STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: Application of Invenergy Thermal Development LLC's Proposal for Clear River Energy Center — Docket No. SB-2015-06

**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-1 a — What is the blast radius of 3,000 scf of hydrogen gas?

RESPONSE 27-1 a — In Invenergy Thermal Development LLC's ("Invenergy's") Responses to the Town of Burrillville ("Town's") 17th Set of Data Requests, Invenergy attached a study, dated October 27, 2016, which was conducted to evaluate the probability of an explosion happening at the Clear River Energy Center ("CREC" or "Project" or "Facility") either due to a natural gas or hydrogen source, and the extent of the potential impact area where a 1 psig overpressure would occur. This study highlights the methodology, assumptions and the potential impact radius. The study assumed approximately 22,000 SCF of hydrogen for the blast radius calculations, which is well above the 3,000 SCF of hydrogen requested in this particular question. The potentially impacted area from a 3,000 SCF hydrogen explosion would be much smaller than that presented in this study. *See* **Exhibit 27-1.**

RESPONDENT: Harri Kytomaa, Exponent, Inc.

DATE: July 18, 2017

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IN RE: Application of Invenergy Thermal Development LLC's Proposal for Clear River Energy Center — Docket No. SB-2015-06

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| Request 27-1 b | What is the blast radius of 15,000 scf of hydrogen gas? |
| RESPONSE 27-1 b | See response to Request 27-1a. All smaller quantities of hydrogen than those addressed in the subject study would have blast radii smaller than that identified in the study conducted to address the Town's Data Requests, Set 17. |
| RESPONDENT: | Harri Kytomaa, Exponent, Inc. |
| DATE: | July 18, 2017 |

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-1 c — What is the blast radius if hydrogen gas and natural gas from the proposed plant exploded?

RESPONSE 27-1 c — Exponent has prepared a supplement to its initial analysis that was issued October 27, 2016 and attached to the Town's 17th Set of Data Requests. See supplemental analysis, attached as **Exhibit 27-1**.

In **Exhibit 27-1**, Exponent evaluated the probability of the simultaneous release of hydrogen and natural gas at CREC and that release leading to an event of an explosion. They determined the likelihood of the occurrence of an explosion involving an accidental and simultaneous release of hydrogen and natural gas is anticipated to be on the order of $10^{-9}$ to $10^{-10}$/yr, or once every 1 billion to 10 billion years.

RESPONDENT: Harri Kytomaa, Exponent, Inc.

DATE: July 18, 2017

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Request 27-1 d — What is the blast radius if hydrogen gas and natural gas from the proposed project and Algonquin /Spectra compressor station exploded?

RESPONSE 27-1 d — Invenergy contacted Spectra with regard to the potential of an explosion at the Spectra/Algonquin compressor station which could cause damage at CREC. Spectra provided the letter attached as part of the response to the Town's Data Request No. 17-1. The letter highlighted the diligence associated with safe operation and maintenance of natural gas compressor facilities, and outlines the federal standards Spectra uses for the design and maintenance of their facilities. In its letter, Spectra advises that their Integrity Management Program has determined the Potential Impact Radius ("PIR") of a possible event, and the PIR is limited to their site and more specifically the fenced area of their site (as it relates to an event at the BCS itself).

The blast radius associated with the combined release of hydrogen gas and natural gas from both the CREC facility and the Algonquin /Spectra compressor station was not evaluated. This scenario could not be studied since there is insufficient information regarding the gas inventory present at the Algonquin/Spectra compressor station. However, it should be noted that this hypothetical simultaneous release scenario resulting in a vapor cloud explosion has a probability of occurrence that is orders of magnitude lower than of once every 10 billion years. In addition, since the equipment at the two facilities are more than 750 feet apart, the flammable releases of hydrogen and natural gas generated at each facility would need to be transported by the atmospheric wind and mix together within a congested area while they are still in the flammable range. This would further lower the likelihood of a catastrophic gas explosion involving accidental and simultaneous releases at both facilities.

RESPONDENT: Harri Kytomaa, Exponent, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

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| Request 27-2 | What is the evacuation zone for the project? Please explain. |
| RESPONSE 27-2 | There is no evacuation zone for the Project nor is one required. There are no anticipated Project conditions which would require an evacuation. |
| RESPONDENT: | Michael Feinblatt, ESS Group, Inc. |
| DATE: | July 18, 2017 |

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

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| Request 27-3 | Why has Invenergy chosen to use compressed hydrogen gas for its emission reductions instead of Nitrogen gas? |
| RESPONSE 27-3 | CREC will be using hydrogen gas as a coolant for the generator and not as a medium to reduce emissions. |
| RESPONDENT: | Michael Feinblatt, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-4 Hydrogen tube trailer(s):

(a) How many scf (standard cubic feet) of hydrogen will be stored via the tube trailers at the facility?

(b) How many "hydrogen tubes" will be contained in one hydrogen tube trailer?

(c) How many hydrogen tube trailers will be stored at the facility at one given time?

(d) What is the maximum number of hydrogen tube trailers that could be stored at the facility at one time?

(e) How many smaller hydrogen cylinders will be stored at the facility at one given time, i.e. hydrogen cylinders not on the hydrogen tube trailer(s)?

RESPONSE 27-4 (a) A tube trailer contains approximately 50,000 SCF.

(b) It can be 6 or 9 tubes, and it depends on the supplier but the total volume will remain about 50,000 SCF.

(c) Two, one for each train.

(d) Two. There is a concrete pad associated with each unit to accommodate a hydrogen trailer.

(e) About 6 per unit.

RESPONDENT: Mark Wiitanen, HDR, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-5 Will any other pressurized gas be stored on site besides the hydrogen gas? If so, please list the type of gas, total scf stored on site, size of cylinders, and number of cylinders.

RESPONSE 27-5 Other compressed gases and their approximate expected quantities that would be stored at the Facility include :

- 10 bottles of Oxygen/Acetylene (~2,500 SCF each) for construction support
- 25 bottles of Argon (~6,250 SCF) for welding during construction
- 6 bottles of CO2/Nitrogen cylinders (~ 1,500 SCF each) for each unit that may be used for purging of systems during the operational phase of the facility
- Gas Chromatograph calibration gas that may be used during the operational phase
    - 1 bottle of Helium (~250 SCF) per unit
    - 1 bottle of Nitrogen (~250 SCF) per unit
    - 1 bottle of Hydrogen (~250 SCF) per unit
- CEMS calibration gas that may be used during the operation phase
    - NO (H) 0-250ppm – 1 bottle per unit
    - NO (L) 0-10ppm – 1 bottle per unit
    - CO(L) 0-20ppm – 1 bottle per unit
    - O2 0-25% - 1 bottle per unit
    - Nitrogen – 1 bottle per unit

RESPONDENT: Mark Wiitanen, HDR, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-6 What are the companies from which Invenergy/CREC may purchase the following:

(a) ULSD?

(b) Ammonia?

(c) Hydrogen tube trailers?

(d) Demineralization trailers?

RESPONSE 27-6 CREC does not yet have a contractual agreement with any of these suppliers, since such contracts are routinely not entered into until after a facility has received all necessary permits. However, CREC has engaged a few suppliers for preliminary discussion on feasibility, interest and cost. Below is a list of suppliers that have been contacted:

(a) Sprague Operating Resources

(b) Borden & Remington Co. and The Chemical Company

(c) No supplier has been contacted at this point. However Airgas, Air Liquide and Praxair are common suppliers of this particular gas throughout North America and will be contacted at a later date.

(d) GE Water and Process Technologies and Evoqua Water Technologies LLC

RESPONDENT: John Niland, Invenergy Thermal Development LLC

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-7 What are the possible routes of the following:

(a) ULSD tankers will take?

(b) Ammonia tankers will take?

(c) Hydrogen Tube Trailers will take?

(d) Demineralization trailers will take?

RESPONSE 27-7 **Exhibit 27-7** details the routes from potential suppliers for ULSD, Ammonia, and Demineralizer Trailers. Currently, Invenergy has not contacted any local suppliers for hydrogen supply and the potential routes are not available for the supply of hydrogen.

RESPONDENT: John Niland, Invenergy Thermal Development LLC

DATE: July 18, 2017

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| Request 27-8 | Will the proposed power plant be a peaker plant or a base plant? Please explain |
| RESPONSE 27-8 | The plant will be dispatched by ISO NE based on a merit order (i.e. lowest cost), and given CREC's high efficiency, it will be part of ISO NE's base load supply. That being said, CREC will also have fast start and high ramp rate capabilities and, as such, will also be capable of providing services normally provided by peaking plants. |
| RESPONDENT: | John Niland, Invenergy Thermal Development LLC |
| DATE: | July 18, 2017 |

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| Request 27-9 | Is Invenergy/CREC able to guarantee that there will be no blasting during construction? Please explain. |
| RESPONSE 27-9 | Yes. Based on the geotechnical information currently available for the CREC site and the anticipated elevation of grade at various points around the site, a minimal amount of rock removal (less than 5,000 cubic yards) may be required for excavations for the CREC project, and this can be accomplished with mechanical means. |
| RESPONDENT: | Mark Wiitanen, HDR, Inc. |
| DATE: | July 18, 2017 |

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| Request 27-10 | Will there be on-site permanent housing for contractors during construction? Please explain. |
| RESPONSE 27-10 | No. CREC does not plan on having on-site housing for the workforce that will be employed during construction. On-site housing is usually provided only for projects that are in remote areas. |
| RESPONDENT: | John Niland, Clear River Energy |
| DATE: | July 18, 2017 |

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-11 What is the estimated ammonia emissions in pounds per year which will be released from the ammonia tank and the piping systems?

RESPONSE 27-11 The ammonia emissions from the CREC ammonia tank and the piping systems will be insignificant by design, and there are no appropriate correlations available to accurately estimate vapor losses from pressure tanks.

The ammonia storage tank and piping will specifically be designed to keep ammonia losses to the environment to an absolute minimum. The storage tank will be designed as a pressure tank and will include a pressure/vacuum relief valve that maintains tank pressure during normal operation, thus preventing any venting of ammonia from the tank during normal storage and operation.

There will be two permanent connections on the aqueous ammonia storage tank, a vapor return connection and a tank fill connection. During a filling event, two hose connections will be made between the storage tank and the delivery truck, one to the fill line of the storage tank and the other to the vapor return connection on the tank. The aqueous ammonia delivery truck will be equipped with an on-truck pump that transfers the aqueous ammonia solution from the delivery truck to the storage tank and returns the vapor from the storage tank back to the delivery truck. By using this delivery system, there will be no venting of ammonia from either the delivery truck or from the storage tank during a filling event.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-12

(a) Why isn't there a maximum water demand/need per year set forth in the new "Water Supply Plan" and in the signed Water Agreement with Johnston? Please explain.

(b) What prevents the proposed facility from using over and above the maximum number of water trucks listed in the "Water Supply Plan"? Please explain.

(c) Is there anything in the Johnston contract that allows the facility to use more water other than the words "approximately" or "estimated to be"? Please explain.

(d) Can you guarantee that the proposed facility will always use the volume of water as outlined in the new "Water Supply Plan"? If not, what is Invenergy's/CREC's estimated/approximated maximum water demand/year? Please explain.

(e) Can you guarantee that the proposed facility will always use the recycling system as outlined in the new "Water Supply Plan"? Please explain.

RESPONSE 27-12

(a) As depicted in the Water Supply Plan (the "Plan"), Figure 2.3 (water source capacity), the annual water demand for CREC will be just a small fraction of the available capacity of the Providence Water Supply and the Town of Johnston water supply system will not be affected in its ability to supply water to its current and future customers. Therefore, a maximum water demand for the CREC facility was not a part of the discussion with the Town of Johnston.

Furthermore, CREC's annual water use will vary with plant load, ambient air temperature and to the extent the Facility is required to fire distillate oil. As such, CREC's actual water use will vary from year to year based on the above factors and the need for electricity from CREC, all of which are outside of CREC's control.

(b) The CREC water demand provided is a conservative analysis of the water needs of the Facility assuming the Facility is operated at its maximum capacity throughout the year. CREC conservatively estimated the maximum number of water trucks for each season that includes up to 3 additional trucks per day for evaporative cooling which was assumed for the entire summer season and the study accounts for 3 days of oil firing. Invenergy expects that the number of trucks represented in the Plan should be the

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maximum expected number of trucks on an annual basis since the facility will not be operating at full load every day of the year.

(c) The Johnston water supply contract does limit the maximum number of trucks per day for a refill event. This is the maximum demand flow rate that CREC can use. CREC's water use is outlined in the water plan and limited to those services (steam cycle make up, evaporative cooling and injection for emissions control when firing oil) required by the Project. The only variable to those uses is how often CREC runs, on gas and oil, and the estimated demands were based on operational projections that assumed the plant would be running every day at its maximum output.

(d) The water demand provided in the Plan is the projected maximum water demand, but this water demand is not guaranteed to account for variability in weather outside of CREC's control. As an example, the study accounts for 3 days of oil firing, should there be another event that requires the need for operating on distillate oil, the water demand would be higher.

The Water Supply Plan included Figure 2.3 "Comparison: CREC Annual Water Usage, Average Day Demand (Projected – 2030) and Safe Yield (83MGD)," which provided a comparison of a conservative estimate of the CREC annual water use with the Safe Yield of the Providence Water Supply System. To make this comparison, CREC estimated its annual water use based on the following conservative assumptions:

- The CREC Facility will operate every day of the year at full load
- A conservative approach to estimating evaporative cooling water use assuming evaporative cooler water use rate for as much as 8 hours per day with an ambient air that represents a 90 $^0$F and 45% RH day for a total of 90 days, and
- The CREC Facility will be required to operate for a total of 3 days of distillate oil firing.

Under these conservative assumptions, the CREC's estimated annual water use would be 11.5 million gallons, which is 0.038% of the Safe Yield of the Providence Water Supply system.

If the conditions remain as specified in the Plan, then the water demand could be viewed as a maximum water demand.

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(e) Yes. The water mass balance provided in the Water Supply Plan stated that the HRSG blowdown water would be sent to the Wastewater Collection Tank during start-up and upset condition. This statement is being superseded by "just upset condition." In essence, the HRSG blowdown will be recycled directly to the Service water/Fire water tank at all times but for upset conditions. An upset condition, although rare, could occur if the recycling system, including the filtration system failed to operate. In this case, the HRSG blowdown would be sent to the Waste Water Collection Tank and then recycled back into the Service Water Tank. Either way, the Facility will recycle the HRSG blowdown at all times.

RESPONDENT: George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-13 On page 5 of "Water Supply Plan" it states: "Based on the annual average cycle makeup water demand, this is equivalent to approximately one trailer needing to be regenerated per month. To provide operational flexibility and avoid trailer demurrage charges, a higher volume of water may be processed through the demineralizer trailers than required for plant operation and the excess water stored in the demineralized water storage tank. Each demineralizer trailer is able to make approximately 400 gallons per minute of demineralized water from the municipal water supplied to the Facility."

Is Invenergy/CREC planning to have an option of utilizing more than one demineralizer trailer at a time?

RESPONSE 27-13 CREC does not plan on operating more than one demineralizer trailer at any given point in time. There is a space allocation for an additional trailer in conjunction with a design that facilitates ease of hook up of the second trailer during change out of the exhausted trailer.

RESPONDENT: George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-14 How quickly (minutes) will the CREC facility be able to shut down in case of fire? Please explain.

RESPONSE 27-14 Depending on the location and severity of the situation, the plant may be shut down manually by operations staff or automatically by the fire protection systems. A normal shutdown sequence, initiated by the operations staff, would shut down the unit in 12 minutes from initiation. If the fire is in a location that is critical to the integrity of the main equipment, the protection system can take the unit off-line immediately. This action is called an emergency trip. Operations staff also have the option to instantly remove the unit from service through a manual trip button. Either of these trip events will shut the unit down in a few seconds.

RESPONDENT: Mark Wiitanen, HDR, Inc.

DATE: July 18, 2017

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| Request 27-15 | Will the emergency shutdown procedure time-frame be different when firing 2 turbines on natural gas vs 1 turbine firing natural gas and 1 turbine firing ULSD? Please explain. |
| RESPONSE 27-15 | No. The shutdown procedure applies to each unit and is independent of the other unit whether it operates on natural gas or ULSD. |
| RESPONDENT: | Mark Wiitanen, HDR, Inc. |
| DATE: | July 18, 2017 |

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Request 27-16 Spectra has provided an "evacuation zone" and an "incineration zone" for all of its compressor stations (already built and in process of acquiring permits from FERC). Please provide a map showing both the CREC and Algonquin/Spectra compressor station "evacuation zone" and "incineration zone".

RESPONSE 27-16 Spectra has no "evacuation zone" or "incineration zone" for of its compressor station. Likewise, CREC does not have an "evacuation zone" or "incineration zone." Invenergy contacted Spectra with regard to this question, and Spectra provided the letter attached as part of the response to the Town's Data Request No. 17-1 that highlighted the diligence associated with safe operation and maintenance of natural gas compressor facilities and outlines the federal standards they use for the design and maintenance of their facilities. In their response, Spectra indicates that their Integrity Management Program has determined the PIR of a possible event, and the PIR is limited to their site and more specifically the fenced area of their site (as it relates to an event at the BCS itself).

RESPONDENT: Mike Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-17 — Will the Demineralizer trailer be "stored" on a site with secondary containment? If the Demineralizer leaks to the ground surface will this water affect the wetlands in the area? Please explain.

RESPONSE 27-17 — Demineralizer trailers will be parked indoors in an area designated for their use. The area will have floor drains connected to the floor drain system that is connected to the oily water separator, so any leaks will not migrate to the local wetland area. This area does not require a secondary containment as the only materials stored in the demineralizer trailers are ion exchange resin beads (a solid) and water in contact with the ion exchange resin beads. There are no chemicals stored in the demineralizer trailers as all chemical regeneration of the demineralizer trailers occurs off-site at the demineralizer trailer supplier's regeneration station.

RESPONDENT: George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-18

On page 8 of the "Water Supply Plan", it states: "Any wastewater stream that might be generated by the filtration system will be collected in a wastewater disposal tank or sump and hauled off-site for disposal at a POTW or other facility licensed to receive and treat these wastewaters. The filtered wastewater may still contain low amounts of oil/grease. The oil/grease can be removed by several types of filter pre-coats such as activated carbon....".

(a) What POTW has Invenergy either already contacted or is thinking about contacting?

(b) What chemicals found in the waste stream will make it impossible for a POTW to treat thus making it necessary for "other facility licensed to receive and treat these wastewaters"?

(c) What "other facility" (not a POTW) has Invenergy contacted or is thinking of contacting?

RESPONSE 27-18

(a) Currently, Invenergy has not contacted any POTW. Invenergy intends to contract with qualified contractors to haul away the process waste water for disposal at a POTW or facility licensed to receive and treat those wastewaters.

(b) There will be no chemicals in the CREC process wastewater streams that would prevent any POTW from being able to successfully receive and treat CREC process wastewaters. 40 CFR 423, Steam Electric Power Generating Point Source Category, specifically allows discharge to POTWs and identifies, under part 423.17, specific pretreatment standards that must be met for electric generating facilities that plan to discharge wastewaters to a POTW. A projection of the CREC process wastewater composition was included in Table 3.1 of the Water Supply Plan, which fully meets the part 423.17 pretreatment standards for discharges to POTWs.

On page 8 of the Water Supply Plan, CREC simply identified that other than POTWs, there are commercial wastewater treatment facilities that are also licensed to accept and treat industrial wastewaters that could be considered to receive CREC process wastewater.

(c) Invenergy has not contacted any commercial wastewater treatment facilities.

RESPONDENT: George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-19 What chemicals will be used to clean the boilers? Please supply MSDS sheets.

RESPONSE 27-19 During the construction phase, the HRSGs, once assembled, will be cleaned using a surfactant flush to remove any oil, dirt and mill scale. No chemical cleaning of the HRSGs is planned once the plant is operational.

**Exhibit 27-19** includes the MSDS sheets for typical chemicals used to perform the surfactant flush of HRSGs during construction. The selection of the actual chemicals to be used for the CREC will be by the engineer procurement and construction ("EPC") Contractor. The actual chemicals and procedures used for cleaning the HRSG and the power cycle piping systems will vary depending on the methods of the installation contractor selected to build the project. At the current stage of project development, no specific method of boiler cleaning has been identified.

RESPONDENT: George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-20 What other chemicals (liquid, gas, or solid) (hazardous or non-hazardous) not listed in the original application submitted to the EFSB, supplements, data request responses, or other written materials will be on site? Please provide the approximate storage quantities of each (gallons, liters, pounds, tons, scf, etc.) on site.

RESPONSE 27-20 The list of chemicals and products that may be used during construction, operation and maintenance of the Facility are included below. The quantities identified in the list below are typical for the type and scale of the power generation facility proposed for this Project.

- Surfactant (~1,000 gallons) – This product is the same as that identified in response 19 of this data request (used during construction);
- Amine (~ 1,000 gallons) (used during operations);
- Lubrication oil (~10,000-15,000 gallons) (used during operations);
- Hydraulic oil (~ 500-1,000 gallons) (used during operations);
- Propylene Glycol / water mixture (~ 20,000 gallons) (used during operations for closed cooling water system);
- Reagents for analyzers such as citric acid, amino acid reagent, potassium persulfate, sulfuric acid, chlorine reagent (~ 1 gallon each), these are stored in the Facilities laboratory. (used during operations);
- Corrosion Inhibitor's such as Cortec's vapor phase corrosion inhibitor (~ 20 lbs) and sodium molybdate (650 gallons) or other equivalent products (used during construction);
- Solvents, cleaners, degreasers such as simple green, denatured alcohol, paint thinners, mineral spirits, and lubricant (~ 10-15 gallons each) (used during construction);
- Motor oil, hydraulic oil (~ 50-100 gallons each) (used during construction) and
- Equipment fuel (~ 5,000 gallons) (used during construction).

RESPONDENT: Mark Wiitanen, HDR, Inc.

DATE: July 18, 2017

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Request 27-21

(a) What would be the blast radius of the total volume of hydrogen stored in a hydrogen tube trailer?

(b) What would be the blast radius of a pipeline explosion?

(c) What would be the blast radius of a natural gas explosion from the compressor station?

(d) What would be the blast radius of (a) & (b) together?

(e) What would be the blast radius of (a) & (c) together?

(f) What would be the blast radius of (a), (b) & (c) together?

RESPONSE 27-21

Exponent has conducted a study for CREC to define the zone that could be affected by the highly unlikely event of an explosion occurring simultaneously due to hydrogen and natural gas releases. Please see **Exhibit 27-1** for the study conducted by Exponent.

Invenergy is not responsible for the design of the gas compressor station and does not have the design parameters of the compressor station. These have not been factored for calculating of the zone impacted. However, in the response to the Town's Data Request No. 17-1, a letter from Spectra Energy has been provided that defines their position on Potential Impact Radius and their position on mischaracterization of blast radius.

(a) See **Exhibit 27-1**; it is 943 feet from the trailer concrete pad parking location.

(b) See **Exhibit 27-1**; it is 884 feet from the power block building. In **Exhibit 27-1**, Exponent evaluated the probability of the simultaneous release of hydrogen and natural gas at CREC and that release leading to an event of an explosion. Exponent determined the likelihood of the occurrence of an explosion involving an accidental and simultaneous release of hydrogen and natural gas is anticipated to be on the order of $10^{-9}$ to $10^{-10}$/yr, or once every 1 billion to 10 billion years.

(c) Invenergy does not have the information pertaining to the design of the compressor station to conduct this study. Spectra has advised their PIR is limited to within their fence line.

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(d) See **Exhibit 27-1**; it is up to 1,420 feet. As discussed in Exponent's October 27, 2016 report, and in **Exhibit 27-1**, the probability of having an accidental release form gas piping or process equipment that could lead to a catastrophic explosion is on the order of $10^{-4}$/yr, or once every 10,000 years. Furthermore, the probability of an explosion is most often found to be 1-2 orders of magnitude lower than the probability of the accidental release occurring. Thus, the likelihood of CREC facility suffering a catastrophic gas explosion involving an accidental and simultaneous release of hydrogen and natural gas is anticipated to be on the order of $10^{-9}$ to $10^{-10}$/yr, or once every 1 billion to 10 billion years.

(e) Invenergy does not have the information pertaining to the design of this compressor station to conduct this study.

(f) The blast radius associated with the combined release of hydrogen gas and natural gas from the CREC facility and the Algonquin/Spectra compressor station was not evaluated. This scenario could not be studied since there is insufficient information regarding the gas inventory present at the Algonquin/Spectra compressor station. However, it should be noted that this hypothetical simultaneous release scenario resulting in a vapor cloud explosion has a probability of occurrence that is orders of magnitude lower than of once every 10 billion years. In addition, since the equipment at the two facilities are more than 750 feet apart, the flammable releases generated at each facility would need to be transported by the atmospheric wind and mix together within a congested area while they are still in the flammable range. This would further lower the likelihood of a catastrophic gas explosion involving accidental and simultaneous releases at both facilities

RESPONDENT: Harri Kytomaa, Exponent, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-22

(a) Out of the 26 listed dual fired power plants how many are peaker plants? Please list by name, MW, and location.

(b) How many power plants on the list are firing natural gas directly from a main pipeline? Please list by name, MW, and location.

(c) How many power plants on the list have MW capacity of 100 MW or below? Please list by name, MW, and location.

(d) How many power plants on the list are owned by towns or cities and actually use electricity generated by them? Please list by name, MW, and location.

(e) How many (if any) power plants on this list are considered "at risk" by ISO-NE? Please list by name, MW, and location.

(f) Why weren't power plants (and corresponding data) which only fire distillate oil (as they also are called upon by ISO-NE during times when natural gas is in short supply) included in this list? Please explain.

RESPONSE 27-22

(a) The table previously provided in response to the Town's Data Request No. 18-2 was developed by ISO New England, and it does not designate units by type and as such we are not in a position to identify which plants are peaking plants. This list was just for plants that have dual fuel capability.

(b) There are two main pipelines that provide natural gas into the New England region, Algonquin ("AGT") and Tennessee Gas ("TGP"). Of the plants that were included in the list of 26 facilities (the list of dual fuel plants originally provided), only two can be considered to be located on the main gas pipeline, Ocean State Power and Bellingham Cogeneration Facility. Invenergy has included a map in **Exhibit 27-22(a)** which show the location of the power plants with respect to the main gas pipelines in CT, RI and MA.

(c) Invenergy has provided a revised list, (in response to question f below) which includes all oil and dual fuel plants and it includes their MW capacity. This list is included as **Exhibit 27-22(b).**

(d) Invenergy does not have the specific ownership data for all of the plants on the list of 26 plants.

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(e) The "At Risk Units" are listed by ISO-NE on page 28 of the 2017 Regional Electricity Outlook Report ( over 5,500 MW excerpted below) and the plants included in the **Exhibit 27-22(b)** that are deemed at risk have been identified in that table.


(f) The original list of 26 was for dual fuel plants only. The updated list (**Exhibit 27-22(b)**) includes all oil and dual fuel units.

RESPONDENT: John Niland, Invenergy Thermal Development LLC

DATE: July 18, 2017

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| Request 27-23 | Concerning Data Request Response #18-2:<br><br>a. Please provide the "publicly available spreadsheet" supposed to be found at https://www.iso-ne.com/static-assets/documents/2015/12/repf event data from may 2015.xlsx. This link cannot be accessed. |
| RESPONSE 27-23 a | Below is the updated link:<br><br>https://www.iso-ne.com/static-assets/documents/2017/01/rcpf_activation_data_2006_10_thru_present.zip |
| RESPONDENT: | John Niland, Invenergy Thermal Development LLC |
| DATE: | July 18, 2017 |

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Request 27-24 If the Facility is approved by the EFSB and the construction phase is over, the Service/Fire Water Storage tank and the Demineralized Water storage tank must be filled.

(a) How many tankers of water will be needed to fill these two tanks?

(b) How many tankers per day will there be and for how many days?

(c) Where are these tankers' "Truck Emissions" (Exhibit 4 of Data Request Response #22) in the table provided?

(d) What are these tankers' VOC, THC, CO, NOx, PM2.5, PM 10 and CO2 emissions for the period answered in #27 above (in lbs/day and total for the period of time provided in your answer to #27?

(e) How many times will the Demineralizer trailer need to be replaced over this period of time?

RESPONSE 27-24

(a) These tanks will be filled up as a part of the construction phase of the project, to facilitate the commissioning and check out of the applicable plant systems, which happens prior to the Facility being operational. Approximately 360 tanker truck trips will be needed to fill these two tanks.

(b) The initial fill of the water tanks will be conducted over a period of a couple of months, and it is anticipated that the maximum daily number of trucks will not exceed the value reported in the Water Supply Plan of 13 water tanker trucks per day.

(c) **Exhibit 27-24** provides an estimate of these tanker truck emissions.

(d) **Exhibit 27-24** provides an estimate of these tanker truck emissions.

(e) The demineralizer trailer will need to be replaced twice over this period of time.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.
George Bacon, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-25 If the Facility is approved by the EFSB and the construction phase is over, the Ammonia storage tank must be filled. Please answer the same questions as #27 (a) through (d) (above) for the ammonia tankers.

RESPONSE 27-25

(a) This tank will be filled up as a part of the construction phase of the project, to facilitate the commissioning and check out of the applicable plant system, which happens prior to the Facility being operational. Approximately 4 tanker truck trips will be needed to fill this tank.

(b) There will be one tanker truck trip per day on average over a week long period.

(c) **Exhibit 27-24** provides an estimate of these tanker truck emissions.

(d) **Exhibit 27-24** provides an estimate of these tanker truck emissions.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

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| Request 27-26 | Please revise the "Annual Emissions Summaries" Table (Exhibit 4 from Data Request Response #22) to include a "Filling of All Liquid Tanks Prior to Operations". Also, please provide calculations of the data. |
| RESPONSE 27-26 | No revision is necessary or required. The Annual Emissions Summaries Table included as Exhibit 4 to Invenergy's Responses to the Town's Data Request No. 22-45 provided a conservative estimate of the expected emissions from all project truck traffic during construction. **Exhibit 27-24** provides the data calculations for the trucks associated with filling all liquid tanks prior to operations. |
| RESPONDENT: | Michael Feinblatt, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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Request 27-27 If the only portions of the Facility's technology which has changed includes 1) changing from the RO/EDI to mobile Demineralizing systems and 2) maximum recycling of water:

(a) Why is the total volume to the "Steam/Water Cycle" changed from 54 gpm (in the original application "Average Ambient Conditions"- 2 turbines firing natural gas) to 33 gpm (in the new Water Supply Plan's "Average Ambient Conditions" — 2 turbines firing natural gas)?

(b) Why is the total volume to the "Steam/Water Cycle" changed from 63 gpm (in the original application "Summer Ambient Conditions" — 2 turbines firing natural gas) to 40 gpm (in the new Water Supply Plan's "Summer Ambient Conditions" — 2 turbines firing natural gas)?

RESPONSE 27-27

(a) The original application presented a conservative volume of steam/water cycle makeup to the HRSG assuming worst case steam cycle chemistry and system losses. After finalizing the selection of a power island equipment supplier and receipt of more refined information from the equipment supplier, the assumptions for HRSG blowdown rate and non-recoverable losses in the steam cycle were reduced. This decreased the steam/water cycle makeup requirements depicted on the water balances.

(b) Please see (a) above.

RESPONDENT: George Bacon, ESS Group, Inc.

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Request 27-28

Note 9 ("Facility Water Balance" Sheets 1-4, 2-4, and 3-4) and Note 14 ("Facility Water Balance" Sheet 4-4) state: "HRSG Blowdown will be routed to the wastewater collection tank only during startup and plant upset conditions."

(a) What will the gpm of water from this HRSG Blowdown be during startup of the plant?

(b) What are the possible "plant upset conditions"? Please list and describe in detail all possible "plant upset conditions" scenarios and state resulting gpm to the wastewater collection tank.

(c) This HRSG Blowdown (regardless of the plant function, i.e., startup or "plant upset conditions"), implies that this increase in flow to the wastewater collection tank will result in more wastewater tanker traffic to and from the facility.

1. Is this true? Please explain.
2. How many more wastewater tankers will be needed during a "normal" startup?
3. How many more wastewater tankers will be needed during each of the "plant upset conditions"?

RESPONSE 27-28

(a) Notes 9 and 14 on Facility Water Balance Sheets 1-4, 2-4, and 3-4 are not correct and need to be revised to indicate that blowdown is directed to the waste water tank only during upset conditions. During start up conditions, the blowdown water is sent to the service water/firewater tank. See updated water balance diagrams attached as **Exhibit 27-28**. The flow of HRSG blowdown is intermittent and will vary depending on the duration of the startup (i.e. the condition of the plant equipment: cold, warm, hot) and the state of the cycle water chemistry within the HRSG. The maximum expected flow during start up would be 170 gpm, which is approximately 7% of the steam cycle flow during start up. Normal blowdown flow is typically 0.5% to 1.0% of steam cycle flow. However, in both cases the water will be recycled back to the service water/firewater tank, so there is no increased water demand.

(b) The only upset condition that could cause all of the blowdown flow to be diverted to the wastewater collection tank is a mechanical or control system logic failure. Water system operational upsets are not expected to occur. If the plant did have upset and if this situation occurred during a startup condition and the HRSG blowdown had to be recycled through the

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wastewater system, there is a potential of increased waste water being generated, which does not necessarily correlate to increased wastewater trucks. The wastewater collection tank and the wastewater disposal tank/sump will be used as surge tanks to control the flow of wastewater and the number of trucks can be managed to remain the same. Secondly, the estimate of 1gpm of wastewater under normal operating conditions being discharged from the Facility is a conservative estimate given that the only other source going to the wastewater collection tank is from the oil water separator and that is not a continuous flow.

(c) While there may be plant conditions that lead to a temporary increase in flow to the wastewater collection tank, the majority of the water in that tank will be treated and recycled to the Fire/Service Water Tank.

1. No, Invenergy does not expect an increase in waste water truck traffic. Please see the response above to part (b).

2. The normal startup accounts for recycling of the blowdown water to the service water tank. Therefore, no additional truck trips will be generated during the startup, normal operation, and the shutdown of the plant than what was stated in the Water Supply Plan. Note 9 of the water mass balances provided as a part of the Water Supply Plan that states the blowdown stream would be sent to the waste water collection tank during startup has been modified to upset condition only.

3. The wastewater collection tank and the wastewater sump/disposal tank will act as a buffer to avoid having more truck traffic due to wastewater discharge. This additional water can be discharged over time and would not increase the wastewater disposal truck traffic.

   Secondly, the size of the truck used to haul wastewater was assumed to be 3,200 gallons while evaluating the Water Supply Plan. Based on current discussions with licensed facilities, an 8,000 gallon truck can be utilized to dispose of the wastewater, which will reduce the truck traffic due to wastewater disposal.

RESPONDENT: George Bacon, ESS Group, Inc.

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| Request 27-29 | What are the Facility Startup water demands? Please explain with specifics. |
| RESPONSE 27-29 | The net plant water demand for startup during different ambient conditions will be the same as specified in the water balance drawings provided as a part of the Water Supply Plan due to recycling of the blowdown and the wastewater stream during the startup condition. |
| RESPONDENT: | George Bacon, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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| Request 27-30 | What are the Facility Shutdown water demands? Please explain with specifics. |
| RESPONSE 27-30 | Shutdown of the Facility requires 12 minutes, and the water demand is not more than the water demand in a normal operating condition as specified in the water balance drawings provided as a part of the Water Supply Plan. |
| RESPONDENT: | George Bacon, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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| Request 27-31 | What are the Facility Emergency Shutdown water demands? Please explain with specifics. |
| RESPONSE 27-31 | As described in the response to Data Request No. 27-14, it takes a couple of seconds to shut down the plant in an emergency. There are no special water requirements during that time frame. |
| RESPONDENT: | George Bacon, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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Request 27-32 — During a Facility Emergency Shutdown, will there be any "blow-off' of natural gas? Please explain and please include the estimated scf of natural gas released during the "blow-off'.

RESPONSE 27-32 — During emergency shutdown, the natural gas supply to the combustion turbines will be isolated to stop flow to the equipment. For the combustion turbines, there will be a small release of natural gas from the pipe cavity between the main control valve for this system and the main shut-off to the combustors that will purge during an emergency shutdown. The purge vent will be piped to a safe distance outside and above all structures/platforms. The gas volume that is vented is ~ 6 cu ft. It is not expected that the design of the balance of the natural gas system will require "blow-off" of natural gas as a result of an emergency shutdown.

RESPONDENT: Mark Wiitanen, HDR, Inc.

DATE: July 18, 2017

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| Request 27-33 | If there are any blow-offs of natural gas, what will be the maximum dBA of such an event? Please include the maximum dBA levels at the closest residents' property lines as well as the maximum dBA level at Invenergy/CREC property lines. |
| RESPONSE 27-33 | If this event occurred, it would last for a short while (a few seconds to at most a minute or two), and the noise levels for this emergency condition would be 50 dBA at most at the nearest residence. Please refer to the March 2016 Transient Noise Level Evaluation that shows the noise contours during an emergency steam release condition. Gas vents will be silenced similar to steam vents, so noise emissions will be similar. |
| RESPONDENT: | Michael Hankard, Hankard Environmental, Inc. |
| DATE: | July 18, 2017 |

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| Request 27-34 | Do the emissions (tons/year) listed in the Appendix 4 (Data Request Response #22) "Annual Emissions Summaries" include the trucks arriving at the Facility and the trucks leaving the facility? |
| RESPONSE 27-34 | The emissions listed in the Annual Emissions Summaries are based on round trips to and from the facility for each truck, so they do include the trucks arriving and the trucks leaving the Facility. |
| RESPONDENT: | Michael Feinblatt, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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| Request 27-35 | Will Invenergy/CREC redo the application "Application for Approval of Plans to Construct, Install, or Modify Fuel Burning Equipment" (specifically, for Gas Turbine #1/HRSG #1, Gas Turbine #2/HRSG #2) as the total number of days that Invenergy/CREC/"Facility" will fire ULSD has changed from 60 to 30? |
| RESPONSE 27-35 | The CREC Major Source Application Addendum, dated September 15, 2016, filed with the Board on May 26, 2017, stated that total gas turbine ULSD usage will be limited to the equivalent usage of 30 days per year at base load (15 days per turbine). Invenergy will submit revised versions of the RIDEM Air Permit Application Forms if requested to do so by RIDEM. |
| RESPONDENT: | Michael Feinblatt, ESS Group, Inc. |
| DATE: | July 18, 2017 |

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Request 27-36 Questions on smoke stacks:

(a) Are the two main stacks still 200 feet above grade? If not, please provide heights.
(b) What equipment will be releasing emissions to the 35-foot stack(s)? How many 35-foot stacks will there be?
(c) What equipment will be releasing emissions to the 50-foot stack(s)? How many 50-foot stacks will there be?

RESPONSE 27-36

(a) The two main stacks will now be 195 feet above grade and not 200 feet. However, the elevation of the emission point has remained the same as the grade has been elevated by five feet.

(b) There will be no equipment which releases emissions to 35-foot stacks anymore. In the original air permit application, the emergency diesel generator, fire pump house, and the fuel gas dew point heater had stacks with 35' height. The revised air permit application from September 2016 represents a stack height of 16 feet, 12 feet, and 26 feet respectively for those same pieces of equipment.

(c) The Auxiliary Boiler will have just one stack with a height of 50 feet.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-37 Retention Pond questions:

(a) What are the dimensions of the retention pond (which will collect precipitation)?
(b) How many gallons will the retention pond hold?
(c) Where is the "outfall" of the retention pond?
(d) Will the water in the retention pond be tested prior to allowing the water to flow to the "outfall"?

RESPONSE 27-37

(a) The pond is irregular in shape to fit the available space. It is approximately 150'x 200' or 0.7 acres at the top of bank.

(b) The pond is designed to meet RIDEM stormwater facility codes and standards and meets the water quality, channel protection and overbank flood protection criteria volumes and flows. If the pond was completely full of water with the outfall plugged, it would hold approximately 7 million gallons of water.

(c) The outfall for the pond is located to the northeast of the pond. The outfall will discharge to the adjacent wetlands in an up flow level spreader to dissipate energy.

(d) The stormwater collection system will not receive water from areas that are considered potential contaminant sources such as secondary containment areas, therefore the water will not require testing.

RESPONDENT: Chad Jacobs, HDR

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-38 Please revise the "Annual Emissions Summaries" Table (Exhibit 4 from Data Request Response #22) to include a "Filling of All Liquid Tanks Prior to Operations". Also, please provide calculations of the data.

RESPONSE 27-38 No revision is necessary or required. The Annual Emissions Summaries Table included as Exhibit 4 from Invenergy's Response to the Town's Data Request No. 22-45 provided a conservative estimate of the expected emissions from all project truck traffic during construction. **Exhibit 27-24** provides the data calculations for the trucks associated with filling all liquid tanks prior to operations.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-39 Please explain the issue of "ammonia slip" in the NOx (SCR system) in detail. How will Invenergy/CREC/ guarantee that there will be no or minimal "ammonia slip"?

RESPONSE 27-39 The selective catalytic reduction ("SCR") system, which is the best available control technology for the control of NOx emissions from combustion turbines, uses ammonia as a reagent in reducing NOx emissions to molecular nitrogen, which is a natural constituent of air. The reduction reaction between ammonia and the NOx compounds is promoted by a catalyst that is installed as a layer of modules across the HRSG casing. The catalyst is typically composed of vanadia/titania that is applied to a substrate material, but the actual formulation of the catalyst is specific to each catalyst supplier. The catalyst layer within the HRSG casing is installed at a location where the flue gas temperature is within a specific temperature range where the activity of the catalyst is optimal. Ammonia is injected into the flue gas upstream of the catalyst layer so that it is evenly distributed at the catalyst face. As the flue gas passes through the catalyst layer, the ammonia reacts with the NOx to produce nitrogen and water.

Ammonia slips refers to stack emissions of unreacted ammonia that can result from the incomplete reaction of the NOx in the gas stream and the ammonia injected. The CREC Major Source Permit will limit the ammonia slip concentration in each of the two turbine/HRSG stacks to two parts per million dry by volume corrected to fifteen percent oxygen (2 ppmvd @ 15% $O_2$) during steady-state operation at all operational loads while firing either natural gas or ULSD. The air toxics modeling analysis completed for the project has demonstrated that at the permitted stack ammonia concentration, the maximum predicted ambient air impact concentrations resulting from the operation of the facility will not exceed the RIDEM Acceptable Ambient Levels ("AAL") for ammonia at or beyond the property line under any operating condition or meteorological condition.

The catalyst of the SCR system slowly degrades over time and becomes less active. At initial operation when the catalyst is new and clean, there will be very little ammonia slip past the SCR catalyst. As the catalyst ages and the activity decreases, there will be a point where the ammonia slip starts to approach the 2 ppm limit. At this point, some or all of the catalyst will be replaced. The typical life cycle of catalyst in a natural gas plant is on the order of 5 to 7 years.

A continuous emissions monitoring system ("CEMS") will be installed on each turbine/HRSG stack to monitor continuous compliance with the permitted ammonia stack concentration limits. The CEMS will measure and record the stack ammonia concentrations continuously whenever the turbine is in

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operation. The Major Source Permit will require the submittal of quarterly excess emissions reports to RIDEM detailing any permit limit exceedances measured by the CEMS during the previous calendar quarter. The Permit will also require that RIDEM be notified in writing whenever a permit limit is exceeded.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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Request 27-40 The SCR will use ammonia at the catalyst to reduce the amount of NOx in the emissions. The "oxidation catalyst system" will reduce the amount of carbon monoxide and VOC's in the emissions. Please explain the "oxidation catalyst system" in detail. What are the chemicals in the oxidation catalyst system which interact with the CO and the VOCs?

RESPONSE 27-40 The CREC combustion turbines will be equipped with oxidation catalyst systems to control the emissions of CO, VOC, and organic hazardous air pollutants ("HAP"). Oxidation catalyst systems typically achieve 90 plus percent control of the emissions of CO, VOC, and other organic compounds from combustion turbines and their use is considered to be the best available control technology for the control of these emissions from combustion turbines.

The oxidation catalyst system is composed of catalyst modules installed in the flue gas path within the HRSG. The catalyst does not require the addition of a reagent for operation, but promotes the oxidation of CO and VOCs to carbon dioxide ("CO2") and water using the excess oxygen and heat of the flue gas. Oxidation catalysts are typically made of a precious metal such as platinum, palladium, or rhodium that are applied on a substrate material that is assembled into modules. The modules are installed into a metal frame system in the HRSG casing. The rate of the reaction is controlled by the temperature of the catalyst chamber and the amount of time the gas stream is able to react with the catalyst. The actual formulation of the catalyst is proprietary to the system supplier and is determined based on the required emissions reduction levels and the expected conditions of the flue gas at the inlet to the catalyst modules. The catalyst material is replaced periodically to maintain optimal performance of the oxidation catalyst system.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-41 What is the noise (dBA) difference between:

(a) "normal operations" of 1 Turbine firing ULSD/1 turbine firing natural gas and 2 turbines firing ULSD?

(b) "normal operations" of 2 turbines firing natural gas and "emergency shutdown" of 2 turbines firing natural gas?

(c) "normal operations" of 2 turbines firing natural gas and "normal shutdown" of 2 turbines firing natural gas?

(d) normal operations" of 2 turbines firing natural gas and "startup" of 2 turbines firing natural gas?

(e) "normal operations" of 1 turbine firing natural gas/1 turbine firing ULSD AND "emergency shutdown" of 1 turbine firing natural gas/1 turbine firing ULSD?

(f) "normal operations" of 1 turbine firing natural gas/1 turbine firing ULSD and "normal shutdown" of 1 turbine firing natural gas/1 turbine firing ULSD?

(g) "normal operations" of 1 turbine firing natural gas/1 turbine firing ULSD and "startup" of 1 turbine firing natural gas/1 turbine firing ULSD?

RESPONSE 27-41 (a) As part of the analysis of transient operations, noise levels from the CREC operating on fuel oil were found to be identical to those produced when the facility is being gas-fired. There is some oil related equipment that comes on line, such as pumps, but some of the gas related equipment goes off line. None of this equipment produces as much noise as the larger components of the CREC that operate identically under both gas and oil operation. Thus, there is no acoustical difference between oil and gas operations. Therefore, there is no change in noise level between normal operations of 1 turbine firing ULSD and 1 turbine firing natural gas, and 2 turbines firing ULSD.

(b) Noise levels from the CREC during emergency operations were described in the March 2016 Transient Noise Level Evaluation. As described therein, two "emergency" situations might occur on the order of once per year. First, an "emergency shutdown" could occur, and during this event additional noise is expected from the discharge of energy into the air-cooled condenser ("ACC") duct, as well as the opening of one emergency steam release vent.

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In the design of the CREC, noise from the ACC duct has been significantly mitigated, and all emergency steam release vents have silencers. The dBA difference between this emergency shut-down and normal operations is about 7 dBA, with the shut-down being louder. Second, noise levels from just one emergency steam release vent being opened were modeled, but in this case assuming the facility does not shut down. The dBA difference between this emergency steam release and normal operations is about 6 dBA, with the steam release being louder.

Note that the noise levels for typical (non-emergency) start-up and shut-down published in the March 2016 Transient Noise Level Evaluation report have been revised downward due to additional noise controls being added to the design of the CREC. As testified to the Town Board in June 2016, noise levels during typical start-up and shut-down conditions will be 43 dBA or less at all nearby residences.

(c) As described in the Transient Noise Level Evaluation report, noise levels during typical shut-down operations are expected to be less than start-up levels. Current modeling indicates that start-up levels will be 43 dBA or less, and typical baseload operations will be 2 dBA lower than that. Therefore, shut-down levels will be about 42 dBA or less, which is 1 dBA higher than normal baseload operations.

(d) Start-up noise levels are expected to be approximately 2 dBA higher than normal baseload operations.

(e) Same as (b), above, as oil and gas operations are acoustically equivalent.

(f) Same as (c), above.

(g) Noise levels during start-up are expected to be about 2 dBA louder than normal operations under any configuration of oil and gas fired units.

RESPONDENT: Mike Hankard, Hankard Environmental, Inc.

DATE: July 18, 2017

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| Request 27-42 | Please provide data on the noise levels of diesel tankers/trucks along Wallum Lake Road in respect to the residents living along this portion of the route. Please give details (i.e., actual noise values at offset intervals). |
| RESPONSE 27-42 | Section 16-43 of the Town of Burrillville Code of Ordinances limits noise from trucks to 86 dBA when traveling 35 miles per hour (mph) or less, and 90 dBA when traveling faster than 35 mph. These levels are measured at a distance of 50 feet from the center of the travel lane. A typical level used in acoustical modeling is 85 dBA at 50 feet. This is the level expected at the homes that are 50 feet from the road. The level would drop to about 80 dBA at a distance of 100 feet, and 70 dBA at 200 feet. |
| RESPONDENT: | Mike Hankard, Hankard Environmental, Inc. |
| DATE: | July 18, 2017 |

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-43 What are the Particulate Matter negative health impacts of diesel tankers'/trucks' emissions on human beings or wildlife?

RESPONSE 27-43 Diesel engines emit a mixture of pollutants, including particulate matter. The negative health impacts associated with particulate matter emissions can include cardiovascular and respiratory ailments, which can impact humans and wildlife when subjected to prolonged high levels of exposure to diesel exhaust, such as in a densely populated urban area or when in proximity to a major highway with near continuous diesel truck traffic. These potential health impacts would not be expected to be significant in the area surrounding a rural roadway with only intermittent diesel truck traffic.

The EPA has adopted more stringent diesel fuel standards and stricter emission standards for heavy-duty trucks in recent years. Diesel fuel quality and diesel engine technology have advanced rapidly in response to these regulatory measures. As more diesel vehicles equipped with cleaner fuels and advanced emission controls designed to meet these stricter emission standards enter the marketplace, the potential health impacts from diesel truck emissions are expected to decrease over time.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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**INVENERGY THERMAL DEVELOPMENT LLC's RESPONSES TO THE TOWN OF BURRILLVILLE'S 27th SET OF DATA REQUESTS**

Request 27-44 — Will Invenergy/CREC guarantee that no trees will be cut down during all bird breeding (including egg hatching and feeding infant birds) and migratory seasons? If not, why not?

RESPONSE 27-44 — As detailed in the CREC Application to Alter Freshwater Wetlands, tree clearing will be avoided during the June-July timeframe to avoid potential impacts during maternity nesting season. Additional tree clearing seasonal restrictions may be considered for the project as the potential benefits of additional seasonal restrictions are identified through consultations with RIDEM and/or the USACE.

RESPONDENT: Michael Feinblatt, ESS Group, Inc.

DATE: July 18, 2017

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| Request 27-45 | What steps will Invenergy/CREC take (e.g., add technology) to reduce the low-octave band/low frequency noise at the Facility? Please explain. |
| RESPONSE 27-45 | A significant number of steps have been taken to reduce CREC noise levels in the low octave bands. Almost all of the noise mitigation measures included in the design of the CREC reduce noise across the frequency spectrum, including the lower octave bands. The measures that have a significant impact on low frequency noise include a low-noise air cooled condenser, placing the auxiliary boiler in a building, enclosing all turbines and associated equipment inside an acoustically designed building, high performance exhaust stack silencers and acoustical treatment of the HRSG panels. |
| RESPONDENT: | Mike Hankard, Hankard Environmental, Inc. |
| DATE: | July 18, 2017 |

INVENERGY THERMAL DEVELOPMENT LLC
By its Attorneys,

/s/ Alan M. Shoer

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Dated: July 18, 2017

CERTIFICATE OF SERVICE

I hereby certify that on July 18, 2017, I delivered a true copy of the foregoing responses to the Town of Burrillville's 27th Set of Data Requests via electronic mail to the parties on the attached service list.

/s/ Alan M. Shoer