW-hr = Pounds per megawatt-hour
lb/MMBtu = Pounds per million British thermal units
MMBtu = Million British thermal units
MMBtu/hr = Million British thermal units per hour
NH_3 = Ammonia
NOx = Nitrogen oxides
O_2 = Oxygen
PM =Particulate matter
$PM_{2.5}$ = Particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate matter less than or equal to 10 microns in diameter
% = percent
ppmvd = parts per million by volume, dry basis
RATA = Relative Accuracy Test Audits
scf = standard cubic feet
SCR = Selective Catalytic Reduction
SO_2 = Sulfur dioxide
ULSD = Ultra Low Sulfur Diesel
U.S.C. = United States Code
VOC = Volatile organic compounds

Table 10 Notes:

1. The Permittee has the option of testing PM and comparing PM emissions to the $PM/PM_{10}/PM_{2.5}$ emission limit in Table 9 of this Plan Approval or testing PM, PM_{10} and $PM_{2.5}$, adding those emissions, and comparing that sum to the $PM/PM_{10}/PM_{2.5}$ emission limit.

Table 11	
EU	**Record Keeping Requirements**
10	1. The Permittee shall maintain records of the hourly fuel heat input rate (MMBtu/hr, HHV), NOx, CO and NH_3 hourly emissions, opacity, natural gas heat input (MMBtu), ULSD heat input (MMBtu), natural gas consumption (scf), ULSD consumption (gallons) and purchase records for natural gas and ULSD per month and on a consecutive 12-month period basis for EU 10.
	2. The Permittee shall maintain records of the date and hours that EU 10 operates per month and per consecutive 12-month period. These records shall identify the fuel fired during each hour.

Table 11	
EU	**Record Keeping Requirements**
	3. The Permittee shall maintain on-site permanent records of output from all continuous monitors (including CEMS and COMS) for flue gas emissions, natural gas consumption (scf) and ULSD consumption (gallons).
	4. The Permittee shall maintain a log to record problems, upsets or failures associated with the emission control systems, DAHS, CEMS, and/or COMS serving EU 10, and the ammonia handling system serving EU 10.
	5. The Permittee shall continuously estimate and record VOC emissions on the DAHS using the VOC/CO correlation curve developed from the most recent emissions test.
	6. The Permittee shall maintain records of the load, startup and shutdown duration, and mass emissions (lb/event) of NOx and CO, during startup and shutdown of EU 10.
	7. The Permittee shall maintain records of gross electrical output from the Project on a daily basis.
	8. The Permittee shall maintain records of the sulfur content of the fuel fired by EU 10 at the frequency required by 40 CFR 60 Subpart KKKK, or pursuant to any alternative fuel monitoring schedule in accordance with 40 CFR 60 Subpart KKKK.
	9. The Permittee shall maintain records of SO_2 and CO_2 emissions from EU 10 in accordance with 40 CFR 75.
	10. The Permittee shall maintain records of the Greenhouse Gas emission rate of EU 10 in accordance with the schedule and calculation procedures in 40 CFR 98.
	11. The Permittee shall maintain continuous records of the SCR and oxidation catalyst: a. inlet temperature, b. the ambient temperature, c. the pressure drop across the SCR and the oxidation catalyst.
	12. The Permittee shall keep records of the CEMS unit's calibration error check sequences.
	13. The Permittee shall maintain records for all of the manufacturer's required monitoring protocols and inspections included in the SOMP for each CEMS, COMS, the SCR, the oxidation catalyst and the ammonia handling system. The records shall include the date, time of monitoring and/or inspection, the results of inspection, and the name of the staff member performing the monitoring and/or inspection.
	14. The Permittee shall continuously record the following: a. Ammonia injection rate, b. Temperature of the injected ammonia.

Table 11	
EU	**Record Keeping Requirements**
	15. The Permittee shall record the date, time of observation and name of the observer (if applicable) of the following: a. The condition of the ammonia system, daily b. Alarm event when triggered on the ammonia leak detection system.
	16. The Permittee shall maintain a record documenting usage of ULSD and the specific condition that qualified the usage, and corresponding records of associated ISO-NE, AGT or other such independent agents to verify the occurrence or presence of such condition or event.
11, 12	17. The Permittee shall maintain a record of the hours of operation of EUs 11 and 12 per month and per consecutive 12-month period.
Project-wide	18. The Permittee shall establish and maintain a record keeping system for the Project so that year-to-date information is readily available. Record keeping shall, at a minimum, include: a. Compliance records sufficient to document actual emissions from the Project in order to determine compliance with the operational/production limits and emission limits in Table 9 and 9-A of this Plan Approval. Such records shall include, but are not limited to, fuel usage rates, emissions test results, and monitoring equipment data and reports; b. Maintenance: A record of maintenance, repair, and inspection activities performed on all emission units and their associated equipment, control equipment and their associated equipment and monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance, repair or inspection performed and the date and time the work was commenced and completed; and, c. Malfunctions: A record of all malfunctions of the control and monitoring equipment serving EU 10 including, at a minimum: the date and time the malfunction occurred; a description of the malfunction and the corrective action taken; the date and time corrective actions began; and the date and time corrective actions were completed.
	19. The Permittee shall maintain all records required by 310 CMR 7.32, 310 CMR 7.70, 310 CMR 7.71 (Reporting of Greenhouse Gas Emissions), and 40 CFR 98 (Mandatory Greenhouse Gas Emissions Reporting) at the Project.

Table 11	
EU	**Record Keeping Requirements**
	20. The Permittee shall maintain adequate records on-site to demonstrate the compliance status with all operational/production limits and emission limits in Table 9 and 9-A, above: a. The records shall include all associated calculations and supporting data, b. The records shall include the actual emissions of air contaminants emitted for each calendar month and for each consecutive twelve-month period, c. The records shall include the actual emissions of air contaminants for each calendar month, and for each consecutive twelve-month period, and d. The Permittee shall compile these records no later than the 15th day following each month. The Permittee may download an electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, at: http://www.mass.gov/eea/agencies/massdep/air/approvals/limited-emissions-record-keeping-and-reporting.html#WorkbookforReportingOn-SiteRecordKeeping.
	21. The Permittee shall maintain a copy of this Plan Approval, its underlying Application, and the most up-to-date SOMP at the Facility.
	22. The Permittee shall maintain a complaint log concerning emissions, odor, and noise from the Project. The Permittee shall make available to the public a telephone number that receives and records complaints concerning the Project and is available to receive complaints 24 hours per day. The Permittee shall maintain the complaint log for the most recent five (5) year period. The Permittee shall make the complaint log available to members of the public and to MassDEP, upon request. The Permittee shall take all reasonable actions to respond to any complaints in a timely manner.
	23. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	24. The Permittee shall maintain records of monitoring and testing as required by Table 10 of this Plan Approval.
	25. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.
	26. The Permittee shall make records required by this Plan Approval available to MassDEP and EPA personnel upon request.
	27. The Permittee shall maintain a record of the sulfur content of each ULSD delivery made to the Project.

Table 11 Key:

CO = Carbon monoxide
CO_2 = Carbon dioxide
CFR = Code of Federal Regulations

CMR = Code of Massachusetts Regulations
CEMS = Continuous Emission Monitors
COMS = Continuous Opacity Monitors
DAHS = Data Acquisition and Handling System
EU = Emission Unit
HHV = Higher heating value
lb/event = pounds per event
MMBtu = Million British thermal units
MMBtu/hr = Million British thermal units per hour
NOx = Nitrogen oxides
scf = standard cubic feet
SCR = Selective Catalytic Reduction
SOMP = Standard Operating and Maintenance Procedures
SO_2 = Sulfur dioxide
ULSD = Ultra Low Sulfur Diesel
VOC = Volatile organic compounds

Table 12	
EU	**Reporting Requirements**
10	1. The Permittee shall submit a written test protocol to MassDEP at least 45 days before initial compliance testing and obtain written MassDEP approval of an emissions test protocol before conducting initial compliance testing of EU 10. The protocol shall include, but not be limited to: a. A detailed description of sampling port locations, sampling equipment, sampling and analytical procedures, and operating conditions for the initial compliance testing, b. Procedures for initial compliance testing of startup and shutdown emissions. c. Procedures for the required CO and VOC correlation, d. Procedures to confirm the parametric monitoring methodology for particulate emissions approved by MassDEP.
	2. The Permittee shall notify MassDEP of the proposed schedule for initial compliance testing at least 30 days prior to conducting the initial compliance testing.
	3. The Permittee shall submit a final emissions test results report to MassDEP within 45 days of completion of the initial compliance testing.
	4. The Permittee shall submit a QA/QC program plan for the CEMS and COMS serving EU 10 to MassDEP, in writing, at least 30 days before commencement of commercial operation of EU 10. The Permittee shall implement the QA/QC program approved by MassDEP. The Permittee shall submit subsequent changes to the QA/QC program plan to MassDEP for MassDEP approval prior to their implementation.

Table 12	
EU	**Reporting Requirements**
	5. The Permittee shall submit a quarterly Excess Emissions Report to MassDEP by the thirtieth (30th) day of April, July, October, and January each year. The Excess Emissions Report shall include at least the information listed below for the previous calendar periods of January through March, April through June, July through September, and October through December, respectively. a. CEMS and COMS excess emissions data, in a format acceptable to MassDEP. b. Exceedances of operational/production limits c. For each period of excess emissions or exceedances of operational/production limits for EU 10, the Permittee shall list the duration, cause, the response taken, and the amount of excess emissions. Periods of excess emissions shall include excess emissions during startup and shutdown, malfunction, emergency, equipment cleaning, and upsets or failures associated with the emission control system or CEMS or COMS. ("Malfunction" means any sudden and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner. Failures caused entirely or in part by poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown are not malfunctions. "Emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the Permittee, including acts of God, which would require immediate corrective action to restore normal operation, and that causes the Project to exceed a technology based limitation in this Plan Approval, due to unavoidable increases in emissions attributable to the emergency. An emergency does not include noncompliance caused by improperly designed equipment, lack of maintenance, careless or improper operations, operator error, or decision to keep operating despite knowledge of these things.) d. A tabulation of periods of operation of each emission unit and total hours of operation of each emission unit during the calendar quarter. e. The number of hours each of the CEMS and the COM collected data and the percent data capture for each CEMs and the COM when EU 10 were operating.
	6. The Permittee shall submit to MassDEP, in accordance with the provisions of 310 CMR 7.02(5)(c), plans and specifications for the main exhaust stacks, EU 10, the SCR (including the ammonia handling and storage system), the oxidation catalyst, and the CEMS, COMS, and DAHS once the specific information has been determined, but in any case, not later than 30 days before the construction or installation of each component.
Project-wide	7. The Permittee shall submit a sound testing protocol to MassDEP at least 30 days before sound measurement testing before conducting a sound measurement program at the Facility. The protocol shall include, at least, a detailed description of monitoring locations, monitoring equipment, sampling and analytical procedures, data handling, and Facility operating conditions for the sound measurement program.
	8. The Permittee shall notify MassDEP of the proposed schedule for any sound measurement program at least 30 days prior to conducting the sound measurement testing.

Table 12	
EU	**Reporting Requirements**
	9. The Permittee shall submit a final sound measurement program results report to MassDEP within 45 days of completion of the sound measurement program.
	10. The Permittee shall submit to MassDEP a plan for monitoring and abating air and noise impacts during the period of construction of the Project, no later than 30 days before the commencement of construction.
	11. The Permittee shall submit, in writing, the following notifications to MassDEP within five (5) business days of: a. the date of commencement of construction of each Emission Unit; b. the date each Emission Unit construction has been completed; c. the date of initial firing of each Emission Unit; d. the date CEMS and the COM are certified; e. the date of commencement of commercial operation.
	12. The Permittee shall submit an Operating Permit Application to MassDEP in accordance with 310 CMR 7.00: Appendix C(4)(a)5 an application for an operating permit shall be submitted no later than one year after commencement of operation.
	13. The Permittee shall report to EPA in accordance with 40 CFR 75.
	14. The Permittee shall comply with all applicable reporting requirements of 310 CMR 7.32, 310 CMR 7.70, 310 CMR 7.71 (Reporting of Greenhouse Gas Emissions), and 40 CFR 98 (Mandatory Greenhouse Gas Emissions Reporting).
	15. The Permittee shall notify MassDEP's Southeast Regional Office of MassDEP, BAW Permit Chief by telephone: 508-946-2824, email: SERO.Air@state.ma.us and Thomas.cushing@state.ma.us, or fax: 508-947-6557, as soon as possible, but no later than three (3) business day after discovery of an exceedance(s) of Table 13 or 13a requirements. A written report shall be submitted to the Permit Chief at MassDEP within ten (10) business days thereafter and shall include identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).
	16. The Permittee shall notify MassDEP immediately by telephone, fax, or e-mail [sero.air@state.ma.us and Thomas.cushing@state.ma.us] and within three (3) working days, in writing, of any upset or malfunction to the ammonia handling or delivery systems that resulted in a release or threat of release of ammonia to the ambient air. In addition, the Permittee shall comply with all notification procedures required under M.G.L. c. 21 E for any release or threat of release of ammonia.

Table 12	
EU	**Reporting Requirements**
	17. The Permittee shall submit a semi-annual report to MassDEP by January 30 and July 30 of each year to demonstrate the Project's compliance status regarding the Project-wide emission limits (TPY) and annual operational/production limits in Table 9 and 9-A. (The Permittee may download the optional MassDEP format at: http://www.mass.gov/eea/docs/dep/air/approvals/aq/aqsarpt.doc) The Permittee shall include in its calculation of actual emissions, emissions during steady state operation, startup, shutdown, malfunction, emergency, equipment cleaning, and upsets or failures associated with the emission control system or CEMS or COMS. The semi-annual report shall include, but not be limited to: a. actual emissions for each month of the previous consecutive 12-month period, b. the maximum hourly fuel heat input rate (MMBtu/hr, HHV), natural gas heat input (MMBtu), ULSD heat input (MMBtu), natural gas consumption (scf), and ULSD consumption (gallons) per month and on a consecutive 12-month period basis, c. a list of deviations from the conditions of the Plan Approval,
	18. The Permittee shall submit to MassDEP for approval, a SOMP for: a. all emission units, b. all emissions control equipment, c. the ammonia handling system, d. all CEMS, e. the COM, and f. the DAHS, The SOMP shall be submitted no later than 45days before commencement of commercial operation. The Permittee shall include in the SOMP, but not be limited to, manufacturer's required monitoring protocols, schedules and inspections. Summary information is acceptable for the combustion equipment. The Permittee shall implement the SOMP approved by MassDEP. Thereafter, the Permittee shall submit updated versions of the SOMP to MassDEP no later than thirty (30) days before a significant change. The updated SOMP shall supersede prior versions of the SOMP.
	19. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a "Responsible Official" as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).

Table 12	
EU	**Reporting Requirements**
Project-wide	20. All notifications and reporting to MassDEP required by this Plan Approval shall be made, unless otherwise noted, to the attention of: MassDEP Southeast Regional Office Bureau of Air and Waste 20 Riverside Drive Lakeville, MA 02346 Attn: Permit Chief Phone: (508) 946-2824 Fax: (508) 947-6557 E-Mail: sero.air@state.ma.us
	21. The Permittee shall report annually to MassDEP, in accordance with 310 CMR 7.12, all information required by the Source Registration/Emission Statement Form. The Permittee shall include HAP emissions in the reporting. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require plan approval.
	22. The Permittee shall provide to MassDEP a copy of any record required by this Plan Approval within thirty (30) days of MassDEP's request.
	23. If MassDEP requires emission testing, the Permittee shall submit to MassDEP for approval an emission pretest protocol, at least thirty (30) days before emission testing.
	24. If MassDEP requires emission testing, the Permittee shall submit to MassDEP a final emission test results report, within thirty (30) days of completion of the emission testing.

Table 12 Key:

BAW = Bureau of Air and Waste
CO = Carbon monoxide
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CEMS = Continuous Emission Monitors
COMS = Continuous Opacity Monitors
DAHS = Data Acquisition and Handling System
EU = Emission Unit
EPA = Environmental Protection Agency
HAP = Hazardous Air Pollutants
HHV = Higher heating value
M.G.L. = Massachusetts General Laws
MMBtu = Million British thermal units
MMBtu/hr = Million British thermal units per hour
QA/QC = Quality assurance/quality control
scf = standard cubic feet
SCR = Selective Catalytic Reduction
SOMP = Standard Operation and Maintenance Procedures

TPY = Tons per consecutive 12-month period
ULSD = Ultra Low Sulfur Diesel
VOC = Volatile Organic Compounds

13. Special Terms and Conditions

A. The Permittee is subject to, and shall comply with, the Special Terms and Conditions as contained in Table 13, below:

Table 13	
EU	**Special Terms and Conditions**
10	1. The Permittee shall not operate EU 10 at less than 30% load while firing natural gas or ULSD, except during startups and shutdowns.
	2. The Permittee shall operate the SCR serving EU 10 whenever the flue gas temperature at the inlet to the SCR is above the minimum flue gas temperature specified by the SCR manufacturer and other system parameters are satisfied for SCR operation.
	3. The Permittee shall certify the CEMS and COMS serving EU 10 according the procedures and schedule in 40 CFR 75.
	4. The Permittee shall continue to operate the emission control system during periods of CEMS data unavailability.
	5. The Permittee shall maintain in the control room, at least two (2) portable ammonia detectors for use during an ammonia spill, or other emergency involving ammonia. The Permittee shall maintain the portable ammonia detectors according to manufacturer's recommendations.
	6. The Permittee shall comply with all applicable requirements of 40 CFR part 60, Subparts KKKK and TTTT.
	7. The Permittee shall develop as part of the SOMP for EU 10, an optimization protocol to establish conditions that maintain compliance with all emission limits at all ambient temperatures and conditions.
	8. The Permittee shall maintain an adequate supply of spare parts on-site to maximize the on-line availability and data capture of the CEMS and COMS equipment and to maximize the availability of the SCR and the oxidation catalyst.
	9. The Permittee shall not fire ULSD in EU 10 unless one of the following conditions apply: a) When ISO-NE declares an Emergency, as defined in ISO New England's Operating Procedure No. 21, No. 4, and No. 7, or declares a Scarcity Condition. b) When the operator of the natural gas transmission line issues a critical notice that disallows increases in nominations from where gas is received on their pipeline system to the point of delivery for the Project. c) When gas supplies cannot be procured or delivered at any price or are not available for purchase or delivery within the timeframe required to support operation of the Project. The Project will use all commercially reasonable efforts to switch to natural gas operation

Table 13	
EU	**Special Terms and Conditions**
	as soon as possible without jeopardizing the safety of equipment or operating personnel. d) If the Project is operating on natural gas and the supply or delivery is curtailed by the pipeline operator. In this situation, the Project will use all commercially reasonable efforts to switch back to natural gas operation as soon as it is again available without jeopardizing the safety of equipment or operating personnel. e) Any equipment (whether on-site or off-site) required to allow the turbine to operate on natural gas has failed including a physical blockage of the supply pipeline. f) During commissioning when the combustion turbine is required to operate on ULSD pursuant to the turbine manufacturer's written instructions. g) For emission testing purposes as specified in the Project's Plan Approval, PSD Permit or as required by MassDEP or other regulatory agencies with relevant authority. h) During routine maintenance if any equipment requires ULSD operation. i) In order to maintain an appropriate turnover of the on-site fuel oil inventory, ULSD can be used when the age of the fuel in the tank is greater than six months. A new waiting period for when ULSD can be used pursuant to this condition will commence once ULSD firing is stopped. The use of ULSD burned pursuant to this condition (ix) is limited to 4,000,000 gallons per rolling four-year period (rolling calendar years). Additionally, the Project shall not fire ULSD pursuant to conditions (g), (h) and (i) on any day when the air quality index for the area including Sandwich, MA is, or is forecast to be, 101 or greater. Fairhaven MA, which is the current AQI tabulation/prediction site closest to Sandwich MA, may be used for the reference AQI value for this condition. AQI is made available through the AIRNow web site at http://airnow.gov/index.cfm?action=airnow.local_city&cityid=74 (or its successor). If the AQI is re-scaled, "101" in this condition shall be replaced by an equivalent value indicating air quality Unhealthy for Sensitive Groups or worse. This provision does not apply to conditions (a) through (f).
11 & 12	10. The Permittee shall comply with the applicable requirements in 40 CFR 60 Subpart IIII.

<table>
<tr><th colspan="2">Table 13</th></tr>
<tr><th>EU</th><th>Special Terms and Conditions</th></tr>
<tr><td>Project-wide</td><td>11. The Permittee shall design, construct, operate and maintain the Project such that at all times:

a. No condition of air pollution will be caused by emission of sounds as provided in 310 CMR 7.01;

b. No sound emission resulting in noise will occur as provided in 310 CMR 7.10 and MassDEP's Policy DAQC 90-001; and

c. Daytime and nighttime sound emissions from the Project will not exceed the levels below, at the receptors described in the Comprehensive Plan Application for this Plan Approval:

<table>
<tr><th>Receptor</th><th>Increase above Existing Ambient Sound Level (dBA)</th></tr>
<tr><td>ST- 1</td><td>6</td></tr>
<tr><td>ST-2</td><td>7</td></tr>
<tr><td>ST-3</td><td>3</td></tr>
<tr><td>ST-4</td><td>3</td></tr>
<tr><td>ST-5</td><td>2</td></tr>
<tr><td>ST-6</td><td>5</td></tr>
<tr><td>ST-7</td><td>2</td></tr>
</table>
</td></tr>
<tr><td></td><td>12. The Permittee shall properly train all personnel to operate the Project and the control and monitoring equipment in accordance with manufacturer specifications. All persons responsible for the operation of the Project shall sign a statement affirming that they have read and understand the approved SOMP. The Permittee shall give refresher training to Project personnel at least annually.</td></tr>
<tr><td></td><td>13. The Permittee shall minimize fugitive dust emissions during construction of the Project so as not to cause a condition of air pollution, using at least, but not limited to, the following mitigation measures:

• Water construction areas, access roads, and staging areas as needed;
• Cover trucks hauling soils and other loose materials;
• Cover inactive stockpiles of soils and other excavated materials;
• Pave access roads when possible; and
• Limit vehicles to 15 miles per hour on unpaved areas.</td></tr>
<tr><td></td><td>14. The Permittee shall determine compliance with the annual CO_2e emission limit in Table 13 of</td></tr>
</table>

Table 13	
EU	**Special Terms and Conditions**
	the Plan Approval using the calculation procedures in 40 CFR 98.
	15. Beginning one year after the commencement of commercial operation, the Permittee shall demonstrate the Project's compliance status with the consecutive 12-month period CO_2e emission limit for EU 10.
	16. The Permittee shall only accept delivery of ULSD with a sulfur content no greater than 0.0015 percent by weight.
	17. The Permittee shall comply with all provisions of 40 CFR 72 and 75, 40 CFR 60, 40 CFR 63, 40 CFR 64, 40 CFR 68, 40 CFR Part 98, and 310 CMR 6.00 through 8.00 that are applicable to this Project.
	18. The Permittee shall comply with the requirements of 310 CMR 7.72 Reducing Sulfur Hexafluoride Emissions from Gas-insulated Switchgear.
	19. All requirements of this Plan Approval that apply to the Permittee shall apply to all subsequent owners and/or operators of the Project.

Table 13

EU	Special Terms and Conditions

20. GHG Reductions: To ensure that the Project will not cause or contribute to a condition of air pollution, and will help the Commonwealth achieve the mandated limits to reduce GHG emissions by 25% from the 1990 emission levels by the year 2020 and by 80% from the 1990 emission level by the year 2050, as required under the GWSA and the Supreme Judicial Court decision in *Kain v. DEP*, MassDEP is including the following declining annual CO_{2e} emission limits on the Project. MassDEP is also including conditions in this Plan Approval that will ensure that the Permittee demonstrates compliance with the actual CO_{2e} limit for each calendar year. Therefore, the Permittee shall ensure that the annual emissions of CO_{2e} from the Project at the date of commencement of commercial operation of the Project shall not exceed 810,500 tons per year ("tpy"). Thereafter, the CO_{2e} limit shall be reduced by 2.5% from the preceding year. Starting in 2026, the limit shall not exceed 622,012 tpy and thereafter shall be reduced 2.5% from the preceding year.

Year	CO_{2e} Limit (tpy)	Year	CO_{2e} Limit (tpy)	Year	CO_{2e} Limit (tpy)
2019	810,500	2030	562,104	2041	425,469
2020	790,238	2031	548,052	2042	414,832
2021	770,482	2032	534,350	2043	404,461
2022	751,220	2033	520,992	2044	394,350
2023	732,439	2034	507,967	2045	384,491
2024	714,128	2035	495,268	2046	374,879
2025	696,275	2036	482,886	2047	365,507
2026	622,012	2037	470,814	2048	356,369
2027	606,461	2038	459,044	2049	347,460
2028	591,300	2039	447,567	2050	338,773
2029	576,517	2040	436,378		

21. Compliance: The Permittee shall demonstrate compliance in achieving the CO_{2e} limit in each calendar year by:

    (a) Controlling operations at the Project to limit Actual CO_{2e} Emissions to a level at or below the applicable year's CO_{2e} limit, or

    (b) In the event that the emissions units are required to operate in order to meet the Project's obligation to ISO-New England and to ensure a reliable supply of electricity in the Commonwealth, and the resulting Actual CO_{2e} Emissions exceed the applicable CO_{2e} limit, the owner or operator of the Project may demonstrate compliance by retiring credits, as set forth in item 22 below, to offset the amount by which the Actual CO_{2e} Emissions exceed the CO_{2e} limit. In no case shall the Project shall operate at greater than a 43% capacity factor over a rolling 36-month average.

Table 13	
EU	**Special Terms and Conditions**
	22. Over Compliance Credits: For purposes of demonstrating compliance with the CO_{2e} limit, the owner or operator may use over compliance credits which may be created as follows. In any calendar year in which the Project's actual annual project-wide emissions of CO_{2e} are less than the Project's CO_{2e} limit, the difference (in tpy) between Actual CO_{2e} Emissions and the CO_{2e} limit for such calendar year shall be deemed over compliance credits generated at the following rates: (a) For CO_{2e} Over Compliance Credits created from 2019-2022: Offset = 90% (b) For CO_{2e} Over Compliance Credits created from 2023-2027: Offset = 80% (c) For CO_{2e} Over Compliance Credits created from 2028-2032: Offset = 70% (d) For CO_{2e} Over Compliance Credits created from 2033-2037: Offset = 60% (e) For CO_{2e} Over Compliance Credits created from 2038-2047: Offset = 50% (f) CO_{2e} Over Compliance Credits may not be created after 2047
	23. The declining annual CO_{2e} emissions limits established by this Plan Approval, and related compliance requirements, shall be superseded by any declining annual greenhouse gas emissions limits and compliance requirements applicable to this Project established by regulation promulgated under the authority of section 3(d) of Chapter 21N, commonly known as the Global Warming Solutions Act, and Executive Order 569. Upon the effective date of such regulation, the declining annual CO_{2e} emission limits established in Table 13, Condition 20, and included in the Section 61 Finding in Section 14 below and related compliance requirements shall become null and void.

Table 13 Key:

BTU = British thermal units
CO = Carbon monoxide
CO_2 = Carbon dioxide
CO_2e = Carbon dioxide equivalents
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CEMS = Continuous Emission Monitors
COMS = Continuous Opacity Monitors
CTG = Combustion turbine generator
dBA = Decibel A weighted
EPA = Environmental Protection Agency
EU = Emission Unit
GE = General Electric
GHG = Greenhouse gases
ISO-NE = ISO New England
lb/MMBtu = Pounds per million British thermal units
MMBtu = Million British thermal units
MWH = Megawatt hour
NH_3 = Ammonia

NOx = Nitrogen oxides
PM = Particulate matter
ppm = parts per million
ppmvd = parts per million by volume, dry basis
% = Percent
SOMP = Standard Operating and Maintenance Procedures
SCR = Selective Catalytic Reduction
SO_2 = Sulfur dioxide
tpy = tons per year
ULSD = Ultra Low Sulfur Diesel
VOC = Volatile organic compounds

B. The Permittee shall install and use an exhaust stack, as required in Table 14, below, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. The Permittee shall configure each exhaust stack to discharge the gases vertically and shall not equip exhaust stacks with any part or device that restricts the vertical exhaust flow of the emitted gases, including, but not limited to, rain protection devices known as "shanty caps" and "egg beaters."

C. The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 14, below, for the Emission Units regulated by this Plan Approval:

Table 14

Stacks

EU	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions (feet)	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (°F)
10	220	25	75.1 – 135.9	750
11	25	0.75	139.3	887.1
12	25	0.33	127.0	809.0

Table 14 Key:

°F = degrees Fahrenheit
EU = Emission Unit

14. MEPA Section 61 Conditions

The Permittee shall comply with the following findings made under Chapter 30 Section 61 of the Massachusetts Environmental Policy Act:

Air Quality

- Use of natural gas as primary fuel, with restriction of ULSD (backup fuel) to periods when natural gas is not reasonably available, and for no more than 720 hours per year;
- Use of emissions controls to meet New Source Performance Standards (NSPS), BACT, and LAER requirements, as applicable.
  - Control NOx emissions through the use of DLN burners and an SCR system;
  - Minimize emissions of SO_2, $PM_{10}/PM_{2.5}$ and H_2SO_4 through the use of natural gas as the primary fuel and limited firing with 15 ppmw sulfur content ULSD;
  - Injection of demineralized water into the combustion chamber during ULSD firing to lower the flame temperature and associated thermal NOx formation;
  - Use of an oxidation catalyst system to control CO and VOC emissions;
  - Use of an NH_3 injection grid before reaching the SCR system to control NOx;
  - Direct exhaust gases to the stack equipped with CEMS to allow for real-time emissions concentration monitoring to signal if concentrations approach or exceed permit levels for NOx, CO, and opacity;
  - Obtain NOx offsets at minimum ratio of 1.26:1 (for 131.4 tpy) prior to issuance of Air Plan Approval from MassDEP; and
  - Emergency engines will use ULSD for a maximum of 300 hours per year and meet EPA Tier 4 Alternate FEL Cap (EDG) or Tier 3 (fire pump) engine emissions requirements consistent with 40 CFR 60 Subpart IIII.
- Meet air Plan Approval and PSD Permit emissions limits through a combination of testing, monitoring, and recordkeeping including:
  - CEMS;
  - Periodic stack testing;
  - Continual tracking of operating parameters;
  - Fuel sampling; and
  - Emissions factors and manufacturers' certification.

Greenhouse Gas Emissions

- Use of a high-efficiency combustion turbine capable of meeting the Project's stated goal of participating in the TMNSR market.
- Adoption of evaporative cooling, high-efficiency auxiliary power sources and premium high- efficiency motors to achieve an additional 605-tpy GHG reduction compared to a Base Case Plant.
- Use of turbine exhaust gas waste heat for SCR ammonia vaporization which will achieve 474 tpy GHG reduction.
- Commitment to continue to evaluate gas compressor selection, that if adopted, may reduce GHG emissions an additional 43 tpy.

These measures include:
  - Gas compressor selection;
  - Fuel gas performance heating;
- Construct, operate, and maintain the on-site natural gas pipeline in accordance with all applicable regulatory requirements to reduce potential fugitive methane emission. The Proponent will prepare and implement an operation and maintenance plan, perform periodic leak checks and promptly repair leaks, and will be responsible for the inspection, maintenance, and repair of the pipeline.
- Declining Annual CO_{2e} Emissions Limits on the Project and conditions to demonstrate compliance with the actual CO_{2e} limit for each calendar year as required under Table 13, conditions 20-23.
- Adoption of energy efficiency measures as part of the repurposing of the existing 4,000-sf Training Building that will reduce building-related GI IG emissions by 20 tpy from 66 tpy to 46 tpy. These energy efficiency measures include:
  - Increase roof insulation (R-38);
  - Improve window performance (insulated low-e windows (R-3.5));
  - Increase wall insulation (R-35);
  - Installation of new exterior insulated doors with gasketing (R-13);
  - Installation of new entrance doors and curtainwall (R-3.5);
  - Add sunshades on windows;
  - Installation of new LED lighting fixtures with motion controls and dimmers;
  - Installation of new WaterSense plumbing fixtures; and
  - Replace all four existing HVAC units (energy efficiency rating (EER 9.5)) with new units with similar output and EER 12.1.

Noise

- Increased casing thickness for the SCR and an acoustic shroud that will envelop the exhaust gas diffuser and the transition duct from the combustion turbine exhaust to the SCR casing;
- Additional exhaust silencing to reduce stack outlet noise;
- Enclosures around the gas turbine, lube oil skid, and generator;
- Lowered height of the tempering air fan inlet plenum box from 50 feet above grade to 35 feet above grade;
- Orientation of the tempering air inlet away from sensitive receptor locations;
- A noise barrier near the tempering air fans;
- Use of low-noise fans for the cooling module and an associated noise barrier;
- Use of acoustically-treated walls for the fuel gas compressor enclosure;
- Use of a low-noise generator step-up transformer;
- Use of turbine inlets equipped with an 8-foot silencer with an acoustically-lined weather hood; and
- Improvements to existing Units l and 2 to ensure minimization of cumulative noise

impacts. These may include:

- Installing lagging or partial enclosures for the Unit 1 and 2 hopper vibrator systems;
- Refurbishment of lined inlet and noise baffling system for the Unit 2 FD fans; and
- Installation of noise barrier walls for Units 1 and 2 service and main transformers.

- Conduct post-construction noise monitoring to demonstrate compliance with the applicable noise policies/bylaw and the results of the noise assessment. The Proponent will require noise guarantees from major equipment vendors and the Engineering, Procurement and Construction (EPC) contractor. Near-field measurements of sound levels from major equipment and at the Station property boundary will be required by the Proponent to demonstrate noise compliance prior to accepting the project.

Construction Period

- Compliance with the MassDEP's Clean Air Construction Initiative, including but not limited to: use of ULSD in all diesel powered non-road vehicles, ensuring that all non-road engines meet applicable emissions standards pursuant to 40 CFR 89.122, ensuring that all diesel powered non-road engines greater than 50 hp used for 30 or more days over the course of the construction period have EPA-verified (or equivalent) emissions control devices, that all diesel engines on equipment not in active use are turned off, that all dump trucks idling for 5 minutes or more are turned off, and establishing a staging area for truck waiting to load or unload material;
- Noise mitigation measures will include, but not be limited to: the use of mufflers, using less noisy construction techniques (where feasible), and selecting the quietest equipment alternatives (where feasible), scheduling the noisiest construction activities during daylight hours, turning off idling equipment, and locating noisy equipment at locations that protect sensitive locations through shielding or distance;
- Construction equipment will comply with the construction hour limits specified by the Town of Sandwich Noise Bylaw;
- Use suppression measures such as water trucks to wet surfaces, stabilization of soils, creation of wind breaks, and stabilized entrance/exit points to control fugitive dust;
- Preparation and implementation of an erosion and sediment control plan that meets current EPA, MassDEP, CCC and Town of Sandwich requirements and guidelines and addresses, at a minimum, storage and handling of hazardous materials, inspection/maintenance/recordkeeping requirements, and construction sequencing;
- Contractors will meet all applicable regulatory requirements regarding handling and disposal of construction waste and debris and recycling procedures and goals will be set in contracts in compliance with the goals of the Massachusetts Solid Waste Master Plan and Proponent (NRG) sustainability requirements;

- Implementation of a traffic construction management plan in coordination with the Town of Sandwich. This plan will include, but not be limited to, construction of a dedicated construction site entrance separate from the existing Station entrance, establishment of programs to encourage carpooling by construction workers, designation of on-site construction-worker parking, establishment of on-site waiting and staging areas for material deliveries to manage truck traffic, and scheduling of material deliveries during off-peak travel periods; and
- Construction of a temporary walkway and subsequent repair, in kind, of a small section of Canal Service Road to connect underground ULSD pipe from the Canal Station dock.

15. General Conditions

The Permittee is subject to, and shall comply with, the following general conditions:

A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Project, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Project, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.

C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Project, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or EPA personnel access to the Project, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.

E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local laws or regulations now or in the future.

F. The Application is incorporated into this Plan Approval by reference. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.

G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.

H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.

J. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

Should you have any questions concerning this Plan Approval, please contact the undersigned at MassDEP's Southeast Regional Office, Bureau of Air and Waste by telephone at 508-946-2824, by email at Thomas.Cushing@State.ma.us or in writing at the letterhead address.

Thomas Cushing
Permit Chief
Bureau of Air and Waste

Enclosures:
None, Stamped Comprehensive Plan Application to be included upon issuance of final approval

cc: Sandwich Board of Health
Sandwich Fire Department
M. Garcia-Serrano, Regional Director, SERO
M. Pinaud, Deputy Regional Director, BAW, SERO
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