

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's :  
APPLICATION TO CONSTRUCTION THE : DOCKET No. SB-2015-06  
CLEAR RIVER ENERGY CENTER IN :  
BURRILLVILLE, RHODE ISLAND :

**ADVISORY OPINION OF THE BURRILLVILLE PLANNING BOARD**  
**TO THE ENERGY FACILITY SITING BOARD**

Dated: August 31, 2016

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BEFORE THE  
TOWN OF BURRILLVILLE  
PLANNING BOARD

IN RE: APPLICATION OF  
INVENERGY THERMAL DEVELOPMENT, LLC.;  
(CLEAR RIVER ENERGY CENTER) and  
ALGONQUIN GAS TRANSMISSION, LLC.  
WALLUM LAKE ROAD (R.I. ROUTE 100)  
BURRILLVILLE, RHODE ISLAND  
ASSESSOR'S PLAT 120  
LOT 7, PLAT 135 LOT 2, PLAT 137  
LOTS 1, 2, 3, and 21, and  
PLAT 153, LOTS 1 and 2

**ADVISORY OPINION TO THE ENERGY FACILITY SITING BOARD  
AND TO THE BURRILLVILLE ZONING BOARD OF REVIEW**

INTRODUCTION

Invenergy Thermal Development, LLC (Invenergy) filed an application with the State of Rhode Island Energy Facility Siting Board (EFSB) to construct and operate a combined-cycle electric generating facility on Wallum Lake Road, in Burrillville, Rhode Island. This facility, designated the Clear River Energy Center (CREC), is rated for a nominal power generation capacity of 850 to 1,000 megawatts (MW) when firing with natural gas. The facility will primarily fire with natural gas provided from the adjacent Spectra Energy Algonquin Compressor Station. However, the system will be capable of firing with ultra-low sulfur diesel (ULSD) fuel, when sufficient natural gas supply is unavailable

As directed by the EFSB in its Preliminary Decision and Order dated March 10, 2016, subsection VII. Advisory Opinions, subsection B Non-Jurisdictional Agencies, subsection 4, Burrillville was directed to render an Advisory Opinion to the EFSB as to:

1. Whether the Facility would be a land use consistent with its respective comprehensive plan pursuant to the Comprehensive Planning and Land Use Act, R.I. General Laws § 45-22.2-1; and
2. Whether Invenergy will be able to comply with the Burrillville Noise Ordinance during construction and operation.

In rendering this Advisory Opinion, we followed our normal process of review. We implement our Comprehensive Plan through application of the Town's Zoning Ordinance and adherence to the Town's Subdivision and Land Development Regulations. In accordance with the EFSB directive and the Zoning Enabling Act, R.I.G.L. § 45-24-41 (General Provisions Variances), R.I.G.L. § 45-24-42 (General Provisions Special-use permits), and R.I.G.L. § 45-24-43 (General Provisions – Special conditions), we hereby offer to both the EFSB and the Burrillville Zoning Board of Review (ZBR) the following Advisory Opinion in reference to the CREC.

This Advisory Opinion draws upon numerous data responses and other filings from Invenergy, government input memoranda as required by R.I.G.L. § 45-23-40(a)(3), testimony from Invenergy, oral and written comments from the general public as required by R.I.G.L. § 45-23-40(d)(3), and guidance and testimony from professional consultants retained by the Town. These items serve as the basis for this Advisory Opinion as it relates to various Comprehensive Plan citations (Goals, Policies and Actions) and the Burrillville Noise Ordinance.

A pre-application meeting was conducted on May 2<sup>nd</sup>, 2016. Subsequent to that meeting we met on June 20<sup>th</sup>, July 11<sup>th</sup>, and August 15<sup>th</sup> to receive testimony, public comment, and to deliberate. The final meeting to deliberate this matter was held on August 22<sup>nd</sup>, 2016.

## **SUMMARY OF HEARINGS**

A meeting and evidentiary hearing was held on June 20, 2016. It lasted about 4 hours.

The discussion began with Town Assistant Solicitor Michael R. McElroy explaining the process the Planning Board would follow to render an Advisory Opinion to the EFSB on the proposed CREC. He then requested that the Town's experts provide their input and recommendations based on their review of the materials provided by the Invenergy representatives.

David Hessler, of Hessler Associates, provided testimony and answered questions from the Board as to the information provided by the Invenergy experts in regards to noise.

Eric Epner, of Russ & O'Neill, provided testimony and answered questions from the Board as to the information provided by the Invenergy experts in regards to air quality.

Tom Hevner, of Sovereign Consulting, Inc., provided testimony and answered questions from the Board as to the information provided by the Invenergy experts in regards to the proposed ammonia storage as well as the proposed water use from Well #3A in reference to the MBTE contamination.

James Jackson, of CDR Maguire, provided testimony and answered questions from the Board as to the information provided by the Invenergy experts in regards to traffic, drainage, the Master Plan submission, and the proposed connection to the Burrillville Wastewater Treatment Facility.

Invenergy Attorney Elizabeth Noonan then began calling the Invenergy witnesses to offer their testimony.

Michael Hankard, of Hankard Environmental, provided testimony in regards to noise. He assured the Board, under oath, that the facility would comply with the Town's overall 43 dba noise limit.



Maureen Chlebek, of McMahon Associates, provided testimony and answered questions from the Board in regards to proposed traffic from the proposed facility, during construction and operation.

Robert Smith, of McMahon & Associates, provided testimony and answered questions from the Board in regards to pavement conditions (current and proposed) for the roadways involved in the route to the proposed facility.

Michael Feinblatt, of ESS Group, provided testimony and answered questions from the Board in regards to air quality from the proposed facility.

The hearing resumed on July 11<sup>th</sup> and lasted about 4 ½ hours.

Board Member Woods read into the record a letter of recusal from the Invenenergy application for the CREC due to the fact that he had previously testified in opposition to the proposal before the EFSB in May.

Attorney Noonan then began the discussion by first addressing a question presented by Board Member Presbrey from the last meeting in regards to the submitted survey not being in conformance with the new survey standards in effect as of January 1, 2016. She stated that she had spoken with Richard Lipsitz, a registered land surveyor, who indicated that under those regulations, any surveys commenced prior to January 1, 2016 are subject to the 1994 regulations and that this survey is in full compliance with those regulations. Mr. Presbrey felt that the survey was still not in conformance with the 1994 regulations, noting that the dimensions and bearings cannot be read and no calculations can be done because it is unreadable. Attorney Noonan said that she could provide full size copies of the survey.

Ms. Noonan then called Edward Pimentel, Professional Planning Consultant, to offer his testimony. Mr. Pimentel provided testimony and answered questions from the Board regarding the project and how, in his opinion, the CREC complies with the Town's Comprehensive Plan.

Town Planner Kravitz then told the Board that his memo dated June 18, 2016, regarding his review of the Comprehensive Plan analysis conducted by Pimentel Consulting, stands on its own and sets forth reasons why the proposal may not conform to the Town's Comprehensive Plan. He stated that Mr. Pimentel looked at the Comprehensive Plan from a different perspective and he should recognize that there are goals and objectives that relate to other types of planning in Town that the Town is trying to effectuate as well.

A motion was then made and approved to open public comment. Chairman Partington informed the public that each person would be allowed 5 minutes to speak.

Approximately 35 individuals spoke, offering comments and/or questions. Some provided documentation in support of their requests. The overwhelming majority of the public comment was in opposition to the CREC. The public also overwhelmingly stated that the proposed facility would not comply with the Comprehensive Plan and would not comply with the Noise Ordinance.

Attorney McElroy requested two items from the Invenergy representatives: written confirmation as to whether the proposed power plant would comply with the recommendations from all of the Town's experts, and if not, the reasons why; and written confirmation as to whether the proposed power plant would comply with all of the recommendations offered by the RI Department of Health (DOH) report, and if not, why.

The hearing resumed on August 15, 2016. It lasted about 4 hours. Invenergy presented testimony from William Ahlert, Ph.D. regarding Invenergy's plan to work with the Pascoag Utility District (PUD) to utilize Well #3A to obtain the needed water for the CREC and to remove the MBTE through granular activated carbon (GAC) to a non-detect level before piping the water to the CREC. Dr. Ahlert answered a number of questions from the Board on various water issues.

At the time he provided his testimony, Dr. Ahlert was unaware of the PUD's draft advisory opinion, which had been circulated that day for public comment. The draft advisory opinion concluded, among other things, that Invenenergy's proposed withdrawal of water from the Clear River Watershed "leaves minimum margin for any future increases in municipal water demands, compromising the ability of the watershed to meet future municipal water demands." (at 5).

The draft advisory also concluded that "based upon the research and finding of the District's assessment it is strongly believed that activation of Well #3A to provide water supply to the CREC facility will modify the direction of the existing [MTBE] contaminant plume, such that it will move in the direction of Well #3A. This in turn will draw MTBE/BTEX contaminant into closer proximity to the proposed Clear River Infiltration Gallery that is intended to provide water for the district." (at 7).

With regard to proposed GAC treatment system to remove the MTBE, the draft advisory opinion concluded that "[n]o determination of the viability of the GAC groundwater treatment system can be made at this time, until a comprehensive pumping test and water quality monitoring program have been completed, followed by the development of a comprehensive groundwater model and assessment impact upon the contaminant plume and anticipated groundwater characterization, execution of treatability studies and preparation of the detailed design of the proposed GAC Filtration treatment system, and the building and infrastructure to house the system." (at 10).

With regard to the construction of the proposed pipeline, the draft opinion concluded that: "Insufficient information has been provided at this time to allow a thorough assessment of the proposed pipeline construction materials and methods, scheduling, safety, traffic control and protection of existing utility systems, monitoring instrumentation and controls." (at 11-12).

Finally, the draft advisory concluded that “A long term pumping test of Well #3A is recommended to evaluate contaminant concentrations and migration in the well field and Well #3A. Vapor intrusion into residences and occupied buildings must be assessed using multiple lines of evidence and testing for existing and anticipated groundwater concentrations resulting from the long term pumping of Well #3A. In addition, a groundwater model should be developed that includes a detailed assessment of groundwater quality throughout the well field including areas near the former Mobil Station.” (at 13).<sup>1</sup>

After the testimony of Dr. Ahlert, public comment was opened, but was restricted to questions regarding the water testimony of Dr. Ahlert. Approximately 20 members of the public presented comment and posed questions to Dr. Ahlert and the Invenergy representatives, primarily concerning various water issues. Dr. Ahlert and the Invenergy representatives also answered a number of questions from our Board.

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<sup>1</sup> On August 19, 2016, the PUD unanimously voted as follows:

Over the past several months we have sought and received much information from various sources including our own experts, other consultants and our ratepayers concerning the re-activation of Well 3A to supply the proposed power plant with processed water for industrial purposes. This information has made it abundantly clear to us that there are numerous concerns that have either not been addressed at all to date or have been addressed in such a way as to raise serious doubts that this endeavor can be taken on without serious risk. Our own consultant has indeed raised many red flags, which cautions us going forward.

After review and input from counsel, it is clear that the provision of water to the power plant from Well 3A cannot occur without resort to the Superior Court. While we recognize that the existing order allows for pumping of the well for remediation, it does not allow for this arrangement. Pascoag does not intend to seek modification of that order to allow for this project.

Therefore, I will entertain a motion to:

- 1) Terminate the letter of intent and any other obligations to Invenergy;
- 2) Not to negotiate further nor to agree to sell any water from Well 3A to Invenergy at any time, nor or in the future.
- 3) Not to seek any change in the existing court orders for this proposal.
- 4) Authorize the Chairman and/or the General Manager and our attorneys to take the appropriate actions to effectuate the action taken by the Board forthwith.

Assistant Solicitor McElroy asked Invenergy to notify the Board whether it would be willing to post a performance bond or other financial security that would provide security to the Town in the event Invenergy was unable to meet the requirements of the Noise Ordinance.

In addition, attorney McElroy asked Invenergy representatives whether they would be willing to commit to redesigning and rebuilding the Church Street/High Street intersection to make it safer for large trucks to pass through the intersection.<sup>2</sup>

After the conclusion of the testimony and the additional public comment/questions, the Board commenced deliberations and then voted unanimously, by a count of eight to zero (8-0) (with Member Woods having recused), that the CREC facility would be a land use that would not be consistent with our Comprehensive Plan and would not be consistent with R.I.G.L. § 45-22.2-1 *et seq.*, the Rhode Island Comprehensive Planning and Land Use Regulation Act.

## **DISCUSSION**

### **I. EFSB**

#### **A. COMPREHENSIVE PLAN**

Unlike typical major land development projects that are not subject to the Energy Facility Siting Act, R.I.G.L. § 42-98-1 *et seq.*, the CREC is subject to an accelerated review process that supersedes that described in the Rhode Island Land Development and Subdivision Review Enabling Act of 1992, R.I.G.L. § 45-23-25 *et seq.* Therefore, we must unfortunately provide this Advisory Opinion without having seen either the complete engineering design for the CREC or permits from other state agencies. Typically, this is not the case. We usually reserve the right to withhold Preliminary and Final Plan approvals until we receive the benefit of reviewing such engineering designs and permits.

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<sup>2</sup> In a letter dated August 19, 2016, Invenergy did not agree to either post a performance bond or to commit to redesigning and rebuilding the Church Street/High Street intersection.

All of the Board members agree that levels of the usual regulatory review by governmental authorities are at this point not complete, such as the Army Corps of Engineers Environmental Impact process, and the RI Department of Environmental Management (DEM) air quality review, which we understand is about 18 months long and will not be issued until after EFSB review. This is troubling to us. Many questions have arisen that relate to various issues, including, but not limited to, air quality, wetlands impacts, wildlife and biodiversity impacts, lighting impacts, traffic impacts, and the incompleteness of Invenergy's Air Dispersion Modeling Report and the related Health Risk Assessment Report.

It is also our opinion that many of the data responses we received from Invenergy were incomplete and at times evasive. For example, we believe that Invenergy deliberately evaded certain regulatory requirements by, for example, utilizing a 19 percent aqueous ammonia mix. While this may technically be legal, a 20 percent or more storage requirement would have triggered much more comprehensive hazard response planning and documentation and would have provided more comfort to the Town. Another example is the lack of presentation detail regarding hydrogen storage. Colonel Stephen Lynch of the Burrillville Police Department has also offered several important suggestions relating to security. These are public safety concerns that are very important to the Town, and directly affect our analysis of whether the CREC would be consistent with our Comprehensive Plan.

Water use has been a concern to us from the beginning, both in terms of quantity and quality. The applicant agreed to remove MTBE at the PUD Well #3A to non-detect using vessels of GAC. We concede that there are obvious potential benefits to removing MTBE from the aquifer. However, at our most recent meeting on August 15th, a substantial figure of 1.6 million gallons per day was cited should both units be running on ULSD. This is a huge amount of water. We also need modeling and pump testing to determine the ability of Well #3A to

provide water to Invenergy, but such pumping/testing and modeling has not been done. Harrisville Water Department has recently rejected the applicant's request for water, and PUD did the same on August 19, 2016. Available water quantity therefore remains a serious concern for us.

Beginning with our Chairman, Jeffrey Partington, each board member has expressed his opinion on this Application, concluding that the CREC facility would not be in accordance with either our Comprehensive Plan or R.I.G.L. § 45-27.1-1 *et seq.* Aside from recognizing the economic potential to Burrillville in terms of tax and impact fee revenues and about 25 permanent jobs, our members were very clear that we should place much greater weight on numerous other Comprehensive Plan Goals and Policies that we feel the CREC would not be in compliance with, such as natural and cultural resources, landscapes, wildlife and biodiversity, local air quality, groundwater quantity and quality, excessive traffic impacts, and noise. We have a particular quality of life in Burrillville that is unique and worthy of preservation. Burrillville's unique European growth pattern (i.e., a mix of dense villages beset by rural spaces) is also supported for preservation and replication as a model for growth for western Rhode Island by the State Guide Plan - a plan with which the Burrillville Comprehensive Plan is consistent.

One of our members stated it this way:

"The CREC proposal is contrary to the economic development objectives of the Town of Burrillville, specifically its efforts toward balancing locally-sourced jobs with natural resource and historic preservation, and its long-term land use plan which promotes the conservation and economic development of its natural resources and tourism potential, preserves open space resources and the low density character of the community.

The Burrillville Comprehensive Plan recognizes the important role the Town plays as a host of energy infrastructure (Land Use Goal IX.5), and it seeks to broaden sources of revenue from industrial projects (Economic Development Goal VII.1). However, the Comp Plan does not encourage further expansion of, or siting of additional power plants within the borders of Burrillville.

Specifically, the following sections of the Comp Plan promote a vastly different planning scenario for our Town.”

The following provisions of the Comprehensive Plan with which CREC was found to be inconsistent are:

## **Natural and Cultural Resources Chapter II**

### **Goals:**

II.1 Promote a harmonious relationship between land development and natural resources.

II.3 To consider the natural capacity of land to support future development and population.

II.4 To ensure that current and future development does not adversely affect natural or cultural resources, or the existing rural qualities of Burrillville, and that environmentally sensitive areas are protected, especially water supply and quality.

### **Policy:**

II.4.b Maintain and improve the existing quality of drinking water in the community.

II.6.a Encourage measures which reduce air pollution levels.

### **Action:**

II.4.b.16 To preserve the Town's rural character, promote low-intensity land use and protect high quality surface and groundwater the F-5 zone should continue as currently mapped in the Town's zoning ordinance.

## **Community Facilities and Services Chapter III**

### **Goal:**

III.4 Provide the Town of Burrillville with sufficient potable water supply and the distribution system necessary to meet the community's residential, commercial, and industrial requirements, utilizing on-site well development where appropriate, while maintaining the Town's self-sufficiency.



**Policy:**

III.4.a Protect existing groundwater sources from contamination to allow continued supply to the local water distribution systems.

III.5.a Conserve existing water supplies to eliminate the development of costly and unnecessary sources.<sup>3</sup>

**Circulation Chapter VI**

**Goal:**

VI.1 To provide and maintain a safe, convenient and cost-effective transportation system.

**Economic Development Chapter VII**

**Goals:**

VII.1 To broaden the sources of Town revenue through development in the industrial and commercial sectors in order to ensure a sound financial future and assist in funding the achievement of Town goals.

VII.2 To recognize the importance of recreation, open space, public access to water bodies, and historic resources to the Town's economy, to tourism development . . .

**Policies:**

VII.1.a Maintain industrial and commercial sector growth at a rate adequate to support the Town's population in a manner consistent with the Town's labor characteristics, land capabilities and environmental objectives

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<sup>3</sup> At the August 15th meeting, Invenergy stated that providing for sustainable reuse of spent processed water through replenishment of the aquifer was not infeasible, rather, discharge to the wastewater system was simply preferred by Invenergy.

VII.2.a Promote economic development which is sited and designed to fit within the rural village character of Burrillville, and harmonizes with environmental surroundings and adjacent land uses.

VII.2.d Encourage natural resource based industry, including forestry, agriculture, and recreation. (Please see Economic Impact of RI Forest-Based Economy, NASF, 2015 <http://www.dem.ri.gov/programs/bnatres/forest/pdf/econimpl5.pdf>).

**Action:**

VII.2.d.3 Identify valuable, unique and ecologically sensitive forestlands so that they may be protected.

**Recreation, Conservation, and Open Space Chapter VIII**

**Actions:**

VIII.1.h Recognize the importance of the Town's recreational and open space resources, and ensure that their development is carefully integrated with efforts to promote Burrillville to visitors.

VIII.2.a Preserve the Town's natural resources by working to save the best representatives of the ecosystem types found in Burrillville, and protecting rare and endangered plants, animals, and unique geologic or other natural features.

VIII.2.a.1 Work toward prevention or mitigation of adverse impacts of human activities on wildlife habitat.

**Land Use Chapter IX**

**Policies:**

IX.3.b Recognize the importance of recreation, open space, public access to water bodies, and historic resources to the Town's economy, in tourism development and in attracting

and retaining industry, and endeavor to protect and enhance these resources in economic development siting and design activity.

IX.4.b Recognize the Town's scenic rural landscapes, roads and vistas as important cultural and economic resources, and act to preserve them.

IX.5.b Minimize the adverse impacts of power generation and transmission facilities on the environment.

**B. THE RHODE ISLAND COMPREHENSIVE PLANNING AND LAND USE  
REGULATION ACT - R.I.G.L. § 45-22.2-1 *et seq.***

The Planning Board is also unanimously of the opinion that the CREC would not be consistent with the following sections of the Rhode Island Comprehensive Planning and Land Use Regulation Act, R.I.G.L. § 45-22.2-1 *et seq.*:

**R.I.G.L. § 45-22.2-3 Legislative findings and intent – Statement of goals.**

*(a) Findings. The general assembly recognizes these findings, each with equal priority and numbered for reference only, as representing the need for effective planning, declares that:*

*(1) Comprehensive planning by municipal government is necessary to form a rational basis for the long-term physical development of a municipality and to avoid conflicting requirements and reactive land use regulations and decisions.*

As has already been discussed in this Advisory Opinion, particularly as to how it relates to the approval process in conjunction with the sheer amount of water which would be pulled from Burrillville's aquifers, we believe that approving the CREC would be a reactive land use decision.

*(2) Municipal government is responsible for land use, and requires accurate technical information and financial resources to plan for orderly growth and development, and the protection and management of our land and natural resources.*

With respect to offering financial resources, such as tax revenues, impact fees, and jobs, the CREC has some benefit, but at an unacceptable cost. For example, based on the information available to us at this time, it appears that the Town would be facing a public water moratorium on future village growth if the CREC is approved. Invenergy's recently denied application to the Harrisville Water Department makes it clear that, at this time, Invenergy has no workable water solution.

*(3) Land, water, and air are finite natural resources. Comprehensive planning is needed to provide for protection, development, use, and management of our land and natural resources.*

\* \* \*

*(c) Goals. The general assembly hereby establishes a series of goals to provide overall direction and consistency for state and municipal agencies in the comprehensive planning process established by this chapter. The goals have equal priority and are numbered for reference only.*

*(1) To promote orderly growth and development that recognizes the natural characteristics of the land, its suitability for use, the availability of existing and proposed public and/or private services and facilities, and is consistent with available resources and the need to protect public health, including drinking water supply, drinking water safety, and environmental quality.*

\* \* \*

*(4) To promote the protection of the natural, historic and cultural resources of each municipality and the state.*

*(5) To promote the preservation of the open space and recreational resources of each municipality and the state.*

### **C. NOISE**

As to whether Invenergy will be able to comply with the Burrillville Noise Ordinance during both construction and operation, Burrillville's Noise Ordinance provides in pertinent part.

Sec. 16-31 - Findings; statement of policy.

- (a) The town council hereby finds and declares that:
  - (1) Excessive noise is a serious hazard to the public health, safety and welfare and the quality of life.
  - (2) A substantial body of science and technology exists by which excessive noise can be substantially abated without serious inconvenience to the public.
  - (3) Certain of the noise-producing equipment in this community is essential to the quality of life and should be allowed to continue at reasonable levels with responsible regulation.
  - (4) Each person has a right to an environment reasonably free from noise which jeopardizes health or welfare or unnecessarily degrades the quality of life.
- (b) It is the declared policy of the town to promote an environment free from excessive noise, otherwise properly called noise pollution, which unnecessarily jeopardizes the public health, safety welfare and degrades the quality of the lives of the residents of this community, without unduly prohibiting, limiting or otherwise regulating the function of certain noise-producing equipment which is not amenable to such controls and yet is essential to the quality of life in the community.

Sec. 16-32 - Purpose, title and scope of article.

- (a) *Purpose.* The purpose of this article is to establish standards for the control of noise pollution in the town by setting maximum permissible sound levels for various activities to protect the public health, safety and general welfare.

\* \* \*

Sec. 16-39. – Maximum permissible sound levels by receiving land use.

- (a) With the exception of sound levels elsewhere specifically authorized or allowed in this article or exempted by this article or by special use permit, the following are the maximum permissible sound levels allowed at or within the real property boundary of a receiving land use.

Table 1, which is incorporated into Sec. 16-39, has a daytime single number equivalent maximum of 53 dba and a maximum non-daytime limit of 43 dba. Because the CREC will essentially be operating around the clock on many days, this effectively means that the maximum single number equivalent will be 43 dba for the facility. Invenergy has committed under oath that the facility will be designed, constructed, and operated at all times, including during start up and shut down, so that it does not exceed the overall 43 dba standard. However, our noise standard also has maximum allowable octave band sound pressure levels that essentially control low frequency sound. Invenergy has asked for a waiver of the octave band limitations. Such a waiver requires a special use permit under Section 16-48. That Section states as follows:

Sec. 16-48. – Special use permits.

- (a) *Designated.* The zoning board of review, established pursuant to G.L. 1956, § 45-24-57(vii) is hereby designated as the board of appeal and relief from this article.
- (b) *Authority.* The zoning board of review, acting pursuant to G.L. 1956, § 45-24-57(vii), shall have the authority, consistent with this section, to grant special use permits after a public hearing.
- (c) *Application.* Any person seeking a special use permit under this section shall file an application with the zoning board of review. The application shall contain information which demonstrates that bringing the source of sound or activity for which the special use permit is sought into compliance with this article would constitute an unreasonable hardship on the applicant, on the community or on other persons.

\* \* \*

- (e) *Grant, denial or revocation.*
  - (1) In determining whether to grant or deny an application, or revoke a special use permit previously granted, the zoning board of review

shall balance the hardship to the applicant, the community and other persons if the special use permit is not allowed, against the adverse impact on the health, safety and welfare of persons affected, the adverse impact on the property affected, and any other adverse impact, if the special use permit is allowed. The zoning board may grant the relief as applied for if it finds that:

- a. Additional time is necessary for the applicant to alter or modify his activity or operation to comply with this section; or
- b. The activity, operation or noise source will be of temporary duration, and cannot be done in a manner that would comply with other subsections of this section; and
- c. No other reasonable alternative is available to the applicant.

\* \* \*

- (f) *Conditions.* The special use permit shall be granted by notice to the applicant containing all conditions necessary to minimize adverse effects upon the community or the surrounding neighborhood, including a time limit on the permitted activity. The special use permit shall not become effective until all conditions are agreed to by the applicant. Noncompliance with any condition of the special use permit shall terminate it and subject that person to those provisions of this article regulating the source of sound or activity for which the special use permit was granted.

It should be noted that the Zoning Board of Review, not the Planning Board, is the appropriate body to issue any special use permit. However, the Planning Board will issue an advisory to both the EFSB and the Zoning Board regarding this requested octave band noise waiver/special use permit.

Over the course of several meetings, the Planning Board and the public questioned the Town's noise consultant, David Hessler, and the noise consultant for Invenergy. Both of them seemed comfortable that CREC would be able to achieve the Town's required 43 dba or less noise limits at all times, including during start up and shut down, so as long as appropriate

lagging (and possible building encapsulation) was installed over all air cooled condenser (ACC) ducts.

As for Burrillville's admittedly low set of octave band noise requirements, we had concerns about possible low frequency noise effects on wildlife. We therefore continued the August 15<sup>th</sup> meeting until August 22<sup>nd</sup> in order to obtain information on possible wildlife impacts. Mr. Hessler then informed us in writing that "CREC won't substantially change or increase the low frequency sound levels in any meaningful way. That means that any potential impact on wildlife from low frequency noise, if there is one, is already present [from the existing Spectra turbine exhausts]."

We met again on August 22<sup>nd</sup> to discuss and vote on the noise issues. However, we are unable to render an opinion as to whether the CREC facility will be able to comply with our Noise Ordinance. R.I.G.L. § 45-23-63(f) requires 5 affirmative votes of our 9 member Board for a motion to succeed. At the August 22<sup>nd</sup> meeting, one member was recused and another member had an excused absence. Despite a number of motions on noise compliance, all failed because we were unable to obtain 5 votes on any of these motions. Therefore, we cannot issue an advisory opinion on noise compliance. We were, however, able to vote to render an advisory opinion that, because the octave band limits present an unreasonable hardship with no corresponding benefits per our noise expert, we recommend that the Zoning Board grant the octave band waiver/special use permit and exempt the CREC from the octave band limits of the Noise Ordinance, provided all of the conditions set forth in paragraph 3 (page 20) below are strictly complied with.



### **REQUESTED EFSB CONDITIONS OF APPROVAL**

Not knowing whether the EFSB will ultimately approve the CREC, we respectfully request that if the EFSB approves the CREC, the following conditions should be imposed on Invenergy's EFSB license, based primarily on the testimony, the recommendations in the Town's expert consultant letters/reports, and the staff memos obtained by the planning office:

1. The EFSB should consider the CREC as a component of the broader inter-state energy reliability project that includes a variety of improvements. We assume an Environmental Impact Statement (EIS) will be developed as part of that review process. The EIS needs to be considered by the EFSB. Accordingly, we respectfully submit that the EFSB should withhold its decision on the siting of CREC until the results of the EIS are available and analyzed.
2. The existing access road with Algonquin/Spectra should be utilized as the CREC access. A new access road should not be constructed because it would disturb significant wetlands. This condition will limit the impact on wetlands disturbance, visual impacts to abutting properties, and traffic.
3. There should be continuous monitoring and reporting of noise levels by Invenergy, and compliance with 43 dba at all times should be an explicit condition of the EFSB license, so that all violations are penalized with fines, a cease and desist order, and possible revocation of the operating license. There should be a commitment from Invenergy to post a performance bond or other financial assurance for the benefit of the Town to ensure that this condition is satisfied and that Town residents who are adversely affected by noise violations are compensated;

4. Sufficient water quantity, alternate supply source, aquifer withdrawal, and aquifer replenishment conditions should be EFSB permit conditions, as recommended by the appropriate agencies.
5. There needs to be traffic management and emergency response enhancement and financial support for the state and town roads impacted by this project, including, but not limited to commitments from Invenergy to (1) rebuild all roads damaged by Invenergy, and (2) redesign and reconstruct the intersection of Church Street and High Street in order to increase the safe turning radius for large trucks.
6. Enhanced safety requirements should be imposed on all trucks hauling fuel oil, ammonia, hydrogen, and other hazardous chemicals through Town.
7. Development of a suitable property value guarantee agreement with the Town that compensates residents for negative impacts to real estate values.
8. Development of a suitable decommissioning agreement for the CREC and related financial assurances.
9. The air modeling revisions, corrections, and recommendations set forth by the Town's air consultant Fuss & O'Neill in their letter of June 17, 2016 must be a condition so that a corrected Air Dispersion Model Report and a new Health Risk Assessment Report showing no health risks are prepared and approved by the Rhode Island Department of Environmental Management (DEM).
10. The Department of Health (DOH) recommendations set forth in DOH's draft advisory opinion dated July 8, 2016 should be conditions.
11. In light of the decisions of the Harrisville Water Department and the PUD, we are of the opinion that to date, it has not been demonstrated by Invenergy that they have access to adequate sources of water or that withdrawing these large amounts

of water will not harm either water quantity or quality in the Town, which relies primarily on wells. Demonstration of the availability of an adequate water supply should be an express condition.

12. Apply as conditions the Burrillville Sewer Commission conditions set forth in their memo to the Town Planner dated May 12, 2016.
13. Apply as conditions all recommendations set forth in Town consultant CDR/Maguire's letters/memoranda to the Town dated June 15, 2016 (ammonia), June 16, 2016 (traffic), June 16, 2016 (master plan), June 16, 2016 (MTBE/Water/Sewer), August 9, 2016 (various issues), and August 11, 2016 (DOH).
14. Apply as conditions all recommendations set forth in Town noise consultant David Hessler's letters/memoranda dated May 26, 2016, July 12, 2016, August 8, 2016, August 10, 2016, August 16, 2016, and August 22, 2016.
15. Require construction of a full time, 24 hour hazardous response center at the CREC that can respond to incidents at both CREC and Spectra Energy/Algonquin compressor station.
16. Require that ULSD only be used during maintenance testing or upon direction from ISO-NE, and will not be used solely for economic reasons, and include the Town as part of a live notification messaging system so that residents can know exactly when ULSD is being used and for what duration.
17. If the PUD Well #3A will be utilized, it should be a condition that Invenergy must obtain a court order lifting the previous court-ordered ban.
18. Pursuant to EFSB Rule 1.14(b), we respectfully request that the EFSB consider delegating to our Board the authority, during the construction period, the period of

plant start up, and a reporting period to follow “to visit the plant and plant site to determine if construction, construction practices, operation or operational practices are in compliance with the terms of the Board’s license.”

## **II. ZONING BOARD**

### **ADVISORY OPINION TO THE BURRILLVILLE ZONING BOARD OF REVIEW ON INVENERGY’S REQUEST FOR A SPECIAL USE PERMIT FOR THE CREC**

At a Zoning Board Meeting on July 12, 2016, Invenergy provided testimony from their planning consultant Edward Pimentel. Mr. Pimentel acknowledged that the Town does not offer special use permit standards to support electrical generating facilities such as the CREC. In place of performance standards, Mr. Pimentel stated that he often looks to the Town’s Comprehensive Plan and Site Plan Review Standards. Mr. Pimentel pointed to standards relating to buffering and suggested the CREC meets buffering standards because of its proposed location. However, the Planning Board is of the opinion that open space in the vicinity of the CREC (such as the Pulaski State Forest) is more in conformance with numerous preservation policies, and that a power plant is not.

Invenergy placed great weight on testimony that claimed that a Special Use Permit is a conditionally permitted land use that must be permitted by the municipality if performance standards are met. However, the notion that a Town needs to grant a special use permit if specific performance standards are met by an applicant is not proper because the standards only represent one evaluation task by the community. For communities to approve applications in this manner would be a reckless land use practice.

This one facility would consume a tremendous amount of the Town’s groundwater resources, to the point where the Town’s future land use growth, specifically as it relates to dense village growth, could be compromised.

The Comprehensive Plan, in its entirety, including all of the other goals and policies, need to be factored into consideration.

The Town must consider whether the amount of water consumed from the aquifer (but not returned to it), meets zoning standards, and more importantly, how much consideration must be given to groundwater, open space, wildlife, traffic, light pollution, noise pollution, air quality, surface water quality, etc., as compared to a buffering requirement that it appears is being misconstrued by the applicant

In terms of Zoning Section 30-34(e), *Special use permit*, we offer the following opinion for the Burrillville ZBR:

Zoning Sections 30-34(e)(4)(a)(b) and (c) require the Board to consider:

- a. Ingress and egress to property and proposed structures thereon with particular reference to automotive and pedestrian safety and convenience, traffic flow and control, and access in case of fire or catastrophe.
- b. Off-street parking and loading areas where required.
- c. Required yard setbacks and other open spaces.

These requirements, in our opinion, are all better served by Invenergy utilizing the existing Algonquin/Spectra access road. A common road would better serve the planned parking area for the CREC, would greatly limit the extent of wetlands impacts, and would serve as an adequate setback by not disturbing forests along Wallum Lake Road in order to construct a new access road.

Zoning Section 30-34(e)(4)(g) and (h) require the Board to consider:

- e. Screening and buffering with reference to type, dimensions, and character.

\* \* \*

- g. General compatibility, the pertinent traffic, economic, noise, glare or odor effects of the special use permit on adjoining properties and properties generally in the district.
- h. Protection of sensitive features.

These requirements, in our opinion, are better served by not constructing a new access road, thereby disturbing less forest and preserving the existing woodland buffer to Wallum Lake Road.

We ask that the ZBR at a minimum weigh impacts on the Town's aquifer system as special conditions under Zoning Section 34-30(f) which provides in part:

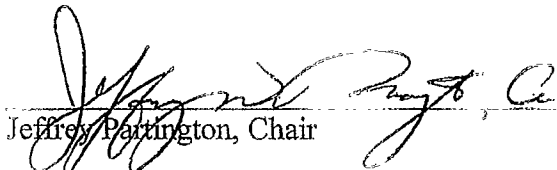
- f. Special conditions. In granting a variance a special use permit or in making any determination upon which it is required to pass after a public hearing under a zoning ordinance, the zoning board of review or other zoning enforcement agency may apply such special conditions that may, in the opinion of the board or agency, be required to promote the intent and purposes of the comprehensive plan and the zoning chapter of the town. Failure to abide by any special conditions attached to a grant shall constitute a zoning violation. Those special conditions shall be based on competent credible evidence on the record, be incorporated into the decision, and may include, but are not limited to, provisions for:
  - 1. Minimizing adverse impact of the development upon other land, including the type, intensity, design, and performance of activities;

Of course, as set forth in detail herein, the Planning Board believes the CREC is inconsistent with the Comprehensive Plan, and we only recommend these conditions as safeguards in the event the EFSB approves the CREC.

As to the requested octave band waiver/special use permit, we are of the opinion that the evidence, especially the testimony of the Town's noise consultant, has shown that (1) the octave band limits are unreasonably restrictive, (2) the waiver will not increase the low frequency noise already present in the area due to the Spectra/Algonquin facility, and (3) there will be no adverse effect on residents or wildlife if the waiver is granted. We therefore recommend to the Zoning

Board that the waiver should be approved, if the conditions set forth in paragraph 3 on page 20 above are strictly complied with.

Dated: 8/22/2016

  
Jeffrey Partington, Chair

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's :  
APPLICATION TO CONSTRUCTION THE : DOCKET No. SB-2015-06  
CLEAR RIVER ENERGY CENTER IN :  
BURRILLVILLE, RHODE ISLAND :

**APPENDIX OF REPORTS CONTAINING REQUESTED CONDITIONS  
IF AN EFSB PERMIT IS ISSUED**

1 **Fuss & O'Neill** -- June 17, 2016 (Air)

2 **Department of Health, Draft Advisory Opinion** July 8, 2016

Electromagnetic Fields (p. 3); Noise (p. 5); Drinking Water Quality (p. 11);  
Air Pollution (p. 12); Asthma (p. 15); Emergency Response and Prevention (p. 18);  
Climate Change and Health (p. 22)

3. **Burrillville Sewer Commission**

4. **CDR Maguire**

- A. June 15, 2016 Ammonia
- B. June 16, 2016 Traffic
- C. June 16, 2016 Master Plan; Stormwater; Wetlands; Traffic
- D. June 16, 2016 Water; MTBE; Sewer
- E. August 9, 2016 Spill Prevention Control; Stormwater Pollution Prevention;  
Water Use and Wastewater Discharge; Wetlands; Stormwater  
Geology and Soils; Traffic; Solid Wastes
- F. August 11, 2016 Drinking Water Quality; Emergency Response and Prevention;  
Ammonia

5 **Hessler** (Noise)

- A. May 26, 2016
- B. July 12, 2016
- C. August 8, 2016
- D. August 10, 2016
- E. August 16, 2016
- F. August 22, 2016



TAB 1



FUSS & O'NEILL

June 17, 2016

Mr. Michael Wood  
Town Manager  
Town of Burrillville  
100 Main Street  
Harrisville, RI 02930

RE: Clear River Energy Center Air Quality Application Review

Dear Mr. Wood:

At your request, Fuss & O'Neill, Inc. has provided a review of the documents submitted to the Rhode Island Department of Environmental Management (RIDEM) and additional information provided to the Rhode Island Energy Facilities Siting Board (EFSB) related to air quality.

#### **Air Quality Permitting Summary**

Invenergy submitted an air quality Major Source Permit Application for a Combined-Cycle Electric Generating Facility to RIDEM Office of Air Resources on June 26, 2015. The submittal did not include the Air Dispersion Modeling Report or Health Risk Assessment Report, both of which are needed for RIDEM to start their preliminary review to determine whether the application is administratively complete and start their technical review. Invenergy submitted the Air Dispersion Modeling Report for the project to RIDEM on October 30, 2015, and the Health Risk Assessment Report on January 27, 2016. We received notice on April 28, 2016 that RIDEM had sent a letter to Invenergy stating the application had been deemed administratively complete. The application was deemed administratively complete by RIDEM on or about April 26, 2016.

In addition, Invenergy has provided additional information to the RI EFSB related to air quality in response to Data Requests submitted by Interested Parties. The Town of Burrillville's Data Request #7 addressed air quality issues with forty-two questions related to the permit application in general, as well as specific questions regarding the Air Dispersion Modeling Report, Health Risk Protocol, and Health Risk Assessment Report. Additional air quality questions were included in other data requests by the Town, include Data Request Nos. 4 and 6.

#### **Ambient Air Quality - Existing Conditions**

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of "sensitive"

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Massachusetts  
Rhode Island  
South Carolina



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populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" air pollutants. Periodically, the standards are reviewed and may be revised. The six principal pollutants are:

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO<sub>2</sub>)
- Ozone (O<sub>3</sub>)
- Particle Matter (PM) less than 2.5-microns - PM<sub>2.5</sub>
- Particle Matter (PM) less than 10-microns - PM<sub>10</sub>
- Sulfur Dioxide (SO<sub>2</sub>)

At present, the Burrillville area is in attainment with National Ambient Air Quality Standards (NAAQS) established by the US EPA for all criteria.

#### **Ambient Air Quality - Future Conditions**

The predicted impact of the project on current ambient air quality conditions have been estimated by Invenergy using an air quality dispersion model. The AERMOD model used by Invenergy is the EPA-approved model for estimating pollutant concentration values at discrete off-site locations resulting from one or more stationary sources of air emissions. Estimated emissions from the facility during operation are entered into the model, including exhaust stack design data, site structures, and area topography. The model is then executed using 5 years of actual meteorological data for each pollutant during various future operational. Results are combined with background concentrations established by RIDEM and compared to the federal standards.

The modeling completed by Invenergy and submitted to RIDEM demonstrated that the maximum predicted impacts for the proposed facility will not cause or contribute to air pollution in violation of the NAAQS for any of the scenarios considered.

According to Rhode Island Air Pollution Control Regulation No. 9 "Air Pollution Control Permits", the owner or operator shall provide an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The sole criterion for determining if an application is approvable with regard to impairment to visibility and soils shall be compliance with applicable provisions of Subsection 9.5.2(d). The sole criteria for



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determining if an application is approvable with regard to impairment to vegetation shall be compliance with all secondary national ambient air quality standards under Subsection 9.5.2(b)(1)a. and compliance with the applicable provisions of Subsection 9.5.2(d).

The same air quality model used to predict off-site concentrations of NAAQS pollutants was used for air toxics. The air quality model results submitted with the to RIDEM in support of its air quality application demonstrated that the maximum predicted impacts due to the proposed project are below acceptable ambient levels set in Rhode Island Air Pollution Control Regulation No. 22 "Air Toxics".

### **General Air Comments**

In general, the reports contain numerous instances of conflicting information, not just between the three reports (which is to be expected, since the submittal timeframe spanned almost seven months), but also within the same report.

For example, all of the location data (coordinates) for on-site buildings and stack locations presented in Table 3 Modeling Input Parameters was different from the location data contained within the model files. When asked about the discrepancy (see Town Data Request 7-24), Invenergy responded that Table 3 "was not updated to reflect" the most recent information used in the model. Typically, when an applicant acknowledges an error affecting an entire table, a copy of an updated/corrected table is provided. No updated table was provided with Response 7-24.

When it was noted that the property line displayed on Figures 2,4, and 5 of the Air Modeling Report was not consistent with the model's receptor locations (see Town Data Request 7-22), Invenergy noted that the proposed property line has changed once again since the model was completed. The response indicated that changes to the property line would not impact the air modeling results, since the receptors with the highest concentration values presented in the modeling summary tables were located beyond both the original and revised facility property lines. It is difficult to verify this claim, since the location data for the highest pollutant concentration value receptor are not contained within the table.

Typically, when an applicant acknowledges a change to a modeling parameter, such as stack location or property line, the model input files are updated and a copy provided to the permitting agency along with a copy of the model output files demonstrating compliance is maintained with the change. No updated model files were provided with Response 7-22.

Most regulatory standards for off-site receptor locations are based on the location of a facility's property line, while some are based upon the facility's fence line. When asked to provide a legal description of both the property line and fence line (see Town Data Request 7-1), Invenergy



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responded by providing a copy of the current Site Arrangement for the facility. The figure indicated the location of the proposed Property Line, but no reference to the proposed Fence Line could be found on the figure or in the response text. In addition, Invenergy did not provide a legal description for either the Property Line or the Fence Line as part of the response.

When asked to clarify whether the model's discrete boundary receptors represented the Property Line or the Fence Line (see Town Data Request 7-22), Invenergy did not provide the requested clarification. Instead the response indicated the property line has changed without any mention of the Fence Line.

For emission rates not based on US EPA AP-42, Invenergy was asked to provide a copy of the emission factor reference source/document (see Town Data Request 7-7). The response to 7-7 only included a copy of the reference document used to estimate metals from combustion of ULSD in the combustion turbines. No documentation of the source used to calculate emissions from the combustion turbines for criteria pollutants, ammonia, sulfuric acid, and formaldehyde was provided. The response indicates that these values "were provided by the equipment manufacturer."

Typically, an applicant will provide a copy of Equipment Data Sheet, Emission Test Report, and/or correspondence with the manufacturer to document the basis for emissions. Without this documentation, it is difficult to verify that emission rates have been appropriately selected for the proposed operating conditions.

When asked to clarify the discrepancy between the 6.1-lb/year Acrolein emission rate listed on Table 2 and the 35-lb/year shown on Table A-2 (see Town Data Request 7-13), Invenergy responded that Table A-2 was correct. Similar to the response concerning the errors found in Table 3, the response did not include an updated Table 2.

In developing the questions for the Town to submit as Data Request #1, we did not include all errors identified in the three reports, rather we identified errors believed to be representative of the types of issues uncovered during our review. We anticipated our questions to cause Invenergy to reexamine the content of each report and correct the information submitted to RIDEM by providing updated report text, tables, figures, etc. For example, we did not include any questions regarding the following items located in the reports, since we were confident that they were plainly errors and would easily be identified by Invenergy as such during their review.:

- In Table A-2, the Benzene emission factor for combustion turbine ULSD is listed as 1.2E-05-lb/MMBtu which is the same as for natural gas instead of the 5.50E-05-lb/MMBtu listed in AP-42.



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- In Table 16 and Table A-2 the hourly emission rate of Sulfuric Acid at 3.69-lb/hr for the combustion turbines on natural gas which considers only a single turbine, rather than the correct 7.46-lb/hr emission rate that considers both turbines.
- In Table 16 and Table A-2 The hourly emission rate of Sulfuric Acid for the combustion turbines on ULSD only considered one turbine, rather than two.
- In Table 16 and Table A-2 The hourly emission rate of Ammonia for the combustion turbines on both natural gas and ULSD only considered one turbine, rather than two.

Finally, we didn't include anything in our questions regarding errors found within the model input files themselves, since we thought that such obvious mistakes would be identified during updates to the model related to changes in the property line and/or fence line receptor locations. Some of the model input file errors identified include:

- For the 5-year average NO<sub>2</sub> Start-Up Shut-Down model scenario, the location for the ACS8 emission source is located almost 2-miles away from its actual location, almost 3,000-meters south of the Algonquin Compressor Station.
- For the five single year CO Start-Up Shut-Down model scenarios, the location for the ACSGH1 emission source is located almost 40-miles west of its actual location, 60-kilometers west of Algonquin Compressor Station.

### Health Risk Assessment Report

While the Health Risk Assessment Report indicates the project will conform and comply with all relevant standards, we find it difficult to verify the report's conclusions based on the issues we've identified within the reports in the absence of updated data/tables/figures/model files to correct the errors located to-date. While none of the issues appear to be significant enough on their own to necessarily change the compliance demonstration from pass to fail, we are simply not in a position to confirm that assumption since we are unable to evaluate the situation when all of the errors have been adequately addresses and presented in a consistent manner.

### MTBE

Assuming the proposed treatment system for Well 3A performs as designed and removes all MTBE from the groundwater, we don't anticipate any MTBE air emissions. The treatment system consists of two granular activated carbon (GAC) units in series to remove MTBE and other pollutants from the groundwater. The estimated pollutant loading at the proposed pumping rate (700-gallons per hour) has not been verified through the use of pump tests. Should breakthrough occur, we asked about the expected fraction of MTBE that would be expected to volatilize and what fraction would be expected to go to the Burrillville sewer (see Town Data Request 10-1). Unfortunately, the response from Invenergy did not contain any information related to the



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estimated fraction of MTBE expected to volatilize versus the estimated fraction expected to be discharged to the sewer.

#### Carbon Credits

The Regional Greenhouse Gas Initiative (RGGI) is a collaboration of nine NE states that set a CO<sub>2</sub> budget for each state. There is a quarterly auction where entities bid on allowances. The money goes to the States and is used for energy efficiency projects. See: <http://www.dem.ri.gov/rggi/>.

The carbon credits that will be purchased by Invenergy could be produced in any of the nine member states. Generally, CO<sub>2</sub> emissions are not a local issue but rather a global issue.

Please let me know if you have questions or comments regarding our review to date.

Sincerely,

Eric P. Epner, PE  
Vice President

TAB 2



# **RHODE ISLAND DEPARTMENT OF HEALTH**



## **Energy Facility Siting Board Advisory Opinion: Clear River Energy Center**

**DRAFT for PUBLIC COMMENT**

**07.08.2016**

## 1.0 SUBMISSION OVERVIEW

The Rhode Island Department of Health (RIDOH)'s Advisory Opinion of the Proposed Clear River Energy Center (CREC) is RIDOH's response to the State of Rhode Island Energy Facility Siting Board (ESFB)'s "Notice of Designation to the Rhode Island Department of Health to Render an Advisory Opinion" issued on March 10, 2016. Pursuant to R.I. General Laws 42-19-10, RIDOH has considered the issues consigned to it for review. This Advisory Opinion will be finalized for submission by September 10, 2016, per EFSB Order 86. A public hearing by RIDOH on this matter will ensure compliance with the following requirements:

In accordance with Rule 1.11(a) of the Board's Rules of Practice and Procedure (Rules), the designated agency shall render its advisory opinion, to the extent possible, pursuant to the procedures that would be followed absent Board designation of the agency. Where necessary, an agency shall modify its procedures to conform to the requirements of the Act, the Rules, and the Preliminary Decision. In accordance with Rule 1.11(c) the advisory opinion shall conform with the Rhode Island Administrative Procedures Act R.I. Gen. Laws § 42-35 requirements regarding Decisions and Orders and shall be clearly identified as an advisory opinion issued to the Board for consideration at the Board's final hearing. A designated agency lacking a process compliant with the Administrative Procedures Act may, and shall at the direction of the Board's Chairperson, make a witness available to sponsor and be examined on its advisory opinion at the final hearing to be scheduled and held following the advisory opinion deadline.

## 2.0 CONTENT OUTLINE

The RIDOH Advisory Opinion consists of the review of a select set of potential health issues associated with the proposed CREC. Selection of these issues was based on a review of the ESFB Preliminary Decision and Order and other publicly available documentation. The following potential health issues are examined within this document:

- Electromagnetic Fields;
- Noise;
- Drinking Water Quality;
- Air Pollution;
- Asthma;
- Emergency Response and Prevention; and
- Climate Change and Health.

## 3.0 CONTACT INFORMATION

For additional information related to this Advisory Opinion, please address all correspondence to:

Barbara Morin  
Principal Environmental Health Risk Assessment Toxicologist  
Rhode Island Department of Health  
Three Capitol Hill  
Providence, RI 02908  
Barbara.h.morin@health.ri.gov

## 4.0 ISSUE 1: Electromagnetic Fields

### *Background*

The recent proposal submitted for CREC of Burrillville, Rhode Island, includes an analysis of **estimated increased intensity of electric and magnetic fields (EMFs)** projected to occur in proximity to electric transmission lines originating at CREC. The new transmission lines will use an existing right of way (ROW) for electric transmission lines. The ROW is currently populated by two sets of lines. The new lines will add a third set, and thereby increase the EMFs within the ROW and in close proximity to the ROW. Estimates of the increase were produced by Exponent at the request of ESS Group, which prepared the *Rhode Island Energy Facility Siting Board Application* for CREC at the request of Invenergy. Exponent's report is appended to the *Application as Appendix F -- EMF Analysis -- CREC Transmission Line*. Results of this report are summarized in the *Application* in pages 99-105. Excerpts of the Exponent analysis are attached to this document as Appendix I.

In its analysis, the applicant used standard assumptions about the generation and magnitude of EMFs, and a conservatively generous assumption about the magnitude of EMFs, i.e., that CREC would operate continuously at peak load, thus generating magnetic fields of maximum intensity. **As expected, the proposed new transmission lines would not increase the strength of electric fields significantly, but would increase the strength of magnetic fields.** (The latter are related to increased transmission, while the former are not.)

The estimates of increased EMF strength at the edges of the ROW do not exceed existing standards as set by international organizations for whole body exposure to 60-Hz fields for the general public. As Exponent points out, "These exposure limits are based on extensive weight-of-evidence reviews and evaluations of relevant health research and are designed to prevent acute, short-term biological responses such as perception, annoyance, and the stimulation of nerves and tissue that can occur at very high EMF exposure levels to which the general public [might] be exposed."

Furthermore, the applicant's results demonstrate that the projected intensity of the magnetic field that will be produced 100 feet from the ROW when CREC is operating at peak load is equal to the existing (present) intensity of the magnetic field at the border of the ROW. In short, the increased intensity of the EMF is measurable for only a short distance further (100 feet). This is because the intensity of EMFs diminishes as the square of the distance from the source, i.e., very quickly. As discussed above, EMF exposures in that area do not exceed health-based standards.

### *60 Hz Magnetic Fields and Cancer*

Over the past four decades, many studies have been done to explore the potential relationship between exposure to 60 Hz (extra low frequency or ELF) magnetic fields and cancer. Here is how the National Cancer Institute (NCI) summarizes the findings of these studies:

According to the NCI, "No mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly. Some scientists have speculated that ELF-EMFs could cause cancer through other mechanisms, such as by reducing levels of the hormone melatonin. There is some evidence that melatonin may suppress the development of certain tumors. Studies of animals have not provided any indications that exposure to ELF-EMFs is associated with cancer. [...] Although there is no known mechanism by which non-ionizing EMFs

could damage DNA and cause cancer, even a small increase in risk would be of clinical importance given how widespread exposure to these fields is.” More information available at <http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet>.

Therefore, the research continues, with a decided focus on 60 Hz magnetic fields and childhood cancer. The latter studies have been equivocal. Some find no relation between EMF exposure and cancer, while others find a weak relation. However, after decades of research, when all the evidence is weighed as a body, “No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found,” as per the NCI. One reason for the equivocality of findings is that childhood cancer is rare, which means that researchers do not have many cases to study. Another reason is that one’s exposure to EMFs in the course of one’s life is very difficult to measure. Therefore the potential dose-response relationship of EMFs to cancer can only be measured very crudely, using broad categories of exposure intensity which do not lend themselves to standard-setting. Nevertheless, were the relation a strong one – if EMFs, as normally encountered, were a significant cause of cancer – the relation would be observable despite small numbers and other measurement issues.

#### *Summary and Conclusion*

The proposed addition to the electrical transmission in the ROW to be used by CREC will increase the strength of magnetic fields therein and close by, but the resulting intensity of potential human exposure is well within limits set by international standard-setting agencies. Furthermore, EMFs have not been demonstrated to create health risks—acute or otherwise—at the levels generated by the transmission lines in question. For this reason, the health impact of CREC attributable to EMFs is negligible, and may in fact be non-existent.

## 5.0 ISSUE 2: Noise

### *Background*

Exposure to intense or long-term highly elevated noise levels, such as may occur in an occupational setting, can cause the loss of auditory sensory cells in the cochlea, resulting in permanent hearing loss. Indoor and outdoor environmental noise exposures are unlikely to cause hearing loss, but have been linked to a variety of effects, including annoyance; cognitive effects in children, including impairment of reading comprehension and memory; sleep disturbances; and cardiovascular effects, including an increased risk of hypertension and myocardial infarction.<sup>1</sup>

Noise-related annoyance manifests as sleep disruption, interference with speech intelligibility, stress reactions, and negative feelings, such as anger, depression and anxiety. The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”<sup>2</sup>; therefore, noise-related annoyance is considered a health effect. According to the WHO, sleep disturbance, one of the most common complaints raised by noise-exposed populations, can have a major impact on health and quality of life. People can recognize and react to sounds, even when asleep. Those reactions, including wakening and changes in sleep stage, are associated with daytime after-effects, such as sleepiness, reduced cognitive and motor performance, and impairment of cardiovascular function.

Several studies have confirmed that environmental noise; including noise from road, rail and air traffic; can impair children’s cognitive functioning. One of the most compelling of these studies was performed during the relocation of the airport in Munich, Germany in 1992. Children living in the vicinity of the old and new airports were evaluated before and two years after the airport was moved. Before the move, children living near the operating old airport showed deficits in reading comprehension and long-term memory. Two years after the relocation, those deficits were no longer seen in the children near the old airport but had appeared in children living near the new airport site.<sup>3</sup>

Studies have also demonstrated a link between transportation noise and cardiovascular effects, particularly hypertension and an increased risk of myocardial infarction. Noise exposure can cause increased blood pressure and alter heart rates and the release of stress hormones. There are two separate mechanisms for those effects, a direct neural pathway and an indirect pathway that is due to perceived discomfort. Since the direct pathway does not require conscious perception of noise, noise exposure during sleep, as well as during waking hours, is linked with cardiovascular outcomes.

### *CREC Noise Analysis*

A noise analysis was submitted as part of the EFSB application for the proposed CREC facility. In that analysis, the applicant reported existing noise levels measured at five locations surrounding the proposed facility, as well as the modeled noise impacts at those locations associated with the construction and operation of the proposed facility. The locations of the noise receptors, which were chosen to represent the closest residential areas, are shown in Table 1.

<sup>1</sup> Basner, Mathias, et al, “Auditory and Non-Auditory Effects of Noise on Health,” *Lancet* Apr 2014, 383(992):1325-1332

<sup>2</sup> World Health Organization Regional Office for Europe, “Burden of Disease from Environmental Noise,” 2011.

[http://www.euro.who.int/\\_data/assets/pdf\\_file/0008/136466/e94888.pdf](http://www.euro.who.int/_data/assets/pdf_file/0008/136466/e94888.pdf)

<sup>3</sup> Hygge S, et al, “The Munich Airport Noise Study – Effects on Chronic Aircraft Noise on Children’s Perception and Cognition,” *inter.noise 2000*, 29<sup>th</sup> International Congress and Exhibition on Noise Control Engineering, Nice, France, Aug 26-30, 2000.

<http://www.confor.fr/internoise2000/cdrom/data/articles/000676.pdf>

**Table 1 – Locations of Noise Receptors**

Receptor	Street	Direction/Distance from Center of Facility Site
M1	Wallum Lake Road	2,300 feet NE
M2	Jackson Schoolhouse Road	2,500 feet E
M3	Wilson Trail and Doe Crossing Drive	4,300 feet NW
M4	Buck Hill Road	4,300 feet N
M5	Jackson Schoolhouse Road	7,200 feet SE

The applicant's analysis predicted that noise from construction of the proposed facility would not increase ambient levels significantly and that "(t)he average individual is likely to tolerate construction noise given its temporary nature and that the majority of construction will take place during daytime hours." Further, the modeling analysis demonstrated that, with the proposed acoustical design, operation of the proposed facility would not cause noise impacts that exceed the Town of Burrillville's limit on nighttime noise of 43 A-weighted decibels (dBA). The Town noise ordinance also includes limits for octave-band frequencies; the applicant stated that "attaining the unusually restrictive octave-band limits was found to require extraordinary mitigation measures commercially untenable and even beyond engineering feasibility." Since RIDOH does not know the basis for the noise limitations in the Town ordinance, the discussion below is based on a comparison of current and predicted noise levels with health-based reference values, rather than on a determination of whether noise levels comply with the Town's ordinance.

#### Nighttime Noise Exposures

Nighttime noise levels are particularly critical because of the importance of undisturbed sleep to health and wellbeing. According to the WHO, the Lowest Observed Adverse Effect Level (LOAEL) for nighttime outdoor noise effects on sleep is 40 dBA, averaged over an eight-hour period, and, when nighttime levels are in the range of 40 – 55 dBA, "many people have to adapt their lives to cope with the noise at night."<sup>4</sup> As shown in Table 2, the existing current average nighttime noise levels measured at all receptors in the CREC analysis except for M3 were above the 40 dBA LOAEL. According to that document, the predominant source of nighttime noise at receptors M1, M2 and M4 was the nearby Algonquin compressor station, while frog sounds predominated at the other two sites.

The modeled nighttime noise levels associated with CREC operations were above the sleep effect LOAEL at all receptors except for M5. When the CREC noise contributions were combined with existing noise levels, the total nighttime noise levels at all sites were above the LOAEL. Note that, when two noise sources (in this case the existing noise and noise from the CREC facility) impact noise levels at a location, the total noise level at that location is 0 - 3 dBA higher than the louder of the two noises. Note also that the noise survey conducted for the CREC EFSB application did not consider noise that will be generated by an additional turbine at the Algonquin compressor station that has been approved by the Federal Energy Resource Commission (FERC) and permitted by the Rhode Island Department of Environmental Management (RIDEM) but is not yet operating. The analysis presented in the Environmental Impact Statement for the Algonquin project does not identify the nighttime or daytime average noise levels associated with operation of that turbine.

<sup>4</sup> World Health Organization, Regional Office for Europe, "Night Noise Guidelines for Europe", 1999.

**Table 2 – Nighttime Noise Levels (8-hour average, in dBA)**

Location	Measured Existing Nighttime Noise Level (CREC EFSB Application)	Modeled CREC Operations Level (CREC EFSB Application)	Total Nighttime Noise Level (Existing & CREC) (Calculated)
M1	45-48	43	47-49
M2	40-41	41	44
M3	34-36	40	41
M4	51	41	51
M5	44-45	34	44-45

As shown in Table 2, the CREC modeling indicates that operation of the CREC facility would increase the average nighttime noise levels at M1, M4 and M5 by less than 3 dBA, the minimal increase that is generally discernable to the human ear. However, as discussed previously, existing noise levels measured at four of the five receptors already exceed the LOAEL for sleep disturbance. Whether or not CREC operations will result in an increase in the number or severity of those disturbances is dependent on a number of factors, including the time pattern and nature of the noise emissions at the two facilities. This issue is discussed further below.

#### Daytime Noise Exposures

Exposure to elevated environmental noise levels during daytime hours causes annoyance and can impact speech intelligibility, children's cognition, and the cardiovascular system. According to the WHO, an outdoor daytime average noise level of 50 dBA is associated with moderate annoyance and a level of 55 dBA serious annoyance.<sup>5</sup> 55 dBA is also at the lower end of the range of noise levels associated with an increased risk of hypertension.<sup>6</sup>

Current measured daytime noise levels at the five receptors, as well as modeled levels associated with the construction and operation of the CREC facility, are shown in Table 3. Existing daytime noise levels measured at all receptors except M3 were above the 50 dBA moderate annoyance threshold on at least one of the measurement days. The primary source of daytime noise at sites M1 and M2 was recorded as the compressor station, while birds predominated at M3 and M5 and traffic on Buck Hill Road was the main noise source at M4.

<sup>5</sup> Berglund, Birgitta et al, "Guidelines for Community Noise," World Health Organization, Geneva, Switzerland, April 1999. <http://www.who.int/docstore/pch/noise/guidelines2.html>

<sup>6</sup> World Health Organization Regional Office for Europe, "Burden of Disease from Environmental Noise," 2011. [http://www.euro.who.int/data/assets/pdf\\_file/0008/136466/e94888.pdf](http://www.euro.who.int/data/assets/pdf_file/0008/136466/e94888.pdf)

**Table 3 – Daytime Noise Levels (16-hour average, in dBA)**

Location	Measured Existing Daytime Noise Level (CREC EFSB Application)	Modeled CREC Construction Noise Level (CREC EFSB Application) <sup>7</sup>	Modeled CREC Operations Noise Level (CREC EFSB Application)	Total Daytime Noise During Construction (Calculated)	Total Daytime Noise During Operation (Calculated)
M1	52-53	49	43	54	53
M2	50-52	53	41	55-56	51-52
M3	36-44	41	40	42-46	41-45
M4	50-51	47	41	52	51
M5	46-52	37	34	46-52	52

As shown in Table 3, the analysis predicts that noise levels associated with construction activities will be highest at location M2 (Jackson Schoolhouse Road); at that location, average daytime noise levels from construction activities would be as high as 53 dBA, resulting in a total noise level at that site of 55–56 dBA, an increase of 4–5 dBA from current levels. Therefore, the total daytime noise at that location during construction activities would exceed the serious annoyance threshold and may cause a slightly increased risk of hypertension for nearby residents.

Operation of the facility, once constructed, is predicted to have a minimal impact on current average daytime noise levels. However, as with nighttime noise, existing daytime noise levels measured at four of the five receptor sites are already in the moderate annoyance range and, depending on factors like the time pattern and nature of the noise emissions at the two facilities, the frequency or severity of annoyance may increase at some locations as a result of CREC operations. As discussed previously, noise associated with operation of the permitted additional turbine at the Algonquin compressor station was not included in these calculations.

#### Day/Night Noise Exposures

Another important measure of noise exposure is  $L_{DN}$ , a metric which combines daytime and nighttime exposures. To calculate  $L_{DN}$ , noise levels in the nighttime hours are increased by 10 dBA to account for the increased need for quiet during those hours, and a 24-hour average level is then calculated. The EPA has identified a  $L_{DN}$  of 55 dBA as the outdoor exposure level that would prevent annoyance, including interference with the intelligibility of speech.<sup>8</sup> According to the WHO, exposure to a  $L_{DN}$  of 50 dBA has not been shown to cause adverse effects, while some children showed cognitive effects at a  $L_{DN}$  of 55 dBA, and the risk of myocardial infarction was slightly increased when  $L_{DN}$  levels were above 60 dBA.

$L_{DN}$  levels associated with the CREC facility are shown in Table 4. Measured existing  $L_{DN}$  levels were not presented in the CREC application. However, the Environmental Impact Statement for the expanded Algonquin compressor station includes  $L_{DN}$  values for three of the receptors modeled in the CREC application; those values were used to calculate total  $L_{DN}$  values for those sites.

<sup>7</sup> These values are for grading and excavation and steel erection. Noise levels during concrete pouring, equipment installation and finishing are projected to be lower than the levels in this table.

<sup>8</sup> US EPA Office of Noise Abatement and Control, "Information on Levels of Environmental Noise Requisite to Protect Public Health and the Environment," March 1974 <http://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF>



**Table 4 – Day/Night L<sub>DN</sub> Noise Levels (weighted 24-hour average, in dBA)**

Location	Day/Night Noise Level With New Compressor Operating Before CREC (Algonquin FERC Application)	Modeled Day/Night Noise Level (CREC EFSB Application)	Total Daytime Noise During Operation (Calculated)
M1 (Algonquin 1)	57	55	59
M2		58	
M3 (Algonquin 4)	45	57	59
M4 (Algonquin 3)	53	53	56
M5		51	

As shown in Table 4, the L<sub>DN</sub> noise level at M1, before the addition of CREC impacts, was above 55 dBA and the L<sub>DN</sub> impacts of the CREC operations alone at M1, M2 and M3 locations were at or above 55 dBA, the L<sub>DN</sub> value associated with cognitive effects in some children. The total L<sub>DN</sub> values for the three sites (M1, M3 and M4) for which existing noise levels were available in the Algonquin application were all above 55 dBA.

#### *Summary and Conclusions*

The reported measurement of existing nighttime and daytime noise levels in the vicinity of the proposed facility that exceed annoyance thresholds is consistent with testimony submitted to the EFSB by residents living at or near those locations. In particular, written testimony received from a resident living on Wallum Lake Road, near receptor M1, the monitored/modeled noise receptor that is closest to the proposed facility, included the following statement:

Specifically, in the past year, I have experienced excessive noise and vibrations coming from the Algonquin Compressor Station site which this project will be located next to. The noise and vibrations emanating from this site are extremely disruptive and negatively impacting our health and we are unable to sleep or enjoy the peace and quiet of our home. I am concerned that the noise levels and vibration are only going to increase during the construction and operational phase of this project.<sup>9</sup>

Note that, in the CREC noise survey, the current daytime noise level measured at that location (M1) was in the moderate annoyance range and the current nighttime noise level exceeded the threshold for sleep disturbance. The compressor station was the primary existing noise source of both day and night noise at that location. Measured noise levels at site M4 (Buck Hill Road) also exceed both nighttime and daytime annoyance thresholds, due primarily to the compressor operations and road traffic.

The model predicts that construction operations at the CREC facility would increase daytime average noise levels at the five receptor locations by between 0 and 6 dBA and that operation of the facility would increase nighttime noise levels by 0–7 dBA and daytime levels by 0–6 dBA. In most cases, the average predicted increases are in a range that is not generally discernable to the human ear. However, noise is a complex issue, and the potential for the introduction of an additional noise source to result in an increase

<sup>9</sup> CREC/Invenenergy Docket, EFSB. [http://www.ripuc.ri.gov/efsb/efsb/SB2015\\_06\\_PC\\_orourke.pdf](http://www.ripuc.ri.gov/efsb/efsb/SB2015_06_PC_orourke.pdf)

in the prevalence or severity of periods of annoyance and sleep disturbance is dependent on a number of factors, including:

- **The pattern of noise variation with time**  
For example, a continuous noise may have a different effect than periodic louder noises that are interspersed with relative quiet, even if the average noise levels are the same. Loud noises emitted by a source during a time that neighboring sources are quiet may increase the number of disturbances during the day or night. Regular variations in noise level may create an unpleasant pulsing sensation.
- **The noise frequency (pitch)**  
The human ear perceives low frequency (pitch) sounds as not as loud as higher frequency sounds of the same level. The A-weighting procedure used to calculate dBAs attempts to account for these differences, but dBA levels do not always correlate well with subjective perception of complex sounds.
- **Types of noise**  
A person's degree of annoyance to a particular noise level is also influenced by the nature of the noise and whether or not it provokes negative associations, like fear.
- **Individual differences**  
There is a substantial variation among people in sound perception.<sup>5</sup>

Existing daytime and nighttime noise annoyances in the neighborhood around the proposed facility, due primarily to the operation of the compressor station, have already been documented, both by subjective reports from residents and by objective noise measurements. In addition, due to the factors discussed above, the full impact of noise generated by operation of the new turbine at the compressor station and the CREC facility, in conjunction with the existing noise levels, is impossible to predict.

Therefore, RIDOH recommends that, if the CREC facility is constructed, the facility should work in conjunction with Algonquin to minimize neighborhood noise impacts to the extent possible and that such actions should include, but not be limited to, consideration of equipment and operational modifications, sound proofing of impacted residences and, if indicated, the purchase of properties subject to noise levels that cause serious annoyance and/or sleep disruption.

## 6.0 ISSUE 3: Drinking Water Quality

### *Background*

Potential impacts on the quality of drinking water associated with the construction and operation of the CREC were evaluated within the context of the CREC proposal. The Invenergy power plant, as proposed, raised a number of questions regarding potential impacts on drinking water quality in private wells and public wells, groundwater, and public water system licensing. These concerns include possible groundwater depletion, possible contamination of drinking water wells, exposure to MTBE and other contaminants, and pollutant concentrations in discharged wastewater.

### *Situation and Analysis*

Approximately 9,300 residents in Burrillville rely on private wells for drinking water. Burrillville currently has 4,232 structures served by private wells, representing 58.9 percent of all Burrillville structures. These wells rely on groundwater within sand and gravel deposits or from wells in fractured bedrock. The proposed power plant is approximately 1,500 feet from the nearest structures and associated wells. Additionally, the proposed project sits within the watershed of Wallum Lake, which provides sourcewater for Zambarano Hospital. The construction and operation of the project may impact the quantity and quality of the water of wells in the vicinity of the plant and its construction activities.

Invenergy proposes to draw process water from two wells known to have been contaminated with methyl tertiary butyl ether (MTBE), a retired component of gasoline. These wells cannot provide drinking water for the facility and a separate, approved source should be developed for onsite use. Concerns have been expressed regarding the impact of groundwater withdrawals from these wells on other water wells in Burrillville. Invenergy's assessment is that operation of the Facility will actually improve the quality of groundwater in the areas affected by the contamination event.

### *Summary and Conclusions*

At this time, the principal concern is protection of sourcewater for nearby wells, including private wells and Wallum Lake, the source serving Zambarano Hospital. Invenergy proposes to develop a spill prevention, control and countermeasure plan. Effort should be made to protect these sourcewaters from contamination through each phase of the project, including construction and operations.

While groundwater withdrawals from the MTBE-contaminated wells for process water are not a health concern at this time, these wells may not be used to provide water to the plant's offices. Should the power plant use well water on-premises for human use and consumption, and their offices serve more than 25 persons more than 60 days out of the year, then the plant will have to obtain a public water system license through RIDOH's Center for Drinking Water Quality.

## 7.0 ISSUE 4: Air Pollution

### *Background*

The Invenergy power plant, as proposed, will be a major source of nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOC), carbon dioxide (CO<sub>2</sub>), particulate matter smaller than 10 microns (PM<sub>10</sub>) and particulate matter smaller than 2.5 microns (PM<sub>2.5</sub>). The facility will also emit a number of air toxics, which are pollutants for which the US EPA has not established a National Ambient Air Quality Standard (NAAQS). Pollutants will be emitted primarily from processes that combust natural gas and ultra-low sulfur diesel oil (ULSD). VOC will also be emitted from two aboveground ULSD storage tanks.

Invenergy has applied to the Rhode Island Department of Environmental Management (RIDEM) for a major source air pollution control permit for the facility. To obtain this permit, Invenergy must demonstrate that the facility will comply with the requirements of 18 of RIDEM's Air Pollution Control Regulations (APCRs), including APCR No. 9, "Air Pollution Control Permits," and APCR No. 22, "Air Toxics." Note the APCR No. 22 lists health-based Acceptable Ambient Levels (AALs) for approximately 250 air toxics.

Among the requirements for obtaining a major source permit, APCR No. 9 specifies that permit applications must demonstrate that facility emissions will be consistent with the Lowest Achievable Emissions Rate and that ambient air impacts from the facility will not cause a violation of any NAAQS or AAL. NAAQS evaluations consider total ambient air levels, including impacts from the proposed facility, background ambient air pollutant concentrations, and impacts from nearby interacting sources. Compliance with NAAQS and AALs is evaluated using US EPA-endorsed air pollution dispersion models, which utilize several years of hour by hour meteorological data to determine impacts under a range of meteorological conditions.

In addition, major source applications must include a Health Risk Assessment (HRA), which considers potential impacts by all exposure routes. Note that the AALs are derived to be protective of inhalation exposures. The HRA also considers deposition of pollutants, which may lead to ingestion of those pollutants via various media, including soil, water and food products. The HRA also considers dermal absorption, which may cause additional exposure for some pollutants. In addition, the HRA evaluates the cumulative effect of exposure to more than one pollutant associated with the same health effect (e.g. respiratory irritation). To standardize procedures for calculating multi-pathway and cumulative risks, RIDEM's "Guidelines for Assessing Health Risks for Proposed Air Pollution Sources,"<sup>10</sup> which was revised in 2015, requires that HRAs be conducted using software developed by the California Air Resources Board for this purpose.

### *Situation and Analysis*

RIDEM's regulations provide a comprehensive framework for evaluating impacts of air pollution emissions. Rhode Island's Air Toxics regulation is one of the most stringent in the nation, and the requirement for a HRA for major sources provides an extra level of health protection. RIDEM's

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<sup>10</sup> RIDEM's "Guidelines for Assessing Health Risks for Proposed Air Pollution Sources" is available on the RIDEM website at: <http://www.dem.ri.gov/programs/benviron/air/pdf/riskguid15.pdf>

regulations, as well as the HRA guidelines referenced above, have been the subject of a public participation process that included opportunities for submittal of both oral and written testimony.

Questions have been raised concerning the modeling analysis submitted by Invenergy to demonstrate compliance with NAAQS and AALs and as the basis for the HRA. RIDEM is now evaluating the permit application, including the modeling analysis and the HRA; that process is separate from the EFSB proceedings. RIDOH, as well as members of the public, will have an opportunity to comment on RIDEM's evaluation of the permit application and on the proposed permit during RIDEM's public comment period and hearing, which will occur when that review is complete.

Questions have also been raised about whether the NAAQS adequately protect public health. Specifically, epidemiological studies have reported an association between ambient NO<sub>2</sub> levels and various health metrics, including new diagnoses of asthma; clinic and emergency department visits for asthma; hospitalizations for asthma, COPD, stroke and heart failure; and death from cardiovascular and respiratory diseases. In some cases, exposure levels reported in those studies were below the current NAAQS for that pollutant.

Those studies and a number of other epidemiological and experimental studies are discussed in some detail in the US EPA's Integrated Science Assessment for Oxides of Nitrogen – Health Criteria (2016 Final Report) document, (<https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310879>), which was prepared as part of the US EPA's requirements to periodically reevaluate the adequacy of the NAAQS. The US EPA found that experimental and epidemiological data are sufficient to establish a causal relationship between short-term (minutes to one-month) exposures to NO<sub>2</sub> and respiratory effects. Evidence for an association between short-term NO<sub>2</sub> exposure and cardiovascular and related metabolic effects and total mortality are classified as "suggestive, but not sufficient, to infer a causal relationship."

However, it does not appear likely that the US EPA's review of these studies will lead to the proposal of a more stringent NO<sub>2</sub>. A more stringent standard could not be based on experimental data, because experimental studies have focused on exposures to NO<sub>2</sub> concentrations of 100 ppb (the current one-hour average NAAQS) and higher. The US EPA acknowledges that epidemiological studies report health effects at NO<sub>2</sub> levels that are below the NAAQS. However, the document discusses a number of issues that make quantitative interpretation of air pollution epidemiological studies difficult, including issues with accurately characterizing exposure levels and concomitant exposures to other air pollutants.

Questions have also been raised about health effects that may be associated with elevated very short-term (less than one-hour) emissions rates of certain pollutants. While variations in instantaneous emissions rates do occur, quantification and evaluation of the impacts of those variations is virtually impossible, given available modeling tools and health data.

#### *Summary and Conclusions*

RIDEM is currently conducting a comprehensive review of the Invenergy major source air pollution control permit application. That review includes the evaluation of the applicant's modeling analysis demonstrating that emissions would not cause exceedances of health-based NAAQS and AALs and that multi-pathway and cumulative impacts of those pollutants would not result in adverse health effects.

Although RIDOH agrees that there is epidemiological evidence that health effects may be associated with exposures to NO<sub>2</sub> at levels below the NAAQS, no other health-based standard is available for evaluating impacts of that pollutant at this time. States are allowed to adopt more stringent standards than the EPA's NAAQS standards, but no states have promulgated a short-term NO<sub>2</sub> standard that is more stringent than the NAAQS and the process for adopting such standards is arduous. Note that standards are needed to make informed, consistent regulatory decisions.

RIDOH plans to review the HRA, as well as RIDEM's permit evaluation, and will have the opportunity to supply comment during RIDEM's public comment period if indicated.

## 8.0 ISSUE 5: Asthma

### *Background*

Asthma is one of the public health concerns which has been raised through the EFSB public hearing process, as well as in phone calls to RIDOH. Asthma is a chronic respiratory disease that causes a person's airways to narrow, resulting in difficulty breathing. If left untreated, asthma can cause permanent lung damage, disability, and even death. An asthma attack occurs when a person with asthma has greater difficulty breathing than their normal level and requires increased medication and/or medical attention.

The burden of asthma can be described in multiple ways: asthma prevalence (how many people have asthma), visits to the hospital and emergency department, insurance claims data, and mortality data. There is no cure for asthma, but the chronic condition can usually be managed and attacks can be prevented. Asthma is treated through medications and by reducing exposure to asthma triggers.<sup>11</sup> Asthma management and control is multi-factorial. Asthma triggers include various outdoor air pollutants as well as allergies, mold, pests, pet dander, smoke, dust, and other triggers. Individuals with asthma are sensitive to different sets of triggers, which can change seasonally or over time.

Due to these complexities, it is difficult to establish causal relationships between a single environmental factor and asthma outcomes without conducting rigorous scientific research. However, in general, people with asthma or other respiratory diseases are more susceptible and reactive to the impacts of air pollutants. With regards to general population health, policies which reduce the overall level and concentration of air pollution and other environmental asthma triggers will support improved public health with respects to asthma.

### *Analysis of Known Triggers and Asthma Burden*

The proposed CREC facility would emit several air pollutants that are known asthma triggers, including nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOC), sulfur dioxide (SO<sub>2</sub>), and particulate matter. As discussed in Section 7.0 above, CREC is a major emissions source for NO<sub>x</sub>, VOC, particulate matter smaller than 10 microns (PM<sub>10</sub>) and particulate matter smaller than 2.5 microns (PM<sub>2.5</sub>). Smaller PM particles are associated with greater respiratory risk due the ability for smaller particles to move deeper into the lungs. NO<sub>x</sub> and VOC also react in the atmosphere, in the presence of light and heat, to form ozone, another pollutant which is of concern for asthma. The facility would also emit smaller quantities of several other pollutants that are known asthma triggers. In general, air pollutants have a greater impact on children because they breathe more air per unit of body weight and have lungs which are still developing.

The following asthma statistics describe the current asthma burden in Rhode Island and Burrillville; these statistics were derived from multiple data sources, including the Rhode Island Behavioral Risk Factor Surveillance System (BRFSS), the National Survey of Children's Health, Rhode Island Hospital Discharge Data, Rhode Island Emergency Department (ED) Data, and the 2014 Asthma Claims Data Book (RIDOH, 2014), based on a geographic analysis of insurance claims:

- As a state, Rhode Island has asthma rates which are significantly higher than the national averages. Approximately 16% of adults in Rhode Island have been diagnosed with asthma at some point in their lifetime, compared to 13% nationally, and 11% of adults in Rhode Island

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<sup>11</sup> *The burden of asthma in Rhode Island.* (2014). Providence, RI: Rhode Island Department of Health, Asthma Control Program

currently experience asthma, compared to 9% nationally.<sup>12</sup> 17.1% of children in RI have been diagnosed with asthma, compared to 14.5% nationally, and 10.9% of children in RI currently experience asthma, compared to 8.8% nationwide.<sup>13</sup>

- Within Rhode Island, the burden of asthma is primarily concentrated within the four core cities of Providence, Pawtucket, Central Falls, and Woonsocket. In 2010–2012, 12.8% of all children statewide between the ages of 2 and 17 had an asthma claim. Most of northwest Rhode Island had a very low prevalence of asthma claims, with most census tracts having a rate of 0–4.4% of children with an asthma claim. The central census tract in Burrillville was two steps higher than the surrounding area, with the percentage of children with an asthma claim between 6.3% and 7.9%. This was lower than the statewide average, which was driven primarily by the high asthma rates in the high poverty urban core cities, where 10.4–15.4% of children had an asthma claim.<sup>14</sup>
- In addition to asthma prevalence, the severity of asthma can be measured through asthma-related Emergency Department (ED) visits and hospitalizations, which are consistently higher for young children compared to other age groups. In 2010–2014, the statewide rate of children’s ED visits due to asthma was 8.9 per 1,000 children. The rate in Burrillville was 4.4 per 1,000 children, compared to 15.1 per 1,000 children in the core cities. The statewide rate of child hospitalizations for asthma is 1.6 per 1,000 children. The rate in the four core cities is 2.4 per 1,000, while Burrillville is consistent with the remainder of the state at a rate of 1.2 hospitalizations per 1,000 children. In Burrillville, and across the state, the number of asthma-related pediatric emergency department visits had been steadily decreasing from 2011 to 2013. However, in 2014 there was a slight increase in statewide pediatric asthma ED visits. There were 21 pediatric asthma-related ED visits in Burrillville in 2014, which is higher than in any of the previous three years (17 in 2011, 10 in 2012, and 9 in 2013), though still less than that of the core cities.<sup>15</sup>

### *Summary and Conclusions*

Without an in depth research study or comprehensive Health Impact Assessment, it is not possible to predict asthma-related impacts specific to the proposed CREC facility. As discussed in the previous section, for the facility to receive an air pollution control permit from RIDEM, the applicant must demonstrate that emissions from the facility, in conjunction with existing background ambient pollutant levels and emissions from nearby interacting sources, will not cause exceedances of National Ambient Air Quality Standards (NAAQS), which are largely based on respiratory health effects. In addition, as discussed in that section, CREC, as a major source of air pollutants, has been required to submit a Health Risk Assessment (HRA) for air toxics, pollutants for which a NAAQS has not been derived. Among other issues, the HRA must evaluate the cumulative impact of all air toxics emitted by the facility that have the potential to effect the respiratory system.

However, it is not possible to say definitively that emissions from the CREC facility will have no impact on asthma rates or on the wellbeing of nearby individuals with asthma. As discussed in the previous section, epidemiological studies have reported an association between ambient nitrogen dioxide (NO<sub>2</sub>) levels and certain asthma-related health metrics, including new diagnoses of asthma, clinic and

<sup>12</sup> Ibid

<sup>13</sup> National Survey of Children’s Health. NSCH 2011/12. Data query from the Child and Adolescent Health Measurement Initiative. Data Resource Center for Child and Adolescent Health website. Retrieved 06/24/2016 from [www.childhealthdata.org](http://www.childhealthdata.org)

<sup>14</sup> *Asthma claims data book*. (2014). Providence RI: Rhode Island Department of Health, Asthma Control Program.

<sup>15</sup> Rhode Island Department of Health, Hospital Discharge Database, 2010–2014; U.S. Census Bureau, Census 2010.



emergency department visits for asthma, and hospitalizations for asthma. In some cases, the ambient air levels of NO<sub>2</sub> in those studies were below the NAAQS for that pollutant.

Children, in general, and people of all ages who have asthma or other respiratory diseases are more susceptible to impacts from air pollutants. Although Burrillville and northwestern Rhode Island have low asthma prevalence rates and low rates of asthma-related hospitalizations and emergency department visits compared to the core cities in Rhode Island, there are sensitive individuals living in all areas of the State. RIDOH received a call from a Burrillville resident who lives in close proximity to the existing compressor station and the proposed location of CREC, and who reported lifelong suffering from severe and poorly controlled asthma. RIDOH does not have comprehensive data available on how many other individuals with asthma are in close proximity to the proposed CREC facility.

Woonsocket is the closest area of high concern related to asthma, with both a large number and percentage of people with asthma and poor health outcomes with high rates of asthma-related hospitalizations and emergency department visits. If air quality modeling shows air quality impacts as far as Woonsocket, additional steps should be taken to examine, mitigate, and/or prevent those impacts.

Without further research, it is not possible to determine the extent or level of impact which this specific facility would have on individual or population health, in comparison to the many other factors impacting asthma. RIDOH recommends that, if the CREC is to be built, all possible steps be taken to reduce harmful emissions and mitigate the health impacts of emissions, with special consideration to individuals with asthma or otherwise impaired respiratory health. RIDOH can collaborate with the appropriate state partners that will help ensure that those possible steps are initiated and implemented effectively to prevent and mitigate such health impacts.

## 9.0 ISSUE 6: Emergency Response and Prevention

### *Background*

Several areas of concern related to prevention and response to potential emergency releases and catastrophic events involving materials at or in transit to or from the proposed CREC facility have been identified, including:

- Potential for toxic releases of ammonia stored and used at the facility;
- Fire and explosion hazards associated with compressed hydrogen used to cool generators at the facility;
- Potential for spills/releases of fuel oil stored and used at the facility;
- Safe storage and transportation of and hazardous waste generated at the site; and
- Releases and catastrophic events involving natural gas at the facility or in the pipeline and related infrastructure in the vicinity of the facility.

### *Hazards*

Emergency release concerns are minimally addressed in Invenenergy's EFSB application, but are discussed in more detail in the applicant's responses to data requests by the Town of Burrillville. The following is a discussion of information supplied by the applicant and RIDOH's recommendations concerning those issues.

### Ammonia Storage

The applicant states that the facility will store 40,000 gallons (more than 300,000 pounds) of 19% aqueous ammonia, which will be used to control air pollutant emissions. The US EPA requires facilities that store more than 10,000 pounds of 20% aqueous ammonia to prepare a Risk Management Plan (RMP) as part of a Risk Management Program designed to prevent and mitigate the consequences of accidental/emergency releases. In Response 11-3 to the Town's 11<sup>th</sup> Set of Data Requests, the applicant states that the 20% concentration criterion was set by the US EPA "because it does not consider aqueous ammonia stored at a concentration less than 20% to pose a public health risk upon release." No documentation was provided to support that statement. Note that, in some cases, threshold concentrations in the RMP rule may have been based on issues other than public health. See the Materials Safety Data Sheet in Appendix II for more information about aqueous ammonia.

In Response 11-3, the applicant reports that, although the CREC facility will not be subject to RMP requirements, an assessment was performed using the Area Locations of Hazards Atmospheres (ALOHA) model to determine the furthest downwind distance that concentrations at the level of the one-hour Acute Exposure Guideline Levels (AEGLs) for ammonia would occur in the event that the full 40,000 gallons of aqueous ammonia were released into the concrete containment area that will house the storage tank and associated pumps, valves and piping. The applicant states that ALOHA predicted that the furthest downwind point at which the most stringent AEGL, AEGL-1; which is associated with effects that are transient, reversible upon exposure cessation and not disabling; is only 121 yards, and that no off-property locations would be affected by such a release.

The applicant further states that the following measures will be implemented to minimize the potential for and mitigate the consequences of an accidental ammonia release:

- The concrete containment area that will house the ammonia storage tank and its associated transfer pumps, valves and piping is designed to contain up to 110% of the storage tank capacity;
- To minimize the evaporation rate of ammonia into the ambient air, the containment area will be filled with passive evaporative controls to reduce the exposed surface area of any aqueous ammonia within the containment area by 90%;
- Ammonia sensors within the containment area will alert plant operators of any system leaks;
- Emergency procedures will be established to evacuate facility personnel from areas on the property potentially impacted by a release and to require emergency personnel to use proper personal protective equipment; and
- The applicant will work with local emergency responders to establish emergency procedures in the event of a release.

RIDOH does not have sufficient information available to reproduce the ALOHA model run. It appears that the model may have been run assuming that the passive evaporation controls were fully functional, reducing the exposed surface area by 90%. If that is the case, RIDOH recommends that the model also be run without that assumption and that emergency planning consider the results of the more conservative model run, including the potential for off-site consequences.

Although it appears that, since the ammonia concentration is slightly lower than the RMP threshold, a RMP is not required, RIDOH strongly recommends that equivalent planning and prevention procedures be implemented. RMP programs include a hazard assessment; a prevention program that includes safety precautions and maintenance, monitoring and employee training measures; and an emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies should an accident occur.<sup>16</sup> Note that such a program is designed to ensure the comprehensive identification and mitigation of potential hazardous releases and the effective implementation of response procedures should a release occur.

In addition, all facilities are subject to EPA's General Duty Clause, which requires facilities to identify and assess hazards, design and maintain a safe facility to prevent accidental releases, and minimize the consequences of such releases if they should occur. A factsheet on the General Duty Clause is available at <https://www.epa.gov/sites/production/files/2013-10/documents/gdc-fact.pdf>.

RIDOH strongly recommends the following regarding storage of ammonia at the facility:

- Invenergy should establish clear, written procedures for the periodic inspection, testing and maintenance of the integrity of the containment area and the functionality of passive controls, sensors, etc., to ensure that those safety elements will function appropriately should an event occur;
- Invenergy should also establish clear, written emergency procedures. Emergency procedures should include appropriate training, including periodic refresher training, of staff who will be responsible for implementing emergency response. Those staff should be fitted for, have available, and be trained in the use of appropriate personal protective equipment.

<sup>16</sup> EPA Risk Management Plan (RMP) Rule Overview webpage:  
<https://www.epa.gov/rmp/risk-management-plan-rmp-rule-overview>

- If ALOHA was run with the assumption that the passive controls would significantly reduce the evaporation rate, the model should also be run assuming a failure in those controls. If, with that assumption, the distance to the toxic endpoint extends off-property, appropriate planning should be implemented for that possibility, including evaluating possible impacts on, and safety procedures for, potentially impacted receptors (residences, schools, health care facilities, etc.) Note that planning for potential impacts on Zambarano Hospital is particularly critical, due to the difficulties that would be associated with evacuation of the residents of that facility.
- Coordination with local emergency responders should include the identification of and coordination with the nearest hazardous materials response team. Emergency responders should be provided with full information about the quantities and locations of chemicals stored on site and of transport routes and procedures, as well as of the results of the worst-case analysis discussed above.

#### Compressed Hydrogen Storage, Use, and Transport

The applicant states that hydrogen will be used at the facility for cooling electric generators. Hydrogen generators will not be operated; hydrogen will be delivered to the facility in compressed gas cylinders or tube trailers. In its responses to the Town's 9<sup>th</sup> Set of Data Requests, the applicant outlines safety procedures that will be employed to assure safe storage and use of those tanks, including:

- To prevent the formation of flammable mixtures, the generator will be purged of hydrogen before opening the system to the atmosphere and purged of air, oxygen or other oxidizers before admitting hydrogen into the system;
- The hydrogen control system will automatically purge the generator using inert carbon dioxide gas to remove the hydrogen;
- When the generator is in operation, the hydrogen storage and supply system is designed to a nonexplosive level (i.e., 99.99%);
- Hydrogen cylinders and tube trailers will be located outside and away from high traffic areas and normally occupied spaces. The location will be based on NFPA 55 guidelines;
- A dedicated concrete pad will be constructed next to the cylinders for a tube truck as a back-up source of hydrogen;
- Protective bollards will be installed around the cylinders and the trailer pad to protect from traffic;
- Hazard signage will be posted;
- Systems will be designed and installed according to NFPA requirements to prevent sources of ignition, including the use of properly rated equipment in hydrogen storage and safety systems;
- The generator is equipped with end shields designed to direct a blast away from possible occupied spaces;
- Enclosed spaces will be furnished with hydrogen sensors to monitor leaks;
- An automated seal oil system control system, equipped with emergency pumps to maintain the seal in the event of a power loss, will be employed;
- Pressure release devices will be used in the compressed storage system to relieve pressure in a controlled manner through a vent system;
- The hydrogen system has a dedicated control panel to monitor hydrogen purity, backed up by an uninterruptible power supply;
- The manifold that supplies hydrogen to generator has a gas control valve assembly and gas pressure monitor;

- The building ventilation system is designed to prevent the accumulation of hydrogen, including redundant fans;
- Purged hydrogen sills be piped and vented to an elevated point outside of the generator building.
- Hydrogen sensors with an externally mounted alarm and control panel will be installed in all battery rooms;
- Hydrogen delivery trucks will follow DOT guidelines;
- Hydrogen tubes and trailers are designed and operated according to DOT specifications to ensure safe transportation; and
- The hydrogen storage and supply system will be designed to meet NFPA 55.

The threshold quantity for hydrogen storage in EPA's RMP rule is 10,000 pounds. If the total amount of hydrogen stored on the facility's site will not exceed that threshold at any time, a RMP is not required. However, as discussed above, RIDOH strongly recommends the implementation of equivalent planning and prevention procedures, including a comprehensive hazard assessment, prevention program and emergency response program. It appears that the applicant has designed a system for the storage and use of compressed hydrogen that considers these issues; however, a RMP-like plan would ensure, to the extent possible, that all possible hazards are identified and mitigated in advance and that emergency procedures would be effectively implemented if an incident were to occur. Note that hydrogen storage and use is also covered by the EPA's General Duty Clause, as discussed above.

RIDOH strongly recommends the following regarding hydrogen storage and use at the facility:

- Clear written procedures should be in place for the periodic inspection, testing and maintenance of all equipment, controls, sensors, etc. related to the storage and use of hydrogen at the facility to ensure that they are functioning appropriately;
- All staff that are involved with the storage, transfer and use of hydrogen should be provided with appropriate training, including periodic refresher training, in procedures necessary to ensure the safe maintenance and operation of the hydrogen system, as well as in emergency procedures.
- As discussed above, coordination with local emergency responders, including the nearest hazardous materials response team, is essential. Emergency responders should be provided with full information about the quantities and locations of hydrogen on site and of transport routes and procedures, as well as any other information relevant to ensure optimum response.

#### *Additional Considerations*

In addition to the ammonia and hydrogen issues discussed above, concerns have been raised about the potential for spills associated with the two million gallons of fuel oil that will be stored at the facility, the storage and transportation of hazardous waste generated at the site, and the potential for catastrophic events involving natural gas at the facility or in the pipeline and related infrastructure. RIDOH expects that the former two issues will be addressed by RIDEM. The potential for catastrophic events related to the safety of the transport and use of natural gas in the area should be considered in a more comprehensive context, rather than in an analysis that is limited to the CREC facility. RIDOH also recommends that all potential hazards be evaluated in a facility-wide RMP-like hazard analysis and in ensuring compliance with General Duty Clause requirements, as discussed above.

## 10.0 ISSUE 7: Climate Change and Health

### *Background*

RIDOH considers climate change to be a current and future health threat in Rhode Island. The US Global Change Research Program states that human-induced climate change, which is caused by the burning of fossil fuels, “is a significant threat to the health of the American people”<sup>17</sup> and can include negative physiological and mental health impacts. Vulnerable populations already face risks due to warming temperatures, reduced air quality, increasing severity of storms, flooding, drought, and the rising of sea levels.

### *Discussion of Potential Concerns*

Climate change threatens the health of Rhode Islanders in several salient ways, from larger storm systems and sea-level rise to the introduction of infectious diseases and infectious disease vectors formerly confined to more southern latitudes. Global warming may also threaten our food supply and supply of fresh water, both critical to public health. The magnitude of these effects is unknown, but public health officials project real threats to the public’s health in the short, medium, and long-term.

The burning of fossil fuels and the extraction of fossil fuels by “fracking” both contribute to climate change by emitting various greenhouse gases to the atmosphere, most notably carbon dioxide and methane. Both have the effect of harming the health of Rhode Islanders now and in the future.

The contribution to climate change from the CREC facility proposed for Burrillville can be assessed indirectly by noting the projected annual rate of greenhouse gas emissions at the plant site and by estimating the annual rate of greenhouse gas emissions attributable to fracking the quantity of gas projected to be burned in the Burrillville plant. We cannot measure the direct contribution of the proposed plant, or of any single facility, to public health by means of climate change.

### *Summary and Conclusions*

When considering expansion of the fossil fuel-based energy system, RIDOH acknowledges that the potential effects on climate change must be considered project by project and community by community. RIDOH supports the Resilient Rhode Island Act’s goals, and thus supports any locally-requested examination of alternative energy sources and/or plans. If and when determined to be at all possible, RIDOH supports efforts aimed at carbon emission reduction and the development of alternative, renewable energy sources.

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<sup>17</sup> Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, 2016: Executive Summary. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. U.S. Global Change Research Program, Washington, DC, page 1–24. <http://dx.doi.org/10.7930/J00P0WXS>

## 11.0 Appendices

### Appendix I

Excerpted from: Rhode Island Energy Facility Siting Board Application

[Received as: SB\_Invenenergy\_application.pdf]

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#### 6.11 Electric and Magnetic Fields

This section provides an assessment of electric and magnetic fields (referred to as EMF) resulting from the operation of the Project's dedicated 345 kV AC electric transmission line that will interconnect the Project into the regional electric transmission system. The complete EMF Analysis Report for the CREC Transmission Line is located in Appendix F.

[...]

Above ground transmission lines are typically located in transmission corridors or Rights of Ways (ROWs) with the conductors suspended from towers or poles to keep the transmission lines at a safe height above the ground. Access to transmission line ROWs is usually restricted for safety reasons.

Table 6.11-2 is provided to illustrate guidelines suggested by various national and international health organizations for exposure to both electric and magnetic fields. The EMF guidelines identified in Table 6.11-2 were developed by the identified organizations to be protective against adverse health effects from EMF, but which should not be viewed as representing EMF levels that have been proven as safe versus levels that are un-safe; the values shown are simply guidelines based on current knowledge.

Table 6.11-2

60-Hz EMF Guidelines Established by Health and Safety Organizations

Organization	Magnetic Field	Electric Field
American Conference of Governmental and Industrial Hygienists (ACGIH) (occupational)	10,000 mG <sup>a</sup> 1,000 mG <sup>b</sup>	25 kV/m <sup>c</sup> 1 kV/m <sup>b</sup>
International Commission on Non-Ionizing Radiation Protection (ICNIRP) (general public, continuous exposure)	2,000 mG	4.2 kV/m
Non-Ionizing Radiation (NIR) Committee of the American Industrial Hygiene Assoc. (AIHA) endorsed (in 2003) ICNIRP's occupational EMF levels for workers	4,170 mG	8.3 kV/m
International Committee on Electromagnetic Safety (ICES)	9,040 mG	5.0 kV/m
U.K., National Radiological Protection Board (NRPB) (now Health Protection Agency (HPA))	2,000 mG	4.2 kV/m
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Draft Standard, Dec. 2006 <sup>c</sup>	3,000 mG	4.2 kV/m
<i>Comparison to <u>steady</u> (DC) EMF, encountered as EMF outside the 60-Hz frequency range:</i>		
Earth's magnetic field and atmospheric electric fields, steady levels, typical of environmental exposure <sup>d</sup>	[550 mG]	[0.2 kV/m up to > 12 kV/m]
Magnetic Resonance Imaging Scan, static magnetic field intensity <sup>d</sup>	[20,000,000 mG]	---

Notes:

<sup>a</sup> ACGIH guidelines for the general worker.

<sup>b</sup> ACGIH guideline for workers with cardiac pacemakers.

<sup>c</sup> [http://www.arpansa.gov.au/pubs/comment/dr\\_elfstd.pdf](http://www.arpansa.gov.au/pubs/comment/dr_elfstd.pdf); and <http://www.arpansa.gov.au/News/events/elf.cfm>

<sup>d</sup> These EMF are steady fields, and do not vary in time at the characteristic 60-cycles-per-second that power-line fields do. However, if a person moves in the presence of these fields, the body experiences a time-varying fields

Table 6.11-3 shows guidelines that have been adopted by a number of states to establish EMF design guidance for future transmission line right of ways that are equivalent to that currently measured within or at the edge of existing transmission rights of way for similarly configured transmission-lines. These EMF state guidelines are not health-based standards, but simply guidelines to maintain EMF values for new transmission lines at EMF measurements experienced for existing similarly configured transmission lines.

Table 6.11-3  
State EMF Standards and Guidelines for Transmission Lines

State / Line Voltage	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Florida <sup>a</sup> 69 -- 230 kV	8.0 kV/m	2.0 kV/m <sup>f</sup>		150 mG
230 kV and <= 500 kV	10.0 kV/m	2.0 kV/m <sup>f</sup>		200 mG
>500 kV	15.0 kV/m	5.50 kV/m		250 mG <sup>e</sup>
Minnesota	8.0 kV/m			
Montana	7.0 kV/m <sup>a</sup>	1.0 kV/m <sup>b</sup>		
New Jersey		3.0 kV/m		
New York <sup>c</sup>	11.8 kV/m	1.6 kV/m		200 mG
	11.0 kV/m <sup>d</sup>			
	7.0 kV/m <sup>a</sup>			
Oregon	9.0 kV/m			

Key: ROW = right of way; mG = milliGauss; kV/m = kilovolts per meter

Notes:

- <sup>a</sup> Maximum for highway crossings
- <sup>b</sup> May be waived by the land owner
- <sup>c</sup> Magnetic fields for winter-normal, maximum line-current capacity
- <sup>d</sup> Maximum for private road crossings
- <sup>e</sup> 500 kV double-circuit lines built on existing ROW's
- <sup>f</sup> Includes the property boundary of a substation

Sources: "Questions and Answers about EMF." National Institute of Environmental Health Sciences and U.S. Department of Energy, 2002. <http://www.niehs.nih.gov/health/topics/agents/emf/index.cfm>

Florida, see: [http://www.dep.state.fl.us/siting/files/rules\\_statutes/62\\_814\\_emf.pdf](http://www.dep.state.fl.us/siting/files/rules_statutes/62_814_emf.pdf)

[...]

### 6.11.3 Projected EMF Impacts

EMF standards and guidelines are applied at those locations where the public could have access to the Project. Most electric generation facilities are closed for general public access and as a result exposure to EMF within the facility is not an issue for the general public. Areas open to the public are typically publically accessible land along the edges of the ROW or for homes located contiguous to transmission rights of way.

As a result of the construction and operation of the Project the EMF levels along the six miles of the transmission ROW used by the Project will be impacted. To assess these impacts EMF estimates were developed that included impacts for the two existing 345 kV transmission lines (lines 341 and 347) and the addition of the Project's new 345 kV transmission line interconnecting the Project into the regional transmission system.

Table 6.11-4 provides the analysis of the magnetic fields (existing and proposed) within the ROW, at the edges of the ROW and 100 feet to either side of the ROW for the two arrangements of transmission towers depicted in Figure 6.11-1.



Table 6.11-4

**Magnetic-field Levels (mG) at Peak Loading of CREC Line and Average and Peak Loading of the Existing 341 and 347 Lines**

			Distance from Centerline of ROW				
Section	Loading	Condition	East ROW Edge -100 ft	East ROW Edge	Max on ROW	West ROW Edge	West ROW Edge +100 ft
4.4 Mile Section (See Figure 6.11-1)	Average	Existing	1.0	1.8	116	1.9	1.1
		Proposed	5.0	12	365	4.3	2.3
	Peak	Existing	0.5	1.1	171	8.2	2.0
		Proposed	6.4	14	343	3.8	1.6
1.6 Mile Section (See Figure 6.11-1)	Average	Existing	4.5	21	116	0.9	1.1
		Proposed	13	65	366	5.9	1.6
	Peak	Existing	3.5	22	171	8.2	2.0
		Proposed	19	79	336	46	14
Reference Exponent, Inc. Report Dated October 27, 2015 See APPENDIX F							

Table 6.11-5 provides the analysis of the electric fields (existing and proposed) within the ROW, at the edges of the ROW and 100 feet to either side of the ROW for the two arrangements of transmission towers depicted in Figure 6.11-1.

Table 6.11-5

**Electric-field Levels (kV/m) With CREC and the Existing 341 and 347 Lines At Maximum Voltage**

			Distance from Centerline of ROW				
Section	Voltage	Condition	East ROW Edge -100 ft	East ROW Edge	Max on ROW	West ROW Edge	West ROW Edge +100 ft
4.4 Mile Section (See Figure 6.11-1)	Maximum	Existing	0.02	0.05	7.5	0.39	0.02
		Proposed	0.04	0.11	7.5	0.33	0.04
1.6 Mile Section (See Figure 6.11-1)	Maximum	Existing	0.14	1.2	7.5	0.39	0.14
		Proposed	0.13	1.2	7.7	1.5	0.13
Reference Exponent, Inc. Report Dated October 27, 2015 See APPENDIX F							

The results of the analysis of the Magnetic and Electric field levels (EMF Levels) for the existing and the proposed addition of the CREC's transmission line within the National Grid ROW finds that the Magnetic and Electric Field levels at the edges of the ROW and 100 feet to either side of the ROW are calculated to be well below the reference levels recommended by International Committee on Electromagnetic Safety (ICES) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (see Table 6.11-1) and well within the Standards and Guidelines set by many other States for new transmission line additions (see Table 6.11-3).

Appendix II: Material Safety Data Sheet (Aqua Ammonia – 19%)



Terra Industries Inc.  
Terra Centre – 600 Fourth Street  
Sioux City, Iowa 51101

Material Safety Data Sheet

Aqua Ammonia  
(19% NH<sub>3</sub>)

MSDS Number 2050A (Revised February 16, 2007)

8 Pages

1. CHEMICAL PRODUCT and EMERGENCY TELEPHONE CONTACT

Product Name: Aqua Ammonia (19% NH<sub>3</sub>)  
Chemical Family: Inorganic Nitrogen Compound  
Synonyms: Ammonium Hydroxide; Ammonia Solution;  
Aqueous Solution; Ammonia Monohydrate;  
Ammonia Water; Ammonia Liquor  
Formula: NH<sub>4</sub>OH in H<sub>2</sub>O  
Product Use: Fertilizers; Pharmaceuticals; Lubricants;  
Household Cleaners; SCR NO<sub>x</sub> Control

**EMERGENCY TELEPHONE NUMBERS**

CHEMTREC (U.S.): 800-424-9300  
CANUTEC (Canada): 613-996-6666

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient Name/CAS Number	Concentration	Exposure Limits (NH <sub>3</sub> )
Ammonium Hydroxide / 1336-21-6	39.1%	25 ppm TWA
Water / 7732-18-5	60.9%	35 ppm STEL
		50 ppm PEL
Contains 19% ammonia as NH <sub>3</sub>		300 ppm IDLH

3. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW**

Corrosive liquid! May be fatal if swallowed. Vapor is toxic and irritating to eyes, nose, throat and skin. Liquid will burn skin and eyes. Vapor is flammable under limited conditions. Use water to control fire and disperse vapors.

NFPA Hazard Classification	Health Hazard (Blue)	3
(for ammonia vapor)	Flammability (Red)	1
	Reactivity (Yellow)	0

## **POTENTIAL HEALTH EFFECTS**

**Primary Routes of Entry:** Inhalation, skin contact/absorption and eye contact.

**General Acute Exposure:** Aqua ammonia may cause caustic injury. The severity of injury depends upon the concentration and duration of exposure. The extent of injury ranges from mild skin irritation or cough to severe burns or laryngeal edema and life-threatening pulmonary edema.

### **Inhalation:**

**Corrosive!** Ammonia vapor is toxic and a severe irritant of the respiratory tract. It may cause a running nose, coughing, chest pain, cessation of respiration and death. It may cause severe breathing difficulties, which may be delayed in onset. **ADDITIONAL MEDICAL INFORMATION:** Bronchospasm, laryngitis, tracheitis, wheezing, dyspnea, and laryngeal stridor may be noted. Mucosal burns to the tracheobronchial tree, Pulmonary Edema, and associated hypoxemia frequently occur following exposure to concentrated ammonia.

### **Skin Contact:**

**Corrosive!** Aqua ammonia is a severe irritant of the skin. Skin exposure to high concentrations may cause pain and deep and severe burns to the skin. **ADDITIONAL MEDICAL INFORMATION:** Corrosive effects on the skin and other tissues may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following exposure is essential.

### **Eye Contact:**

**Corrosive!** Vapors cause irritation. Effects as a result of direct contact with aqua ammonia may range from irritation and lacrimation to severe injury and blindness. **ADDITIONAL MEDICAL INFORMATION:** Eye exposure may result in conjunctivitis, lacrimation and/or corneal irritation. Total corneal epithelial loss may occur.

### **Ingestion:**

**Toxic!** May cause corrosion to the esophagus and stomach with perforation and peritonitis. Symptoms may include pain in the mouth, chest, and abdomen, with coughing, vomiting and collapse. Ingestion of as little as 3-4 ml of ammonium hydroxide may be fatal.

**Note to the Physician:** Pneumonitis should be anticipated after severe inhalation or ingestion. If severe exposure is suspected, observe for 48-72 hours for delayed pulmonary edema.

### **Carcinogenicity:**

NTP: .....	Not Listed
IARC: .....	Not Listed
OSHA: .....	Not Regulated

**Medical Conditions Aggravated by Exposure:** Chronic respiratory or skin disease.

#### 4. FIRST AID MEASURES

**First Aid for Eyes:** Immediately flush eyes with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, excessive tearing, or light sensitivity persists, the patient should be seen in a health care facility and referral to an ophthalmologist considered.

**First Aid for Skin:** Immediately flush exposed area with copious amounts of tepid water for at least 15 minutes followed by washing area thoroughly with soap and water. The patient should be seen in a health care facility if irritation or pain persists.

**First Aid for Inhalation:** Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. If trained to do so administer supplemental oxygen with assisted ventilation as required. Administer artificial respiration if patient is not breathing.

**First Aid for Ingestion:** Call a physician. If conscious, give the patient 4 to 8 ounces of milk or water to drink immediately. Do not induce vomiting.

#### 5. FIRE FIGHTING MEASURES

Flash Point:	Not Applicable
Lower Flammable Limit:	15.5 % Volume in Air (for NH <sub>3</sub> )
Upper Flammable Limit:	27.0 % Volume in Air (for NH <sub>3</sub> )
Autoignition Temperature	1204° F (651° C) (for NH <sub>3</sub> )

**Extinguishing Media:** Stopping the flow of gas rather than extinguishing the fire is usually the best procedure to follow when escaping gas is burning.

Small Fire: .....Dry chemical or CO<sub>2</sub>

Large Fire: .....Water spray, fog or foam

**Special Fire Fighting Procedures:** Use water to keep fire exposed containers cool. Use water fog or foam to reduce vapor concentrations if necessary. Full protective equipment including a self-contained breathing apparatus should be worn in a fire involving the material.

#### 6. ACCIDENTAL RELEASE MEASURES

**Spill or Leak Measures:** Stop leak if you can do so without risk. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Evaluate the affected area to determine whether to evacuate or shelter-in-place by taping windows and doors, shutting off outside air intake (attic fans, etc.), and placing a wet towel or cloth over the face (if needed). Self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing used in conjunction with water spray will provide limited protection in outdoor releases for short-term exposure. Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. Use water spray to control vapors.

**CAUTION:**

Runoff from vapor control or dilution of spilled product may cause pollution.

**Determining Spill Size:** Generally, a small spill is one that involves a single, small Package (i.e. up to a 55 gallon drum), small cylinder, or a small (non-continuing) leak from a large container. **Small Spill:**

- a. Flush area with flooding amounts of water.
- b. First isolate 100 feet in all directions and then protect persons downwind 0.1 miles during daylight and 0.1 miles at night (recommended for ammonia vapor).

**Large Spill:**

- a. Dike far ahead of liquid spill for later disposal.
- b. Follow local emergency protocol for handling.
- c. First isolate 200 feet in all directions, then protect persons downwind 0.4 miles during daylight and 1.4 miles at night (recommended for ammonia vapor).

## 7. HANDLING AND STORAGE

**Handling:** Avoid contact with either liquid or vapors. Direct contact with mercury must be avoided. Use proper PPE when working with or around aqua ammonia (See section 8).

**Storage:** Ambient temperature. Store in dry, well-ventilated area away from incompatible materials. Protect against physical damage. Keep out of direct sunlight and away from heat sources.

## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

**Respiratory Protection Requirements: (for NH<sub>3</sub>)**

<25 ppm:	No protection required.
25 to 35 ppm:	Protection required if the daily TWA is exceeded.
35 to 50 ppm:	Protection required if exposed for more than 15 minutes.
50 to 250 ppm:	Minimum of an air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
250 to 300 ppm:	Minimum of a full-face air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
>300 ppm:	A fresh air supply system must be used (i.e. SCBA)

**Skin Protection Requirements:** Nitrile rubber, neoprene, or PVC gloves and protective clothing should be used.

**Eye Protection Requirements:** Use chemical (indirectly vented) goggles when there is a potential for eye contact. A full-face shield is recommended in addition to goggles for added protection.

**Other Protective Equipment:** Safety shower and eyewash fountain should be provided in the aqua ammonia handling area. When transporting, provide at least 5 gallons of readily accessible, clean water and personal protective equipment.

**Engineering Controls:** Maintain adequate ventilation to keep ammonia concentrations below applicable standards.

**NOTE:** See Section 2 for regulatory exposure limits.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: ..... Liquid  
Color: ..... Colorless  
Odor: ..... Strong pungent penetrating odor, ammonia.  
pH: ..... 12.0 (neat)  
Specific Gravity: ..... 0.9277 (@ 20° C)  
Vapor Density: ..... 0.60 (@ 15.5° C) for NH<sub>3</sub>  
Vapor Pressure: ..... 236 mm Hg (@ 15.5° C)  
Molecular Weight: ..... 35.05  
Relative Density: ..... 0.9261 kg/l (@ 20° C)

## 10. REACTIVITY

Stability: ..... This is a stable material.  
Hazardous Polymerization: ..... Will not occur.

**Decomposition:** Will liberate ammonia if heated. Hydrogen is released on heating ammonia above 850° F (454° C). The decomposition temperature may be lowered to 575° F (300° C) by contact with certain metals such as nickel. At 1290° F (690° C) or in the presence of electric spark ammonia decomposes into nitrogen and hydrogen gases, which may form a flammable mixture in the air.

**Conditions to avoid:** Excessive heat.

**Materials to avoid:** Contact with calcium hypochlorite, bleaches, gold, mercury, and silver may form highly explosive products. Contact with iodine, bromine or chlorine may cause violent spattering.

## 11. TOXICOLOGICAL INFORMATION

### Toxicity

#### Acute Oral Toxicity

LD<sub>50</sub> Rat:..... 350 mg/kg bw

LD<sub>50</sub> Cat:..... 750 mg/kg bw

#### Acute Toxicity, Other Routes

LD<sub>10</sub> Rabbit:..... 10 mg/kg bw

#### Skin Irritation / Corrosion

Rabbit:..... Corrosive at 20% but not 10%

#### Eye Irritation / Corrosion

Rabbit:..... Irritating

#### Genetic Toxicity *in vitro*

Gene Mutation *E. Coli*:..... Negative

#### Genetic Toxicity *in vivo*

Gene Mutation *Drosophila melanogaster*:..... No evidence for mutagenicity

### Ecotoxicity

#### Acute Toxicity to Fish

LC<sub>50</sub> *Cyprinus carpio*:..... 1.34 – 1.70 mg un-ionized NH<sub>3</sub>/L (48 hr semi-static)

#### Acute Toxicity to Aquatic Invertebrates

LC<sub>50</sub> *Daphnia magna*:..... 32 mg NH<sub>3</sub>OH/L (48 hr static)

#### Chronic Toxicity to Fish

LC<sub>50</sub> *Ictalurus punctatus*:..... 37.5 ppm (8 days)

Source: TFI Product Testing Program April 2003

## 12. ECOLOGICAL INFORMATION

- a. Ammonia is harmful to aquatic life in very low concentrations and may be hazardous if it enters water intakes.
- b. Local health and wildlife authorities, as well as operators of water intakes in the vicinity, should be notified of water releases.
- c. Waterfowl toxicity may occur at elevated concentrations.
- d. Ammonia does not concentrate in the food chain.
- e. The conversion of ammonia to nitrites/nitrates by bacteria in aquatic systems can reduce the concentration of dissolved oxygen (referred to as nitrogenous oxygen demand).

Effect on water treatment process: Chlorination will produce chloramines, which are more readily detected by taste and odor.

Note: See Ecotoxicity information in section 11.

### 13. DISPOSAL CONSIDERATIONS

Reclaim as fertilizer if possible. Otherwise, waste must be disposed of in accordance with federal, state, and local environmental control regulations.

### 14. TRANSPORTATION INFORMATION

U.S. DOT and Canadian TDG Act

Shipping Name: ..... Ammonia solutions, (more than 10% but not more than 35 % ammonia)

Hazard Class/Division: ..... 8

Label Code: ..... 8 Corrosive Liquid

Product Identification Number (PIN): ..... UN2672

Packing Group: ..... III

OSHA Label Required: ..... Yes

RQ (Reportable Quantity): ..... 1000 pounds (as  $\text{NH}_4\text{OH}$ )

TDG Reporting Quantity: ..... 5 kg or 5 liters

### 15. REGULATORY INFORMATION

Controlled Products Regulations Classification:

D-1B: Toxic (Acute Lethality); E: Corrosive

OSHA: This product is considered a hazardous material under criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200 (Toxic; Corrosive).

CAA Chemical Accident Prevention:

Ammonia solution with a concentration less than 20% is not subject to the provisions of 40 CFR Part 68.

CERCLA Hazardous Substances List:

a. RQ (Reportable Quantity): 1000 pounds (as  $\text{NH}_4\text{OH}$ )

b. Regulation: "Designation, Reportable Quantities, Notification" - 40 CFR Part 302

SARA TITLE III:

Ammonia (including ammonia solution) is subject to the reporting requirements of Section 313 "Specific Toxic Chemical Listings" 40 CFR Part 372. Terra is required by 40 CFR Part 372.45 to notify certain customers as to which of its mixture or trade name products contain those chemicals. The purpose of that notification is to ensure that facilities that may be subject to the reporting requirements of Section 313 and that use products of unknown formulation will have knowledge that they are receiving products that contain chemicals subject to those reporting requirements.



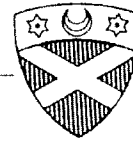
## 16. OTHER INFORMATION

May 5, 2003: This MSDS was written to comply with ANSI Standard Z400.1-1993.  
July 1, 2003: Added toxicity information from the TFI Product Testing Program April 2003.  
October 4, 2006: Added NFPA hazard classification information and updated isolation / protective action distances per ERG 2004.  
February 16, 2007: Created separate MSDS for 19% Aqua Ammonia.

The information and recommendations herein are taken from data contained in independent, industry-recognized references including but not limited to NIOSH, OSHA, ANSI, NFPA, DOT ERG, the TFI Product Testing Program, Global Engineering Documents, MEDITEXT, HAZARDTEXT, SARATEXT, CHRIS, OHM/TADS and IRIS. Terra Industries Inc. makes no guarantee, warranty or other representation concerning this substance, since conditions of its use are beyond the control of the company. Terra Industries Inc. disclaims any liability for loss or damage incurred in connection with the use of this substance.

TAB 3

# BURRILLVILLE SEWER COMMISSION



RECEIVED  
TOWN OF BURRILLVILLE

MAY 16 2016

PLANNING DEPARTMENT

Thursday, May 12, 2016

Thomas Kravitz, Town Planner  
Planning Department  
144 Harrisville Main St.  
Harrisville, RI 02830-1499

POST OFFICE BOX 71  
HARRISVILLE, R.I. 02830  
TELEPHONE: 401/568-6296  
FAX: 401/568-9464

RE: Clear River Energy Center (CREC)

Dear Tom:

Per your request received May 11, 2016, this office has reviewed the current information available regarding this proposed land development project.

In September 2015 Invenergy made a presentation to the Sewer Commission regarding the possibility of a sewer connection from CREC to the public sewer system. Based on the limited information presented the Sewer Commission voted that the project may be viable but final approval would be based on full compliance with all State, Town and Sewer Commission regulations.

Further review of the matter between Invenergy and Sewer Commission consultants concluded that an amendment to the Burrillville Wastewater Facilities Plan (WFP) would be required and then submitted to Rhode Island Department of Environmental Management (RIDEM) for review and the issuance of an Order of Approval. Invenergy requested that the Sewer Commission have its consultant prepare the WFP amendment with the full cost of the work to be paid by Invenergy. The WFP amendment was completed and submitted to RIDEM in March 2016. As of this date the amendment is still under RIDEM review.

Assuming the issuance by RIDEM of an Order of Approval for the WFP amendment Invenergy will be required to submit full technical drawings and specifications for the proposed sewer connection. Since the estimated average daily flow is estimated to be greater than 30,000 gallons per day, by State regulation, both RIDEM and the Sewer Commission will review the proposal. Approval from both RIDEM and the Sewer Commission will be required.

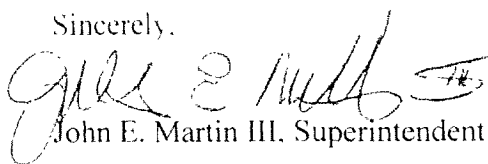
Upon completion of the sewer connection but prior to any discharge Invenergy will be required, by State regulation, to request a determination from the Director of RIDEM on what, if any, RIDEM pretreatment regulations are applicable. If any EPA, RIDEM or Sewer Commission regulations are found to be applicable then Invenergy will be required to submit an industrial waste permit application along with any technical documentation so that an Industrial Waste Discharge Permit can be developed. At this time RIDEM is the control authority under both federal and state regulations.

Attached please find the WFP amendment as submitted and I believe this document will provide answers to the questions posed in your memo.

Please be advised that this correspondence in no way confers any formal Burrillville Sewer Commission approval of any nature for this development and any such approval would only be considered by the Commission following the owner/applicant's submission of an Application for Approval with supporting design documents which fully complies the Commission's regulations and policies as well as any other federal state or local agencies.

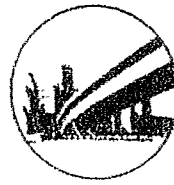
If you should have any questions or require any further information please do not hesitate to contact this office.

Sincerely,



John E. Martin III, Superintendent

TAB 4A



**CDR** | MAGUIRE

June 15, 2016

Mr. Michael Wood  
Town Manager  
Town of Burrillville  
100 Main Street  
Harrisville, RI 02830

Re: Clear River Energy Center Ammonia Storage Review

Dear Mr. Wood:

At your request, CDR Maguire and Sovereign Consulting Inc. (Sovereign) has provided a review of the issues related to storage of ammonia at the proposed Clear River Energy Facility.

#### **SUMMARY**

The EFSB application states that the facility will include storage for approximately 40,000 gallons of aqueous ammonia at concentrations below 20%. The ammonia will be used in the plant emission controls.

#### **3.2.6 40 CFR 68 - Chemical Accident Prevention Provisions**

40 CFR 68 sets forth the list of regulated substances and thresholds, and the requirements for owners and operators of stationary sources concerning the prevention of accidental releases. It applies to a stationary source that has more than a threshold quantity of a regulated substance.

The only regulated substance which will be stored at the Facility is ammonia. The threshold quantity for ammonia listed on Table 1 of 40 CFR 68 is 10,000 pounds at a concentration of 20% or greater. The ammonia to be stored at the Facility will be at a 19% concentration. Therefore, 40 CFR 68 and its associated requirements do not apply to the Facility because it will not store a regulated substance at more than its threshold quantity.

#### **The General Duty Clause**

Under the Clean Air Act Section 112(r)(1), the General Duty Clause states: "The owners and operators of stationary sources producing, processing, handling or storing such substances [i.e., a chemical in 40 CFR part 68 or any other extremely hazardous substance] have a general duty [in the same manner and to the same extent as the general duty clause in the Occupational Safety and Health Act (OSHA)] to identify hazards which may result from (such) releases using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur."

In the Clean Air Act Amendments of 1990, Congress enacted Section 112(r)(1), also known as the General Duty Clause (GDC), which makes the owners and operators of facilities that have regulated and other extremely hazardous substances responsible for ensuring that their chemicals are managed safely. Facilities have been required to comply with GDC since November 1990.

The General Duty Clause applies to **any** stationary source producing, processing, handling, or storing regulated substances or other extremely hazardous substances. "Other extremely hazardous substances" are any chemicals listed in 40 CFR part 68, or any other chemicals, which may be considered extremely hazardous. Facilities subject to the General Duty Clause are, among other things, responsible for the following:

- Knowing the hazards posed by the chemicals and assessing the impacts of possible releases,
- Designing and maintaining a safe facility to prevent accidental releases, and
- Minimizing the consequences of accidental releases that do occur.

#### SUMMARY OF RECOMMENDATIONS

Since the cutoff for ammonia under 40 CFR 68 is 20%, it would be advisable for the CREC project team to evaluate the potential risk of a chemical accident under the Risk Management Plan requirements. At a minimum, the provisions for the prevention of chemical accidents should be addressed under the provisions of the General Duty Clause. Please be advised that even though the CREC facility is slightly below the RMP requirements, the use of regulated substances or any other extremely hazardous substance in any amount is subject to the General Duty Clause under EPA.

The CREC facility should consider conducting an impact zone analysis for the proposed storage of 40,000 gallons of 19% aqueous ammonia.

The CREC facility should consider a less hazardous chemical than 19% aqueous ammonia for use in the proposed plant emission control system.

The Pascoag Fire Department should be consulted concerning the equipment and training to respond to chemical accidents at CREC.

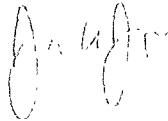
The Burrillville Hazard Mitigation Plan 2015 should be updated to include the CREC prior to the storage of ammonia on site.

Mr. Michael Wood  
June 15, 2016  
Page 3 of 3

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience

Very truly yours,

CDR MAGUIRE INC.

A handwritten signature in black ink, appearing to read "James A. Jackson".

James A Jackson, P.E.  
Project Manager



TAB 4B



June 16, 2016

Mr. Jeffrey Partington  
Chairman  
Burrillville Planning Board  
144 Harrisville Main Street  
Harrisville, RI 02830

**Re: Clear River Energy Center Traffic Impact Study Review**

Dear Mr. Wood:

At your request, CDR Maguire's Traffic Engineer, James Coogan, PE, has reviewed the Developer's report entitled "Traffic Impact Study for the Clear River Energy Center" dated May 2016 and prepared by McMahon Transportation Engineers and Planners.

In essence, it identifies two unsignalized intersections in Burrillville that will undergo increased delay during peak hours. It offers no mitigation for these increases, and in fact there's little that could be done to these intersections to improve their capability to accept the increased volumes:

#### **COMMENTS**

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We offer the following observations and comments:

1. Page 3: By what criteria were only the driveway and two unsignalized intersections identified for study? Were no other intersections along the Rte 100/Rte. 44 corridor affected by a 400 vph site traffic increase?
2. Page 5: Is Main Street really 62 feet wide?
3. Page 7: The statement that the weekday afternoon peak hour of adjacent streets occurred between 5PM and 6PM (3<sup>rd</sup> para) is not supported in the appendices.
4. Page 8: How was the period (3:15 – 4:15) in the heading of far right column determined? See comment 3 above.
5. Page 11: Route 100 / Route 44 roundabout: While no detours are anticipated, couldn't other traffic control strategies such as temporary lane blockage or temporary alternating traffic flow introduce traffic disruption and delays?
6. Page 25: 3<sup>rd</sup> para - Please clarify the PM Peak Hour (See comment 4 above)
7. Page 28: 2021 Construction Build, Pascoag Main / South Main - Please define the "short duration" of the degraded turning movement operation.
8. Page 28: 2021 Construction Build, Pascoag Main / South Main - How much of a decline in level of service would have been experienced had we NOT been conservative?
9. Page 29: 2021 Construction Build, Pascoag Main / Church - Please see comments 7 & 8.
10. Page 30: Table 6 - Is there sufficient Intersection sight distance in both directions? Table and text are not clear on this.

Mr. Jeffrey Partington

June 16, 2016

Page 2 of 2

11. Page 30: The last paragraph refers to adequate sight distance for heavy vehicle access, but the bottom of Page 29 states the design vehicle is a single unit truck. Are these the same vehicles?

#### SUMMARY

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The report asserts that there will be noticeable delays during the construction phase of the project, when over 400 additional vehicles per peak hour may be experienced. Further, it asserts that the actual, final, operating traffic effects will be minimal, with less than 40 vehicles per peak hour. Both of these assertions appear to be true.

During the Construction Stage, Northbound traffic on South Main Street at Pascoag Main Street is projected to see AM Peak Hour Level-of-Service drop from "C" to "F" (see comment 7). Similarly, at the Church Street southbound approach to Pascoag Main Street, traffic is projected to experience a PM Peak Hour Level-of-Service drop from "E" to "F" (see comment 9), with an increase in delay of about 80 seconds per vehicle for that approach.

#### RECOMMENDATIONS

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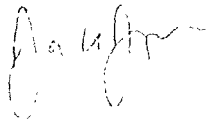
CDR Maguire recommends that the developer address our comments and confirm that their conclusions remain valid.

The proponent's Appendix "A" to the Traffic Impact Study notes the commitment to an appropriate level of restoration for roadway sections degraded by the construction-related traffic. The Town may wish to pursue a firmer commitment with regard to identifying degraded areas and the appropriate restoration.

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience

Very truly yours,

CDR MAGUIRE INC.



James A Jackson, P.E.  
Project Manager

Cc: Michael Wood, Burrillville Town Manager  
Thomas Kravitz, Burrillville Town Planner

TAB 4C



**CDR** | **MAGUIRE**

June 16, 2016

Mr. Jeffrey Partington  
Chairman  
Burrillville Planning Board  
144 Harrisville Main Street  
Harrisville, RI 02830

**Re: Clear River Energy Center Master Plan Drawing Package Review**

Dear Mr. Wood:

At your request, CDR Maguire and Sovereign Consulting Inc. (Sovereign) has provided a review of the documents submitted to the Planning Board on May 9, 2016. The submittal included a set of plans titled "Master Plan Drawing Package for Invenergy Clear River Energy Center" Dated March, 2016.

#### **SUMMARY**

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On May 9, 2016 Invenergy submitted a Master Plan Submission to the Burrillville Planning Board. The submission included a set of plans that have been reviewed by CDR Maguire and Sovereign. The submittal did not include a stormwater report or traffic report and the plans did not provide detail that would normally be anticipated for a review. The Town Planner sent a letter to Invenergy's attorney on May 11, 2016 requesting additional information. A Traffic Study was received on May 27, 2016. The following are our review comments on the plans submitted, we will update our review as more information becomes available.

#### **SUMMARY OF RECOMMENDATIONS**

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CDR Maguire and Sovereign recommend the following:

Request that Invenergy perform a stormwater analysis and provide a Stormwater Report and plans for the stormwater system proposed.

Request that Invenergy consider using Algoquin Lane in lieu of construction of the proposed access road. If this is not practical Invenergy should provide reasoning why this is not practicable, including information on the use of the existing Algoquin Lane and why this would not be suitable.

Request that Invenergy consider reducing the size of the laydown area or having off-site construction parking and staging to offset the massive amounts of wetland impacts.

#### **STORMWATER**

---

The plans indicate three stormwater detention ponds, no other drainage elements are indicated on the plans. These plans are not sufficient to address the projects stormwater needs, plans are needed that clearly indicate what is being done to collect, detain, and treat stormwater on the site.

Development of the site will result in increased stormwater run-off from the site, the developer will be required to treat and detain the run-off to avoid impacts to the areas receiving the run-off. The RIDEM Stormwater Design and Installation Standards Manual provides guidance for evaluating impacts of development and designing drainage elements to address these impacts. The developer should prepare a stormwater report to evaluate the impacts and design a drainage system that will address the impacts of the development.

#### WETLANDS

Sovereign has reviewed the plans to evaluate wetland impacts from construction of the proposed CREC; wetland impacts on the site need to be avoided and mitigated to the fullest extent practical.

**Background.** The current plans incorporate the construction of a new road which will pass directly through wetlands within the vicinity of the Proposed CREC Site. In addition to the proposed road the construction, the CREC plant is proposing lay down area and construction staging/parking within 50-foot perimeter wetlands.

The existing Algonquin gas facility has an access road that runs along the northern edge of the proposed CREC property (Algonquin Lane). Algonquin currently provides easement grants to SPRINT to service its cell tower located on the backside of their facility. Algonquin Lane may be suitable for use as the CREC site access road.

The current plan set and submittal states that the roadway needs to be able to handle large capacity truck loads. Algonquin Lane was established to construct the Algonquin facility and was clearly able to handle large trucks bringing in heavy equipment. Minor reconfiguration of the proposed CREC facility layout would allow for a more direct route into the CREC site without many sharp turns and without the need to construct a new road.

In addition to the new access road to the facility, the plans also include the construction of an access road to the new transmission lines as well as the temporary construction parking and laydown area, which would be further impacting wetlands. The parking and laydown area would clear cut the wetlands and make the area unsuitable for re-establishing current wetland conditions. Compaction of soils and removal of mature trees which make up these forested wetlands take more than 40 to 50 years to regrow. These functions and values cannot be restored once lost.

**Avoidance of Wetland Impacts.** The utilization of the Algonquin Lane would avoid the direct impact of 1.4 acres of wetland. This would also keep a larger contiguous wetland area and not segment the wetlands with culverts and permanent impervious surfaces. The reduction of paved surfaces also reduces runoff and contamination which would be released to the surrounding wetlands. These impacts are not always considered when looking at the full impacts to the area. The wetlands would further be impacted as the roadway would need to stay clear of vegetation and be maintained – thus creating a wider travel corridor than stated in the plans. Though the area might be vegetated it will be regularly disturbed throughout the growing season through mowing and vegetative maintenance practices. The removal of large broad leaved vegetation increases surface temperatures of the water within the wetland and reduces the quality of habitat for wetland wildlife. Additional sedimentation and

disturbance from traffic will further reduce the quality and function of the wetlands where the road crossing is proposed.

Moving the roadway to connect near the proposed CREC parking area and having the main entrance to CREC be on the northeast side of the proposed facility would reduce wetland impacts.

CREC has not addressed any of these concerns within their most recent submission to the planning board.

**Recommendations**

- Request that Algonquin Lane be shared and a redesign of facility entrance be created.
- If denied have detailed reasoning why this is not practicable, including information on the use of the existing Algonquin Lane and why this would not be suitable.
- Consider then reducing the size of the laydown area or having off-site construction parking and staging to offset the massive amounts of wetland impacts. If reducing the size of the construction laydown areas and parking can be reduced by at least 2.25 acres this may be able to be used as a mitigation effort of wetland avoidance and would offset the impact of the roadway, if it would have to be used.
- Have further well data or current water levels of the wetlands be monitored now. This would tell historic water table values in the wetland to monitor for post construction changes.

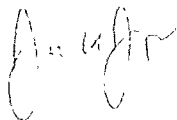
**TRAFFIC**

Invenergy submitted a traffic report entitled "Traffic Impact Study for the Clear River Energy Center" dated May 2016 and prepared by McMahon Transportation Engineers and Planners. CDR Maguire reviewed this report and provided comments in our June 9, 2016 review letter.

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience

Very truly yours,

CDR MAGUIRE INC.



James A Jackson, P.E.  
Project Manager

Cc: Michael Wood, Burrillville Town Manager  
Thomas Kravitz, Burrillville Town Planner

TAB 4D





**CDR** | MAGUIRE

June 16, 2016

Mr. Michael Wood  
Town Manager  
Town of Burrillville  
100 Main Street  
Harrisville, RI 02830

**Re: Clear River Energy Center MTBE Issue Review**

Dear Mr. Wood:

At your request, CDR Maguire and Sovereign Consulting Inc. (Sovereign) has provided a review of the issues related to the use of the Pascoag Utility District Water and disposal of waste process water at the Burrillville Sewer Treatment Facility.

#### SUMMARY

---

Invenergy has submitted an application to the Energy Facility Siting Board (EFSB) for construction of the Clear River Energy Center. In their application they are proposing to utilize water from the Pascoag Utility District (PUD) Well #3A for the proposed power plants process water, potable water will be provided to the plant from a potable water source. Well 3A was closed in 2001 due to petroleum contamination including methyl tert-butyl ether (MTBE) from an off-site gasoline storage tank. The plant will require approximately 104,000 gallons per day (gpd) (72 gpm) firing natural gas under normal full-load conditions, in the summer the plant will require approximately 225,000 gpd (156 gpm). During periods when the plant is firing oil, expected for periods of time during the winter months, the daily water demand will increase to 925,000 gpd (642 gpm). Following treatment with granular activated carbon (GAC) at Well #3A, and use as process water at the CREC facility, Invenergy is proposing to discharge the waste process water as well as sanitary flows to the Burrillville Sewer Treatment Facility.

In their EFSB application Invenergy is proposing to treat the well water through an activated carbon treatment system. They are proposing to treat the MTBE levels to a maximum of 55 µg/l, one µg/l is equal to one part per billion (ppb). The water will then be piped to the power plant through a dedicated water line to a raw water tank on the site. The raw water will be further treated at the power plant site through a reverse osmosis and electro-deionization process to produce high purity water required by the projects generation steam cycle process.

Invenergy is proposing to discharge wastewater to the Burrillville Sewer Treatment facility. Wastewater will include the wastewater generated from the high purity treatment process; blowdown from the steam generators and evaporative coolers; housecleaning; and sanitary wastewater from the staff. Wastewater will be pumped from the site to a Burrillville sewer manhole on Wallum Lake Road. Typical daily flows will vary between 69,000 gpd to 89,000 gpd with peak flows of 200,000 gpd when the plant is fired with oil.

Invenergy has submitted additional information on the use of the PUD well water in response to the Town's Data Requests 8-1 and 8-2. In response to Data Request 8-1 Invenergy states that the well water

will be treated through a two stage granular activated carbon (GAC) system, the first stage will treat the well water to 40 µg/l and the second stage will be capable of treating the water to a non-detect level (i.e. <0.5 µg/l as achieved by USEPA Method 524). In response to 8-2 Invenergy explains that they have calculated the 200 µg/l maximum MTBE in the sewer discharge based on the well water being treated to a maximum MTBE level of 40 µg/l. At the power plant the process water will be further treated to provide high purity process water, during this treatment the MTBE will become more concentrated.

CDR Maguire and Sovereign have reviewed the impacts of Invenergy's proposal to use the MTBE contaminated water from the PUD Well 3A. The review focused on the issues related to treatment of the well water and impacts of discharging wastewater with MTBE contamination to the Burrillville Sewer Treatment Facility. The RIDEM is evaluating the impacts to the aquifer. The Burrillville Sewer Commission is evaluating impacts of the Invenergy discharge with the Sewer Treatment Facilities capacity.

#### SUMMARY OF RECOMMENDATIONS

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CDR Maguire and Sovereign recommend that Invenergy design the treatment system for the well water to remove the MTBE to a non-detect level as Invenergy has stated in their response to Data Request 8-1. We recommend that the maximum allowable limit be reduced to less than 0.5 µg/l (ppb) of MTBE as well as other related petroleum constituents.

Since data on the contaminants in Well #3A vary due to flow rate from the pump, we recommend that Invenergy perform a pump test and sampling and testing from Well #3A as well as the remedial wells and the Pascoag River. In their response to Data Request 11-1 that was received on June 13, Invenergy stated that they intend to perform pump testing on Well 3A. Invenergy included a draft "Request for Well Investigation for the Reactivation of PUD Well 3A". We recommend that Sovereign review the pump test protocol as it becomes available.

Re-activation of Well #3A could result in the potential for vapor from contaminated groundwater to enter buildings. We recommend that Invenergy perform a vapor intrusion assessment of commercial and residential properties located in the vicinity of the site. The assessment should include baseline sampling and testing prior to activating the well with additional sampling and testing during an extended pump test and during normal operation of the well. This will establish baseline vapor intrusion data and monitor impacts of the well operation on vapor intrusion. In their response to Data Request 11-2 Invenergy states that they do not intend to perform any vapor intrusion assessments on the properties in the vicinity of Well 3A. Contingency arrangements should be presented for response actions from CREC in the event that indoor air impact to properties with buildings occurs from reactivation of Well #3A.

We recommend that Invenergy confirm that there is no hydraulic connection between the Pascoag and Harrisville Utility Districts.

We recommend that Invenergy confirm that the reactivation of well #3A for use as process water is not a concern for the 7Q10 stream flow data for the Clear River.

Based on the capacity of Well #3A, and the potential concerns related to the 7Q10 stream flow data for the Clear River, CREC should consider discharging a portion or the entirety of the spent process water into the Clear River, to recharge the river. This would likely require additional treatment and cooling at the power plant as well as piping to the Clear River or a tributary of the Clear River.

The potential building size and process and instrumentation diagram for the water treatment at the Wellhead #3A should be estimated for planning purposes in the design process.

As a contingency we recommend that Invenenergy identify alternative sources of process water that can supplement the water supplied by the PUD. This may become advantageous in the event that Well #3A has mechanical problems following reactivation.

While the 200 µg/l level of MTBE in the proposed sewer discharge does not violate any current regulations, we recommend that the maximum allowable levels be set at 20 to 40 µg/l, this will reduce the chance of the discharge having a detectable odor. If the Well 3A water is treated to non-detect levels the actual levels in the sewer discharge will be well below these recommended levels. We also recommend that Invenenergy have an Industrial User Permit with the Sewer Commission, this will set limits for contaminants in the discharge and protect the Sewer Commission in the event that future regulations or treatment changes require more stringent controls. RIDEM is currently reviewing the facility plan and will determine what level of contaminants are acceptable.

In their response to Data Request 10-1 Invenenergy explains that no MTBE will be released with the plant emissions, any MTBE that did reach the turbines would be destroyed by the in the high temperature combustion process.

## WELL 3A TREATMENT EVALUATION

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The Pascoag Utility District (PWS ID# RI 1592020), created in 2001 as a successor to the Pascoag Fire District provides water service to 1,111 metered connections with a user population of approximately 3,000, in the Village of Pascoag, within the Town of Burrillville, RI.

Water is presently provided to the system from one (1), drilled bedrock water supply well (PUD Well #5) and from a connection with the neighboring Harrisville Fire District. Well #5 contributes approximately 20% of the daily user demand, with the majority of the water supply provided from the Harrisville system. The water is stored in two (2) standpipes (water tanks), a 1.5 million gallon tank on Rock Avenue and a 265,000 gallon tank located on South Main Street (opposite Lapham Farm Road). The storage tanks are sized to meet both potable water and fire protection requirements for the District.

The PUD system originally imported water from the Harrisville Fire District, however following the installation of Well #1, in 1946, the District began providing water from its own source wells. This gravel-packed well was installed in the Silver Street well field, within the building that now serves the PUD at the Maintenance Barn, initially providing a capacity of 350 gpm (or 504,000 gallons per day – gpd). Well #1 continued in service until April 1972 when it was abandoned due to elevated levels of iron and manganese (0.4 mg/l) in the water creating aesthetic problems, and clogging of the gravel packing around the well screen that reduced the apparent well capacity.

Well #2 was installed in the Silver Street well field, approximately 600 feet SE of Well #1, in 1947, to augment the system capacity. This gravel-packed well, installed within a small pump house building, had an initial capacity of approximately 150 gpm (or 216,000 gpd), however it declined over time, ultimately being redeveloped in 1989 to a capacity of approximately 125 gpm. When this well was abandoned in 2001, due to VOC contamination, it had a capacity of approximately 70 gpm (or 100,800 gpd).

Well #3 was also installed into the Silver Street well field, approximately 650 feet SE of Well #1 and 220 feet SW of Well #2, in 1970. This gravel-packed well was installed within a pump house building, providing a capacity of approximately 440 gpm (or 633,600 gpd). The well capacity had declined to approximately 220 gpm at the time it was abandoned in 2001 due to VOC contamination.

Well #3A was installed in 1999, adjacent to Well #3 in the Pump House, in response to declining capacity of Wells #2 and #3. During test programs in 2000/2001, this well demonstrated a capacity of 600 gpm (or 864,000 gpd), however the well had to be abandoned in 2001 shortly after start-up, due to VOC contamination of the well field, from an off-site source.

Following the shut-down of the Silver Street well field due to VOC contamination in 2001, the PUD has imported water from the Harrisville fire District via a 10"Ø connection in Harrisville Road, initially depending upon this source to make up 100% of the PUD user demand. Well #5, a drilled bedrock well, was constructed in 2007 on the Sugarman Property, going on-line in early 2008. This well presently provides a capacity of approximately 42 gpm (or 60,000 gpd) to lessen reliance upon the Harrisville Fire

District. The table below was obtained from the Pascoag Utility District and presents a summary of the water supply wells installed by the PUD since 1946.

**Table 1: Pascoag Utility District Water Supply Well Summary**

Well ID	Well #1	Well #2	Well #3	Well #3A	Well #5
Date Installed	1946	1947	1970	1999	2007
Type of Well	Gravel Pack	Gravel Pack	Gravel Pack	Gravel Pack	Bedrock
Total Well Depth	48 ft.	43'-3"	56 ft.	64 ft.	665 ft.
Casing Diameter Ø	12" x 18"	10" x 18"	8"	16"	8"
Casing Length	34 ft.	33 ft.	53 ft.	56.3 ft.	20 ft.
Screen Length	15 ft.	10 ft.	5 ft.	7 ft.	NA
Screen Diameter	12"	10"	8"	14.5"	NA
Screen Slot Size (0.001") <sup>1</sup>	125	125	125	140	NA
Screen Install Depth – BGS	34 – 48 ft.	33.3–43.3 ft.	52-56 ft.	56.3-64 ft.	NA
Est. Capacity	350 gpm	150-70 gpm	440-220 gpm	600 gpm	75-42 gpm
Water Quality Issues	Fe, Mn	Fe, VOC	VOC	VOC	NA
Service Status	Off-Line	Off-Line	Off-Line	Off-Line	On-Line

Note: Screen slot size is measured in thousandths of an inch (125 = 0.125")

Based on information provided by Mr. Robert Ferrari, PE of Northeast Water Solutions, consultant for the Pascoag Utility District (PUD), there would be no impact to Harrisville Utility District water supply wells if no remediation of the petroleum contamination was conducted going forward as a result of the Invenergy project failing to proceed. Since there is no water production at Well #3A, the natural groundwater flow is the Pascoag River located west and northwest followed by discharge to the Clear River. It is the opinion of Mr. Ferrari that the current petroleum contamination levels are low in the aquifer and may not be present in the surface water of the Clear River. PUD also endorses that the reactivation of Well #3A has the potential or likelihood to greatly reduce the time needed to restore groundwater quality in the former wellfield, and eliminate threats to public and private wells in the area.

For presentation purposes, **Figure 1** presents the location of Pascoag Well #3A and the Harrisville Utility District production wells. **Figure 2** presents the location of the Interim Wellhead Protection Areas (IWPA's). Even though there is an apparent overlap between the IWPA's of Pascoag Well #3A and the Harrisville Eccleston production field, available information indicates that the Clear River represents an apparent boundary condition that prevents the hydraulic connection and potential contaminant transport between the two IWPA's. This condition should be confirmed as part of the evaluation process for the proposed CREC.

Sovereign has reviewed the available historical site data in the context of how reactivating PUD Well #3A will impact the local residents and commercial businesses. The extent of the gasoline release from the former North Main Street Mobil gasoline service station, located at 24 North Main Street, was exacerbated by the operation of PUD Well #3A which drew the contaminants approximately 1,500 feet

in a northerly direction from the Source Area across an area covering approximately up to 17.4 acres (the Site).

The 17.4 acre area is based on a petroleum contamination groundwater plume analysis that was conducted immediately after the identified release in 2002. A re-evaluation of the groundwater plume impact was conducted in 2006 after four years of groundwater remediation and the impacted area was calculated to be approximately 15.9 acres. In 2012, the groundwater plume impact was calculated to be approximately 5.1 acres. **Attachment A** presents the groundwater plume impact figures that was included in a 2013 groundwater monitoring report.

#### **Remedial Actions:**

Since 2001, a variety of remedial actions have been implemented to address the gasoline release. Remedial actions have included vacuum trucks and recovery well pumps to remove free product that was found in Area 1, a soil vapor extraction system (SVE) in Area 1 to remove the contaminated soil vapors near the source area and from the Herald Square Shops parking lot, a groundwater pump-and-treat system to treat contaminated overburden and bedrock groundwater near the source area, the area between to the source area and the Herald Square Shops, and behind the Herald Square Shops in the south central section of Area 4, the removal of all underground storage tanks (UST) and UST system components and approximately 1,800 tons of gasoline contaminated soil, and an emergency carbon filtration system was connected to public well PW-3A from November of 2001 through January 11, 2002 to remove contaminants that allowed the water supply to be used for bathing. At the time of these report, groundwater was being pumped continuously from four remedial wells (BETA-1, BETA-2, MW-28BR, and MW-58BR) located at the southern end of Area 4 at a combined rate of 4 to 5 gpm. Pumped groundwater is conveyed to an activated carbon treatment system prior to discharge to the Town of Burrillville's wastewater collection system. As of July 2013, approximately 12.5 million gallons of groundwater has been pumped and treated through activated carbon filters and discharged either to the Pascoag River or to the Town of Burrillville's wastewater collection system. It was estimated that approximately 3,100 equivalent gallons of gasoline had been removed from the Site. Groundwater pumping and treatment/remediation has not occurred since that time.

#### **Groundwater Analytical Data:**

Based on groundwater sampling results from 2012, MTBE, benzene, toluene, ethylbenzene and naphthalene remain above the applicable RIDEM Groundwater Standards in several monitoring wells located throughout the site. The highest concentration of MTBE is present in well LE-15D having ranged from 340 µg/l to 970 µg/l over the four quarterly sampling events in 2012. In assessing the vertical distribution of contaminants, it is evident that higher concentrations of contaminants are found in the "deep" and "bedrock" wells throughout the Site. In addition, strong gasoline odors and visible sheens have been consistently noted in bedrock wells MW-33BR and MW-34BR. It is likely that as public well PW-3A was drawing contaminants to the north and east it was also pulling the contaminants downward toward and through bedrock. As a result, gasoline related contaminants could remain trapped in bedrock fractures.

As depicted on Figures 6A, 6B and 6C of the 2013 *Groundwater Remediation Project Summary Report, Pascoag, Rhode Island* prepared by BETA Group, since PUD Well #3A was shut down, and no longer influences groundwater flow direction, the area of groundwater impact has receded. Reactivating PUD Well #3A, will not necessarily impact "new" areas, but might result in the re-expansion of the current VOC impacted plume. In addition, any residual petroleum impacted areas may migrate under the influence of the reactivation of PUD Well #3A.

#### **Surface Water Sampling:**

In 2012, surface water samples were also collected and tested for VOCs. The results for the surface water samples collected in January of 2012 were all below laboratory detection limits. Based on the laboratory results, contaminants previously present in the groundwater proximate to the Pascoag River and in the surface water have been reduced to below current GAA Standards. GAA standards are the current drinking water standards for groundwater in Rhode Island.

#### **Vapor Intrusion Potential:**

Vapor intrusion to indoor air describes the transfer (volatilization) of chemicals from contaminated groundwater or soil into subsurface gas (vapor), the migration of the gas to the base of an overlying building, and the entry (intrusion) and dispersion of the gas within the building. Diffusion and advection are the two main mechanisms by which subsurface soil gas is transported into a building. Diffusion describes subsurface gas movement from areas of high to low concentrations due to a concentration gradient. Advection describes subsurface gas movement from higher to lower in pressure, due to factors such as forced pressure differences from building ventilation systems or temperature changes. Subsurface gases generally enter the building through foundation cracks by advection due to the indoor-outdoor building pressure differences.

Various factors influence the extent to which subsurface gases from contaminated groundwater or soil can migrate to, enter, and disperse within a building. These factors include the characteristics of the soil through which the gases will flow (e.g., its porosity and moisture content), the distance between the groundwater surface and the building, the nature of the structure itself (e.g. size, intact or cracked foundation, active or passive ventilation), and properties of the chemical.

To evaluate whether groundwater has the potential to result in unacceptable indoor air concentrations to exposed occupants of the building, U.S. EPA developed a vapor intrusion screening level (VISL) calculator. Using various conservative assumptions, the calculator can identify a groundwater concentration of an individual constituent below which an indoor air concentration of health concern in an overlying building is not likely to occur through vapor intrusion. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., concentrations in groundwater) fall below the applicable VISL, no further action or study is warranted, as long as site and exposure conditions are consistent with the assumptions of the model. Exceeding a VISL generally suggests that further evaluation of the vapor intrusion pathway is appropriate.

In 2001, in response to reports of petroleum odors, RIDEM conducted a soil vapor intrusion assessment. Volatile vapors were found to be present in three residential buildings located at 92 North Main Street, 99 North Main Street and at Bradford Manor. On September 28, 2001 volatile vapors measured at 92 North Main Street were between two to three parts per million (ppm) in a sump pump pit located in the basement. The sump pump pit was filled in and subsequent testing indicated that volatile vapors were not present. Volatile vapors were also measured at Bradford Court at concentrations between two to three ppm on November 13, 2001. Subsequent testing indicated that elevated volatile vapor concentrations were not present at Bradford Court after the initial reading. Volatile vapors were detected at 99 North Main Street at concentrations between two to three ppm and a vapor recovery system was placed into operation until it was removed by the property owner in April of 2002. Indoor air laboratory analytical data was not located during Sovereigns file review.

In 2006, approximately four years after PUD well #3A was shut down, an additional soil vapor intrusion assessment was performed and involved the installation and sampling of eight exterior soil vapor points located around residential properties downgradient of the MTBE source area (VP-4, VP-5, VP-21, VP-22, VP-25, VP-26, VP-27 and VP-60). The assessment was performed using protocol developed by the United States Environmental Protection Agency (EPA). Vapor samples were collected in tedlar bags and submitted for laboratory analysis via EPA methodology TO-15 and 8260B. Vapor points VP-4, VP-21, VP-5 and VP-22 (analyzed via TO-15 but only benzene, toluene, ethyl benzene and xylenes and MTBE were reported), had detections above the laboratory detection limit of all reported analytes (i.e. - MTBE, benzene, toluene, ethyl benzene and xylenes). The concentration of each analyte was as follows: MTBE ranged from 5.8 to 10 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), benzene ranged from 11 to 67  $\mu\text{g}/\text{m}^3$ , toluene ranged from 39 to 83  $\mu\text{g}/\text{m}^3$ , ethyl benzene ranged from 9.7 to 13  $\mu\text{g}/\text{m}^3$ , and total xylenes ranged from 33 to 46  $\mu\text{g}/\text{m}^3$ . Please note that the units  $\mu\text{g}/\text{m}^3$  is a measurement of chemical mass in a cubic meter of air.

Vapor points VP-25, VP-26, VP-27 and VP-60 were analyzed by EPA Method 8260B, with the reporting unit of  $\mu\text{g}/\text{L}$ , which is a measurement used when reporting the concentration in a water sample in parts per billion (ppb). No VOCs were detected above the laboratory reporting limits.

Based on the information presented above, the groundwater data from 2012, and improved sampling procedures and techniques, the potential for vapor intrusion exists and might be influenced by the reactivation of PUD Well #3A when pumped at full capacity. The assessment completed in 2006 documents low level VOCs present in soil gas, but the assessment has limitations. For instance, the assessment was completed after PUD Well #3A was shut down, and therefore does not provide data that can be correlated to the proposed pumping conditions. To better understand the potential vapor intrusion risk, Sovereign recommends that vapor assessment be completed (see recommendations below). Contingency arrangements should be presented for response actions from CREC in the event that indoor air impact to properties with buildings occurs from reactivation of Well #3A.

#### **PUD Well #3A 2005 Pump Test:**

Pump tests completed on PUD Well #3A document that MTBE concentrations increase as the pump rate increases. In 2005, during a pump test completed by RIDEM, PUD and the University of Rhode Island's Department of Geosciences this increasing MTBE trend was observed. PUD Well #3A was pumped



initially at a rate of 240 GPM and the MTBE concentration reached 43 µg/l. The pumping rate was decreased to 150 GPM on April 19, which resulted in a decrease in the MTBE concentration to 35 µg/l. Laboratory analysis documented that MTBE and TAME were the only VOC-type contaminants that were detected at the pumping wellhead which indicated that these contaminants have moved ahead of other contaminants, such as benzene, toluene, ethylbenzene, and xylenes – total (BTEX). It was noted that the duration of this pump test was insufficient to come to a definite conclusion of the long-term MTBE concentration at the wellhead and that long-term trends in BTEX concentrations could not be determined.

Pursuant to Invenergy Thermal Development LLC's Responses to the Town of Burrillville's 5<sup>th</sup> and 8<sup>th</sup> Set of Data Request, Responses 5-3 and 8-1, Pare Engineering is designing the treatment facility that is proposed to be installed at PUD Well #3A. A basic Activated Carbon System Process Flow Diagram was provided and it depicts that the system will consist of two activated carbon vessels (capable of handling 700 gpm), a 30,000-gallon treated water storage tank, a 30,000-gallon backwash tank, pumps, sample ports and flow valves. Specific details on the treatment system were not provided, such as actual GAC vessel size, number of GAC vessels, resonating time, carbon breakthrough calculations, contingency for fouling due to metals, or a contingency for drawing in non-aqueous phase liquids that could be liberated from the bedrock due to long term pumping and a maximum pumping rate of 700 gpm.

In general, GAC is an effective media to remove MTBE as well as BTEX from groundwater. GAC relies on an adsorption process that transfers the contaminants from groundwater to the GAC. Contaminants will partition from the water to the GAC until it reaches the saturation point for the specific contaminant. However, multi-contaminants can affect the adsorption capacity of the carbon, and if naturally occurring minerals or metals, such as iron or manganese, are present in the groundwater, then the GAC may have to be backwashed or replaced more frequently to prevent backpressure.

In order to design a treatment system, Invenergy will need to complete a pump test and collect representative groundwater samples. The pump test should be conducted at an appropriate flow rate and duration, representative of the proposed withdrawal rates for the Clear River Energy Center (CREC) project, until the stabilization of contaminants of concern, which will be drawn from the source area, is achieved. Upon achieving stabilization of the contaminants of concern, groundwater samples should be collected for metals, VOCs (by drinking water analysis EPA Method 524.1), gasoline oxygenates and TPH. Upon receipt and review of this analytical data, a treatment system can be designed and the adequacy of the treatment system can be reviewed.

The potential building size and process and instrumentation diagram for the water treatment at the Wellhead #3A should be estimated for planning purposes in the design process.

#### **Clear River Stream Flow**

CREC should verify that the reactivation of Well #3A for use as process water at the proposed facility will not adversely affect the streamflow of the Clear River. The lowest flow conditions in a stream or river is based on the 7Q10 flow. The definition of 7Q10 is, the lowest average discharge over a period of one week, 7 days, with a recurrence interval of 10 years.

CREC should confirm that the reactivation of well #3A for use as process water is not a concern for the 7Q10 stream flow data for the Clear River.

CREC should consider discharging a portion or the entirety of the spent process water into the Clear River. This would require treatment not only at the wellhead, but also potentially at the power plant prior to discharge to the Clear River. Although another stage of treatment would be required, it is a more sustainable solution that may be potentially beneficial for the Clear River. The potential treatment area at the CREC should be estimated for planning purposes in the design process.

**Recommendations:**

- It should be confirmed that there is not a hydraulic connection between the water sources for the Pascoag and Harrisville Utility Districts. In the event that the CREC project does not proceed, it would be beneficial to demonstrate that the residual contamination related to the petroleum release in Pascoag will not impact the water supply sources in Harrisville. The Harrisville Utility District is currently providing 85% of the water for the Pascoag Utility District.
- Prior to reactivating PUD Well #3A, which has been shown to draw the contaminants approximately 1,500 feet in a northerly direction from the Source Area across an area covering as much as 20 acres, additional data should be collected to be protective of human health and the environment. A pump test should be conducted at an appropriate flow rate and duration until the stabilization of contaminants of concern is achieved. During this pump test, water samples should be collected from the PUD Well #3A, select overburden and bedrock wells located throughout the Site, and the Pascoag River. All samples should be submitted for laboratory analysis of total petroleum hydrocarbon, VOCs and gasoline oxygenates. This data will assist in monitoring local conditions for vapor intrusion potential and to monitor for plume migration.
- To be protective of human health, a vapor intrusion assessment of commercial and residential properties located within Site should be conducted. Through pump testing of PUD Well #3A, it has been shown that when the well is operational, the groundwater flow direction shifts toward PUD Well #3A. This results in an expanding VOC impacted groundwater plume underlying a larger area, which includes numerous residential properties. The impact of operating PUD Well #3A should be evaluated by collecting baseline vapor intrusion data (i.e. – TO-15 and APH) prior to utilizing PUD Well #3A as a water source for the proposed Clear River Energy Center, during a pump test, and during continued operation until the effects of the shifting VOC impacted plume and the potential off-gassing from the migrating VOC impacted groundwater plume are well understood. Sub-slab soil vapor (and indoor air samples if needed) should be collected utilizing laboratory supplied SUMMA canisters and submitted for laboratory analysis TO-15 and APH.

If a pump test is not conducted for an adequate duration prior to reactivating PUD Well #3A, a vapor intrusion assessment plan should be designed and implemented prior to the reactivation of PUD Well #3A. An example of this might include the collection of baseline indoor air or sub-slab soil gas samples prior to reactivating PUD Well #3A. Upon reactivating PUD Well #3A,

continued air monitoring should be conducted until aquifer and contaminant stabilization has been achieved and the seasonal effect on the concentration of VOCs is well understood.

Contingency arrangements should be presented for response actions from CREC in the event that indoor air impact to properties with buildings occurs from reactivation of Well #3A.

- Per Invenergy Thermal Development LLC's Responses to the Town of Burrillville's 5<sup>th</sup> and 8<sup>th</sup> Set of Data Request, Responses 5-3 and 8-1, Pare Engineering is designing the treatment facility that is proposed to be installed at PUD Well #3A and it will consist of two activated carbon vessels. Specific details on the treatment system were not provided. Based on the 2008 *Design and Cost Estimate For Groundwater Treatment System, Pascoag Water Supply Well 3A, Burrillville, Rhode Island*, prepared by GZA GeoEnvironmental, Inc., an assessment was completed to design, build and operate a treatment system for the PUD Well #3A to remove gasoline constituents to below laboratory detection limits. It was assumed that the well would pump at a rate of 500 GPM for 12 hours per day, with a total daily volume of 360,000 gpd. GZA determined 4,400 pounds of carbon would be required per day (1,606,000 pounds per year) to effectively remove the known VOC and gasoline oxygenate contaminants. The approximate 2009 cost to operate the system per year for the first six years was estimated at \$2,875,000.00. GZA estimated that each additional year would cost approximately \$1,597,000.00. Per Invenergy Thermal Development LLC's Responses to the Town of Burrillville's 6<sup>th</sup> Set of Data Request, Response 6-11, it is stated that PUD will own and operate the proposed treatment system.

A revised study should be completed to determine treatment system requirements based on current conditions, conditions when the well is pumping at full capacity resulting in the impacted VOC plume migration toward PUD Well #3A, and the feasibility of either PUD or Invenergy Thermal Development LLC (Invenergy) to fund the construction and ongoing operation of this system. The revised study should demonstrate that any petroleum constituents would be removed from the water prior to conveyance to the CREC facility for use as process water. The performance criteria for removed from the water should be below laboratory quantification limits. A dual train system with at least 3 GAC units on each train should be considered for redundancy and performance.

The potential building size and process and instrumentation diagram for the water treatment at the Wellhead #3A should be estimated for planning purposes in the design process.

- Confirm that the reactivation of well #3A for use as process water is not a concern for the 7Q10 stream flow data for the Clear River.
- Based on the capacity of Well #3A, and the potential concerns related to the 7Q10 stream flow data for the Clear River, CREC should consider discharging a portion or the entirety of the spent process water into the Clear River.

- As a contingency, additional water sources beyond the Pascoag Utility District should be considered to supplement the process water demand. This may become advantageous in the event that Well #3A has mechanical problems following reactivation.

#### MTBE IMPACTS ON BURRILLVILLE SEWER TREATMENT

The EFSB application includes a summary of the discharge parameters anticipated, the projected maximum discharge parameter for MTBE is 200 µg/l. Table 6.2-2 from the EFSB application summarizes the well water and wastewater discharge parameters. CDR Maguire reviewed the impacts of the MTBE on the operation of the sewer treatment plant and on the discharge from the sewer treatment plant to the Clear River.

**Background.** Clear River Energy Center indicates that the water to be used in the process of producing electricity will be obtained from the Pascoag Utility District. The well that will produce the water is contaminated with Methyl-Tertiary-Butyl-Ether (MTBE) is proposed to be treated to a maximum concentration of 55 µg/l prior to delivery to the power plant.

As part of the evaluation for their submittal, pre and post concentrations of 32 parameters have been summarized in Table 6.2-2. Table 6.2-2 also states the applicability of regulations to those parameters. As seen in Table 6.2-2 the projected concentration in the wastestream is different than in the water from the well. This is attributed to reactions that occur during the high purity treatment process and in the production of the energy.

Invenergy states in the EFSB permit application that the MTBE levels in the sewer discharge will be below 200 µg/l at a temperature below 140 degrees F. The major questions are will the discharge be harmful to the operation of the plant and will the quality of the discharge affect the Town's wastewater discharge permit.

MTBE is a gasoline additive that was designed to maintain the octane (power) of gasoline, reduce engine knocking and reduce tailpipe emissions. It was designed to be a soluble additive; that is, it maintains a homogeneous mixture without additional agitation. This trait also makes it difficult to remove by a normally efficient treatment process.

#### Research

Plant. It is unclear if MTBE at the concentrations presented will cause any problems at the plant. Much of the research discovered has contaminated sites reducing the MTBE level down to 200 µg/l with no further treatment and this is the proposed discharge concentration from the Clear River Energy Center plant.

Discharge limits. Since MTBE is not currently regulated, there will not be an immediate concern with the discharge of any residual MTBE in the discharge from the plant.

Odors. The odor threshold for a chemical is the concentration at which it can be perceived. These numbers vary from chemical to chemical and person to person. The Fact Sheet for the State of New Hampshire states:

The MtBE odor and taste thresholds from several studies fall within the range of 20-40 µg/l, identified by EPA as an approximate threshold for aesthetic effects. EPA states that this range can be used as advisory guidance to help ensure consumer acceptance of the taste and odor of MtBE in drinking water. The State secondary standard of 20 µg/l for MtBE is based on the lower

end of EPA's recommended odor and taste threshold range. This value is anticipated to provide protection for most individuals.

Since the proposed discharge from Clear River Energy is 200 µg/l, it is highly likely that the discharge will have a detectable odor of MTBE to most if not all people.

Impact of future change at plant could be significant. It is a complete unknown as to whether or not EPA decides to regulate MTBE in the future. According to an unmaintained page (last updated Feb. 20, 2016) on the EPA website:

"EPA is continuing to study both the potential health effects and the occurrence of MTBE, and it is on a list of contaminants (Contaminant Candidate List) for which EPA is considering setting health standards. As a means of gathering occurrence information, beginning in 2001, EPA will require all large drinking water systems and a representative sample of small systems to monitor and report the presence of MTBE (Unregulated Contaminant Monitoring Regulation)."

To protect the Town from this occurrence, we suggest adding language to the IUP that allows the Town to change the discharge requirements if the current concentrations are detrimental to the treatment plant process or to the meeting the discharge limits in the permit.

Impact of future regulation change. Currently the discharge from the plant is regulated by the RIDEM and USEPA through the National Pollution Discharge Elimination System (NPDES) program. Under this program, the EPA has developed a list of Priority Pollutants that are regulated. The list is included with this memorandum. The priority pollutant list is a dynamic list of elements and compounds that the EPA deems as detrimental to the receiving waterways. The list is dynamic and changes over time as new pollutants are developed or discovered.

Currently MTBE is not a regulated constituent under the program. However, the nature of the list is that it is dynamic. Because MTBE is not currently on the list, which does not mean that it won't be regulated at some point in the future.

Temperature. It should be noted that the proposed temperature of the discharge (140 degrees F) is greater than what is typically seen (50-60 degrees) but is less than applicable discharge standards. Given the average daily flow of 96,000 gpd (at 140 degrees) and the average daily flow of the plant at 887,500 (at 53 degrees), the combined temperature at the plant would be approximately 61 degrees. Please note that this calculation does not include any heat loss through the 4 miles of the collection system.

### **Recommendations**

Based on the fact that the full effects of MTBE on the treatment plant and the discharge are not fully known, we recommend that the Town develop a method for protecting itself. The typical method for establishing this kind of protection is through the development of an Industrial Users Permit (IUP). An IUP will allow the Town set enforceable limits on the discharge from the Clear River Energy Center and also protect itself in the future if the discharges affects the current processes at the wastewater plant and regulations or treatment technologies change.

Mr. Michael Wood  
June 16, 2016  
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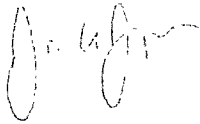
Many options are available for the development of an IUP. For example, the USEPA has a template available that we have included in Attachment B. Other communities and RIDEM likely have templates available for the Town to utilize as well.

For the elimination of possible odors, we recommend that a maximum level of MTBE in the discharge be capped at 20 to 40 µg/l.

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience.

Very truly yours,

J. DRIMAGUIRE INC.

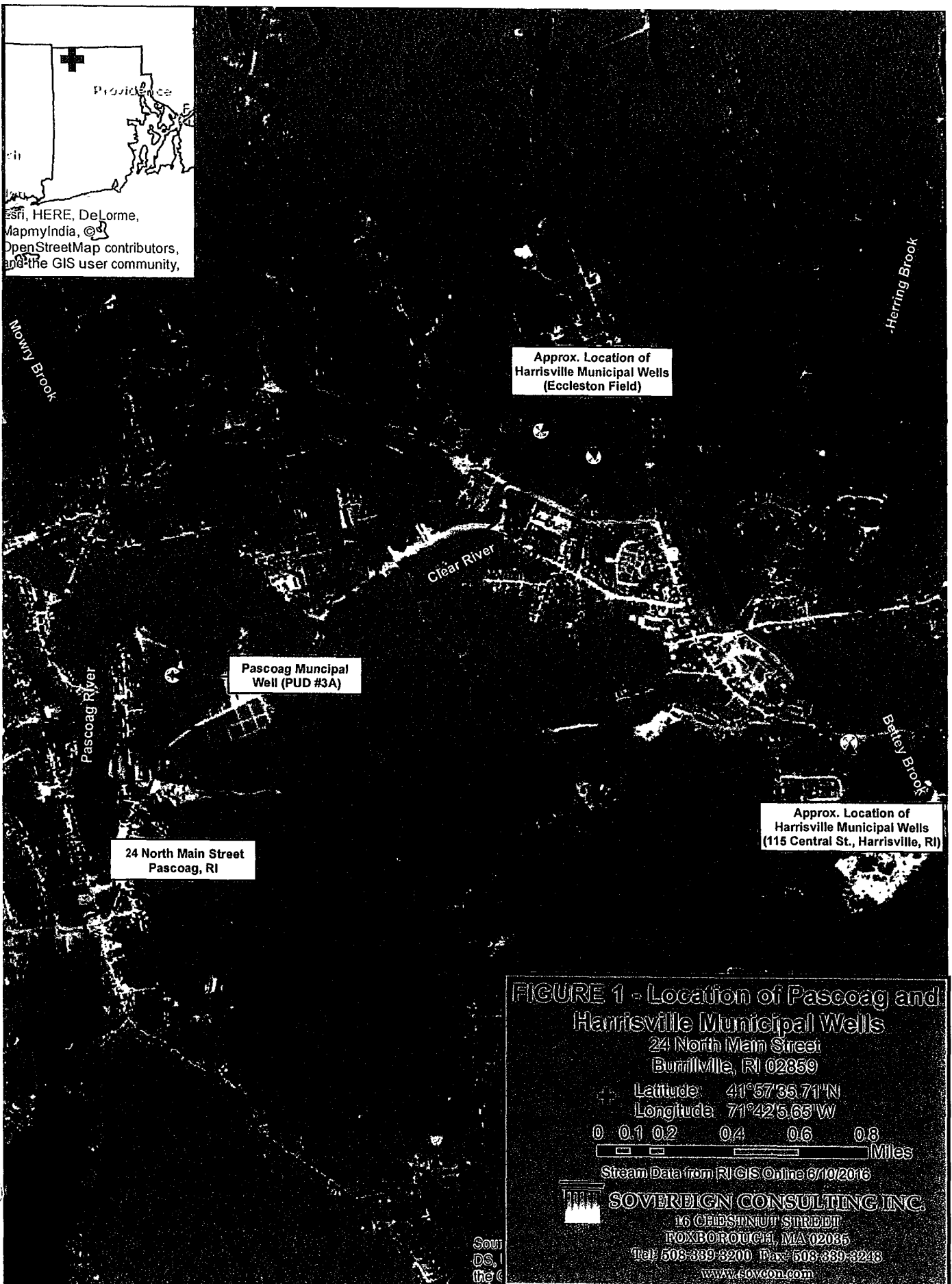
A handwritten signature in black ink, appearing to read "J. A. Jackson", written over a light blue horizontal line.

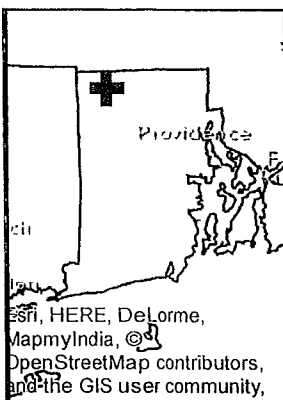
James A Jackson, P.E.  
Project Manager

Figures  
Attachment A  
Attachment B

## FIGURES







Mowry Brook

Herring Brook



Approx. Location of  
Harrisville Municipal Wells  
(Eccleston Field)

Pascoag Muncipal  
Well (PUD #3A)

24 North Main Street  
Pascoag, RI

Approx. Location of  
Harrisville Municipal Wells  
(115 Central St., Harrisville, RI)

## Legend

-  Rivers and Streams
-  Community Wellhead Protection Area (WHPA)

A wellhead protection area (WHPA) is the portion of an aquifer through which groundwater moves to a well.

Community Well - serves year-round residents; at least 15 service connections or at least 25 individuals

Stream Data from RI GIS Online 6/10/2016

Originator: RI Department of Environmental Management  
Office of Water Resources

## FIGURE 2 - Pascoag and Harrisville Wellhead Protection Areas

24 North Main Street  
Burrillville, RI 02859

Latitude: 41°57'35.71"N

Longitude: 71°42'56.5"W

0 0.1 0.2 0.4 0.6 0.8  
Miles



**SOVEREIGN CONSULTING INC.**

16 CHESNUT STREET

ROXBOROUGH, MA 02085

Tel: 508-339-3200 Fax: 508-339-3243

[www.sovcon.com](http://www.sovcon.com)

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ATTACHMENT A







## ATTACHMENT B

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## APPENDIX C

### Sample Permit Application Form

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### **Disclaimer**

The U.S. Environmental Protection Agency (EPA), Office of Wastewater Management, Water Permits Division has prepared this sample permit application as a guide for Control Authorities in developing a permit application form. The Control Authority is not required to use this permit application form and may develop either its own form or choose to modify the sample form to reflect specific conditions at the publicly owned treatment works (POTW) and requirements of state and local law. For the Control Authority choosing to use a modified version of the sample application, the EPA sample permit application provides, as an aid to the Control Authority, blank spaces or brackets throughout the application. These identify areas in which additions and changes to the sample application might be needed to address the circumstances at a POTW. The sample has additional bracketed notes that further explain issues the Control Authority might wish to consider when developing its permit application form.

## APPENDIX C. SAMPLE PERMIT APPLICATION FORM

Note: Please read all attached instructions prior to completing this application.

### SECTION A -- GENERAL INFORMATION

1.	Facility Name:		
	a. Operator Name:		
	b. Is the operator identified in 1.a., the owner of the facility?		Yes      No
	If no, provide the name and address of the operator and submit a copy of the contract and/or other documents indicating the operator's scope of responsibility for the facility.		
2.	Facility Address:		
	Street:		
	City:	State:	Zip:
3.	Business Mailing Address:		
	Street or P.O. Box:		
	City:	State:	Zip:
4.	Designated signatory authority of the facility:		
	[Attach similar information for each authorized representative]		
	Name:		
	Title:		
	Address:		
	City:	State:	Zip:
	Phone #		
5.	Designated facility contact:		
	Name:		
	Title:		
	Phone #		
6.	<i>[Note: This question might not be applicable to all pretreatment programs. The following question is only applicable to those programs implementing this optional streamlining provision.]</i>		Yes      No
	Do you wish to be considered for regulation under a general permit, if the Control Authority considers it to be appropriate? If so, you must file a request for coverage under a general control mechanism.		
	<b>[POTW's should include list of available general control mechanisms]</b>		

## SECTION B – BUSINESS ACTIVITY

1. If your facility employs or will be employing processes in any of the industrial categories or business activities listed below (regardless of whether they generate wastewater, waste sludge, or hazardous wastes), place a check beside the category of business activity (check all that apply).

## Industrial Categories

<input type="checkbox"/>	Aluminum Forming
<input type="checkbox"/>	Asbestos Manufacturing
<input type="checkbox"/>	Battery Manufacturing
<input type="checkbox"/>	Can Making
<input type="checkbox"/>	Canned and Preserved Fruit and Vegetable Processing
<input type="checkbox"/>	Canned and Preserved Seafood
<input type="checkbox"/>	Carbon Black Manufacturing
<input type="checkbox"/>	Cement Manufacturing
<input type="checkbox"/>	Centralized Waste Treatment
<input type="checkbox"/>	Coal Mining
<input type="checkbox"/>	Coil Coating
<input type="checkbox"/>	Concentrated Animal Feeding Operation and Feedlots
<input type="checkbox"/>	Concentration Aquatic Animal Production
<input type="checkbox"/>	Copper Forming
<input type="checkbox"/>	Dairy Product Processing or Manufacturing
<input type="checkbox"/>	Electric and Electronic Components Manufacturing
<input type="checkbox"/>	Electroplating
<input type="checkbox"/>	Explosives Manufacturing
<input type="checkbox"/>	Fertilizer Manufacturing
<input type="checkbox"/>	Ferroalloy Manufacturing
<input type="checkbox"/>	Foundries (Metal Molding and Casting)
<input type="checkbox"/>	Glass Manufacturing
<input type="checkbox"/>	Grain Mills
<input type="checkbox"/>	Gum and Wood Chemicals Manufacturing
<input type="checkbox"/>	Hospital
<input type="checkbox"/>	Ink Formulation
<input type="checkbox"/>	Inorganic Chemicals
<input type="checkbox"/>	Iron and Steel
<input type="checkbox"/>	Landfill
<input type="checkbox"/>	Leather Tanning and Finishing
<input type="checkbox"/>	Meat and Poultry Products
<input type="checkbox"/>	Metal Finishing
<input type="checkbox"/>	Metal Products and Machinery
<input type="checkbox"/>	Mineral Mining and Processing
<input type="checkbox"/>	Nonferrous Metals Forming
<input type="checkbox"/>	Nonferrous Metals Manufacturing
<input type="checkbox"/>	Oil and Gas Extraction
<input type="checkbox"/>	Ore Mining
<input type="checkbox"/>	Organic Chemicals Manufacturing
<input type="checkbox"/>	Paint and Ink Formulating

<input type="checkbox"/>	Paving and Roofing Manufacturing
<input type="checkbox"/>	Pesticides Chemical Manufacturing, Formulating, and/or Packaging
<input type="checkbox"/>	Petroleum Refining
<input type="checkbox"/>	Pharmaceutical Manufacturing
<input type="checkbox"/>	Phosphate Manufacturing
<input type="checkbox"/>	Photographic Processing
<input type="checkbox"/>	Plastic and Synthetic Materials Manufacturing
<input type="checkbox"/>	Porcelain Enameling
<input type="checkbox"/>	Printed Circuit Board Manufacturing
<input type="checkbox"/>	Pulp, Paper, and Fiberboard Manufacturing
<input type="checkbox"/>	Rubber Manufacturing
<input type="checkbox"/>	Soap and Detergent Manufacturing
<input type="checkbox"/>	Steam Electric Power Generating
<input type="checkbox"/>	Sugar Processing
<input type="checkbox"/>	Textile Mills
<input type="checkbox"/>	Timber Products
<input type="checkbox"/>	Transportation Equipment Cleaning
<input type="checkbox"/>	Waste Combustors
<input type="checkbox"/>	Other (Describe)

2. Give a brief description of all operations at this facility including primary products or services (attach additional sheets if necessary):

3. Indicate applicable North American Industry Classification System (NAICS) for all processes:

a.	
b.	
c.	
d.	
e.	

4. Production Rate

Product	Past Calendar Year Amounts per Day (Daily Units)		Estimate This Calendar Year Amounts Per Day (Daily Units)	
	Average	Maximum	Average	Maximum

5. For production-based categorical IUs only:  
What is the facility's long-term average categorical production rate for the past 5 years?

## SECTION C – WATER SUPPLY

1.	Water Sources: (Check as many as are applicable.)		
	Private Well		
	Surface Water		
	Municipal Water Utility (Specify City):		
	Other (Specify):		
2.	Name (as listed on the water bill):		
	Street:		
	City:	State:	Zip:
3.	Water service account number:		
4.	List average water usage on premises: [new facilities may estimate]		
	Type	Average Water Usage (GPD)	Indicate Estimated (E) or Measured (M)
a.	Contact cooling water		
b.	Non-contact cooling water		
c.	Boiler feeding		
d.	Process		
e.	Sanitary		
f.	Air pollution control		
g.	Contained in product		
h.	Plant and equipment washdown		
i.	Irrigation and lawn watering		
j.	Other		
k.	Total of a through j		

[illegible]

## SECTION E – WASTEWATER DISCHARGE INFORMATION

1.	Does (or will) this facility discharge any wastewater other than from restrooms to the City sewer?						
	Yes	If the answer to this question is "yes," complete the remainder of the application.					
	No	If the answer to this question is "no," skip to Section I.					
2.	Provide the following information on wastewater flow rate. [New facilities may estimate.]						
	a. Hours/day discharged (e.g., 8 hours/day)						
	M	T	W	TH	F	SAT	SUN
	b. Hours of discharge (e.g., 9 a.m. to 5 p.m.)						
	M	T	W	TH	F	SAT	SUN
	c. Peak hourly flow rate			(GPD)			
	d. Maximum daily flow rate			(GPD)			
	e. Annual daily average			(GPD)			
3.	If batch discharge occurs or will occur, indicate: [New facilities may estimate.]						
	a. Number of batch discharges			(per day)			
	b. Average discharge per batch			(GPD)			
	c. Time of batch discharges			(days of week)		(hours of day)	
	d. Flow rate			(gallons per minute)			
	e. Percent of total discharge						

4. Schematic Flow Diagram – For each major activity in which wastewater is or will be generated, draw a diagram of the **flow of materials, products, water, and wastewater** from the start of the activity to its completion, showing all unit processes. Indicate which processes use water and which generate wastestreams. Include the average daily volume and maximum daily volume of each wastestream (new facilities may estimate). If estimates are used for flow data this **must** be indicated. **Number each unit process** having wastewater discharges to the community sewer. Use these numbers when showing this unit processes in the building layout in Section H.



- [illegible]

- [illegible]

- |         |                    | Yes | No | N/A |
|---------|--------------------|-----|----|-----|
| Current | Flow Metering      |     |    |     |
|         | Sampling Equipment |     |    |     |
| Planned | Flow Metering      |     |    |     |
|         | Sampling Equipment |     |    |     |

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
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- |  |                           |
|--|---------------------------|
|  | Yes                       |
|  | No, (skip to Question 10) |

9.	Briefly describe these changes and their effects on the wastewater volume and characteristics: (attach additional sheets if needed).		
10.	Are any recycling or reclamation system in use or planned?		
	Yes		
	No (skip to Question 12)		
11.	Briefly describe recovery process, substance recovered, percent recovered, and the concentration in the spent solution. Submit a flow diagram for each process (attach additional sheets if needed):		
12.	<i>[Note: This question might not be applicable to all pretreatment programs. The following question is only applicable to those programs implementing this optional streamlining provision.]</i> As allowed at 40 CFR 403.6(c)(5) when the limits in a categorical Pretreatment Standard are expressed only in terms of pollutant concentration, an Industrial User may request that the Control Authority convert the limits to equivalent mass limits. Do you anticipate that you will make this request?		Yes      No
13.	<i>[Note: This question might not be applicable to all pretreatment programs. The following question is only applicable to those programs implementing this optional streamlining provision.]</i> As allowed at 40 CFR 403.6(c)(6), an Industrial User subject to the mass limits of categorical Pretreatment Standards to 40 CFR Parts 414, 419, and/or 455 may request that the Control Authority convert the mass limits to equivalent concentration limits. Do you anticipate that you will make this request?		Yes      No

## SECTION F – CHARACTERISTICS OF DISCHARGE

All current industrial users are required to submit monitoring data on all pollutants that are regulated specific to each process. Use the tables provided in this section to report the analytical results. **Do not leave blanks.** For all other (nonregulated) pollutants, indicate whether the pollutant is known to be present (P), suspected to be present (S), or known not to be present (O), by placing the appropriate letter in the column for average reported values. Indicate on either the top of each table, or on a separate sheet, if necessary, the sample location and type of analysis used. Be sure methods conform to 40 CFR Part 136; if they do not, indicate what method was used.

New dischargers should use the table to indicate what pollutants will be present or are suspected to be present in proposed wastestreams by placing a P (expected to be present), S (may be present), or O (will not be present) under the average reported values.

Pollutant	Detection Level Used	Maximum Daily Value		Average of Analyses		Number of Analyses	Units	
		Conc.	Mass	Conc.	Mass		Conc.	Mass
Acenaphthene								
Acrolein								
Acrylonitrile								
Benzene								
Benzidine								
Carbon Tetrachloride								
Chlorobenzene								
1,2,4-Trichlorobenzene								
Hexachlorobenzene								
1,2-Dichloroethane								
1,1,1-Trichloroethane								
1,1,2,2-Tetrachloroethane								
Chloroethane								
Bis(2-Chloroethyl)ether								
17 Bis (chloro methyl) ether								
2-Chloroethyl vinyl Ether								
2-Chloronaphthalene								
2,4,6-Trichlorophenol								
Parachlorometa cresol								
Chloroform								
2-Chlorophenol								
1,2-Dichlorobenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
3,3'-Dichlorobenzidine								
1,1-Dichloroethylene								
1,2-Trans-Dichloroethylene								
2,4-Dichlorophenol								
1,2-Dichloropropane								
1,2-Dichloropropylene								
1,3-Dichloropropylene								
2,4-Dimethylphenol								
2,4-Dinitrotoluene								
2,6-Dinitrotoluene								
1,2-Diphenylhydrazine								
Ethylbenzene								
Fluoranthene								

Pollutant	Detection Level Used	Maximum Daily Value		Average of Analyses		Number of Analyses	Units	
		Conc.	Mass	Conc.	Mass		Conc.	Mass
4-Chlorophenyl Phenyl Ether								
4-Bromophenyl Phenyl Ether								
Bis(2-Chloroethyl)ether								
Bis(2-chloroethoxy)methane								
Methylene Chloride								
Methyl Chloride								
Bromoform								
Dichlorobromomethane								
Chlorodibromomethane								
Hexachlorobutadiene								
Hexachlorocyclopentadiene								
Isophorone								
Naphthalene								
Nitrobenzene								
Nitrophenol								
2-Nitrophenol								
4-Nitrophenol								
2,4-Dinitrophenol								
4,6-Dinitro-O-Cresol								
N-Nitrosodimethylamine								
N-Nitrosodiphenylamine								
N-Nitrosodi-N-Propylamine								
Pentachlorophenol								
Phenol								
Bis(2-ethylhexyl)phthalate								
Butylbenzyl Phthalate								
DI-N-Butyl Phthalate								
DI-N-Octyl Phthalate								
Diethyl Phthalate								
Dimethyl Phthalate								
Benzo(a)anthracene								
Benzo(a)pyrene								
3,4-Benzofluoranthene								
Benzo(k)fluoranthene								
Chrysene								
Acenaphthylene								
Anthracene								
Benzo(ghi)perylene								
Fluorene								
Phenanthrene								
Dibenzo(a,h)anthracene								
Indeno(1,2,3-cd)pyrene								
Pyrene								
Tetrachloroethylene								
Toluene								
Trichloroethylene								
Vinyl Chloride								
Aldrin								
Dieldrin								
Chlordane								
4,4'-DDT								
4,4'-DDE								

Pollutant	Detection Level Used	Maximum Daily Value		Average of Analyses		Number of Analyses	Units	
		Conc.	Mass	Conc.	Mass		Conc.	Mass
4,4'-DDD								
Alpha-Endosulfan								
Beta-Endosulfan								
Endosulfan Sulfate								
Endrin								
Endrin Aldehyde								
Heptachlor								
Heptachlor Epoxide								
Alpha-BHC								
Beta-BHC								
Gamma-BHC								
Delta-BHC								
PCB-1242								
PCB-1254								
PCB-1221								
PCB-1232								
PCB-1248								
PCB-1260								
PCB-1016								
Toxaphene								
(TCDD)								
Asbestos								
Acidity								
Alkalinity								
Bacteria								
BOD <sub>5</sub>								
Chloride								
Chlorine								
Fluoride								
Hardness								
Magnesium								
NH <sub>3</sub> -N								
Oil and Grease								
TSS								
TOC								
Kjeldahl N								
Nitrate N								
Nitrite N								
Organic N								
Orthophosphate P								
Phosphorous								
Sodium								
Specific Conductivity								
Sulfate (SO <sub>4</sub> )								
Sulfide (S)								
Sulfite (SO <sub>3</sub> )								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Chromium								

Pollutant	Detection Level Used	Maximum Daily Value		Average of Analyses		Number of Analyses	Units	
		Conc.	Mass	Conc.	Mass		Conc.	Mass
Copper								
Cyanide								
Lead								
Mercury								
Nickel								
Selenium								
Silver								
Thallium								
Zinc								
Any additional pollutants regulated by state or local laws:								

*[Note: This question might not be applicable to all pretreatment programs. The following question is only applicable to those programs implementing this optional streamlining provision.]*

Yes No

Do you anticipate requesting a monitoring waiver for regulated pollutants which you believe to not be present in your process wastestream(s)?

*[Note: This question might not be applicable to all pretreatment programs. The following question is only applicable to those programs implementing this optional streamlining provision.]*

Yes No

In order to request a monitoring waiver for pollutants not present, you must provide data from at least one sampling of your facility's wastewater prior to any treatment present at your facility that is representative of all wastewater from all processes. The request of a monitoring waiver must be signed in accordance with 40 CFR 403.12(l), and include the certification statement in 40 CFR 403.6(a)(2)(ii). Do you wish to make this request?

## SECTION G - TREATMENT

1.	Is any form of wastewater treatment (see list below) practiced at this facility?
	<input type="checkbox"/> Yes
	<input type="checkbox"/> No
2.	Is any form of wastewater treatment (or changes to an existing wastewater treatment) planned for this facility within the next three years?
	<input type="checkbox"/> Yes, describe:
	<input type="checkbox"/> No
3.	Treatment devices or processes used or proposed for treating wastewater or sludge (check as many as appropriate).
	<input type="checkbox"/> Air flotation
	<input type="checkbox"/> Centrifuge
	<input type="checkbox"/> Chemical precipitation
	<input type="checkbox"/> Chlorination
	<input type="checkbox"/> Cyclone
	<input type="checkbox"/> Filtration
	<input type="checkbox"/> Flow equalization
	<input type="checkbox"/> Grease or oil separation, type:
	<input type="checkbox"/> Grease trap
	<input type="checkbox"/> Grinding filter
	<input type="checkbox"/> Grit removal
	<input type="checkbox"/> Ion exchange
	<input type="checkbox"/> Neutralization, pH correction
	<input type="checkbox"/> Ozonation
	<input type="checkbox"/> Reverse osmosis
	<input type="checkbox"/> Screen
	<input type="checkbox"/> Sedimentation
	<input type="checkbox"/> Septic tank
	<input type="checkbox"/> Solvent separation
	<input type="checkbox"/> Spill protection
	<input type="checkbox"/> Sump
	<input type="checkbox"/> Rainwater diversion or storage
	<input type="checkbox"/> Biological treatment, type:
	<input type="checkbox"/> Other chemical treatment, type:
	<input type="checkbox"/> Other physical treatment, type:
	<input type="checkbox"/> Other, type:
4.	Is process wastewater mixed with nonprocess wastewater prior to the sampling point?
	<input type="checkbox"/> Yes, describe:
	<input type="checkbox"/> No

4.	<b>Description</b> Describe the pollutant loadings, flow rates, design capacity, physical size, and operating procedures of each treatment facility checked above.		
5.	Attach a process flow diagram for each existing treatment system. Include process equipment, by-products, by-product disposal method, waste and by-product volumes, and design and operating conditions.		
6.	Describe any changes in treatment or disposal methods planned or under construction for the wastewater discharge to the sanitary sewer. Please include estimated completion dates.		
7.	Do you have a treatment operator? (If Yes)	Yes	No
	Name:		
	Title:		
	Phone:		
	Full time (specify hours):		
	Part time (specify hours):		
8.	Do you have a manual on the correct operation of your treatment equipment?	Yes	No
9.	Do you have written maintenance schedule for your treatment equipment?	Yes	No



## SECTION H – FACILITY OPERATIONAL CHARACTERISTICS

1. Shift Information												
Work days				Mon	Tues	Wed	Thur	Fri	Sat	Sun		
Shifts per work day												
Employees per shift				1 <sup>st</sup>								
				2 <sup>nd</sup>								
				3 <sup>rd</sup>								
Shift start and end times				1 <sup>st</sup>								
				2 <sup>nd</sup>								
				3 <sup>rd</sup>								
2. Indicate whether the business activity is:												
Continuous through the year, or												
Seasonal (circle the months of the year during which the business occurs):												
J	F	M	A	M	J	J	A	S	O	N	D	
Comments:												
3. Indicate whether the facility discharge is:												
Continuous through the year, or												
Seasonal (circle the months of the year during which the business occurs):												
J	F	M	A	M	J	J	A	S	O	N	D	
Comments:												
4. Does operation shut down for vacation, maintenance, or other reasons?												
Yes, indicate reasons and period when shutdown occurs												
No												
5. List types and amounts (mass or volume per day) of raw materials used or planned for use (attach list if needed):												

6. List types and quantity of chemicals used or planned for use (attach list if needed). Include copies of Material Safety Data Sheets (if available) for all chemicals identified.

Chemical	Quantity

7. Building Layout Draw to scale the location of each building on the premises. Show map orientation and location of all water meters, storm drains, numbered unit processes (from schematic flow diagram), public sewers, and each facility sewer line connected to the public sewers. **Number each sewer** and show existing and proposed sampling locations.

A blueprint or drawing of the facilities showing the above items may be attached in lieu of submitting a drawing on this sheet.

## SECTION I – SPILL PREVENTION

1.	Do you have chemical storage containers, bins, or ponds at your facility?	Yes	No
	If yes, please give a description of their location, contents, size, type, and frequency and method of cleaning. Also indicate in a diagram or comment on the proximity of these containers to a sewer or storm drain. Indicate if buried metal containers have cathodic protection.		
2.	Do you have floor drains in your manufacturing or chemical storage area(s)?	Yes	No
	If yes where do they discharge to?		
3.	If you have chemical storage containers, bins, or ponds in manufacturing area, could an accidental spill lead to a discharge to (check all that apply):		
	an onsite disposal system		
	public sanitary sewer system (e.g., through a floor drain)		
	storm drain		
	to ground		
	other, specify:		
	not applicable, no possible discharge to any of the above routes		
4.	Do you have an accidental spill prevention plan (ASPP) to prevent spills of chemicals or slug discharges from entering the Control Authority's collection systems?		
	Yes – <b>[Please enclose a copy with the application.]</b>		
	No		
	N/A, not applicable since there are no floor drains and/or the facility discharge(s) only domestic wastes.		
5.	Please describe below any previous spill events and remedial measures taken to prevent their reoccurrence.		

1.	Describe the types of best management practices (BMPs) you employ to prevent pollutants from entering a facility's wastestream or from reaching a discharge point. BMPs are management and operational procedures such as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the general and specific prohibitions listed in 40 CFR 403.5(a)(1) and (b). BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.		
2.	Do you have the potential for a slug discharge to the sewer system? A slug discharge is any discharge of a non-routine episodic nature, including but not limited to an accidental spill or a non-customary batch discharge, which has a reasonable potential to cause interference or pass through, or in any other way violate the POTW's regulations, local limits or permit conditions [40 CFR 403.8(f)(2)(v).	Yes	No
Please describe the type of the potential slug discharge, including quality and content.			
Please describe current mechanisms for prevention of slug discharges.			
Please describe where and how raw materials are stored.			

1.	Are any waste liquids or sludges generated and not disposed of in the sanitary sewer system?		
	Yes, please describe below		
	No, skip the remainder of Section J		
	Waste Generated	Quantity (per year)	Disposal Method
2.	Indicate which wastes identified above are disposed of at an off-site treatment facility and which are disposed of on-site.		
3.	If any of your wastes are sent to an off-site centralized waste treatment facility, identify the waste and the facility.		
4.	If an outside firm removes any of the above checked wastes, state the name(s) and address(es) of all waste haulers:		
	a.	b.	
	Permit No. (if applicable):	Permit No. (if applicable):	
5.	Have you been issued any Federal, State, or local environmental permits?		
	Yes		
	No		
	If yes, please list the permit(s):		
6.	Describe where and how waste liquids and sludges are stored.		

**Compliance certification:**

- Yes

No

## Not yet discharging

- |    |   |
|----|---|
| a. | What additional operations and maintenance procedures are being considered to bring the facility into compliance? Also, list additional treatment technology or practice being considered in order to bring the facility into compliance. |
|----|---|

- |    |  |
|----|--|
| b. | Provide a schedule for bringing the facility into compliance. Specify major events planned along with reasonable completion dates. Note that if the Control Authority issues a permit to the applicant, it may establish a schedule for compliance different from the one submitted by the facility. |
|----|--|

[illegible]

**Authorized Representative Statement**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

---

Name(s)

---

Title

---

Signature

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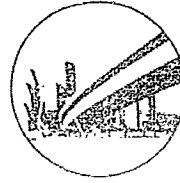
Date

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Phone

TAB 4E





**CDR** | MAGUIRE

August 9, 2016

Mr. Michael Wood  
Town Manager  
Town of Burrillville  
100 Main Street  
Harrisville, RI 02830

Re: Clear River Energy Center RI Data Request 1-1 Review

Dear Mr. Wood:

At your request, CDR Maguire and Alares LLC (Alares) has provided a review of the Invenergy Supplemental Response to Data Request 1-1. We have reviewed the document and offer the following comments and recommendations:

**EFSB 1 – 1: Construction and Operation Mitigation Measures**

Please describe the environmental disturbance expected with the construction and operation of the Clear River Energy Center and detail what mitigation efforts will be engaged to address those disturbances.

***Response 1-1: Paraphrased as applicable to the CDR Maguire & Alares Review Team  
Groundwater and Surface Water***

A Spill Prevention, Control, and Countermeasure (SPCC) Plan and a Stormwater Pollution Prevention Plan (SWPPP) will be developed and implemented to prevent impacts to groundwater or surface water during CREC operation. A Water Quality Certification will also be required. During CREC construction, dewatering will be performed as needed to avoid groundwater impacts. If any contaminated groundwater is encountered in any of the construction areas potentially requiring dewatering, the appropriate state and/or local permits will be obtained to address discharge of off-site management of the pumped water. Invenergy will apply for and obtain a RIPDES Construction General Permit, including a Soil Erosion and Sediment Control Plan to ensure that area surface waters are adequately protected for potential impacts during construction.

***Review Team Comments and Recommendations:*** Please advise on construction schedule and timeframe for the generation of these documents. The Town of Burrillville and it's CREC review team requests the opportunity to review the documents prior to the submittal to the applicable regulatory agencies.

***Water Use & Wastewater Discharge***

The stream depletion analysis completed for CREC has demonstrated that there will be adequate water supply from Pascoag Utility District (PUD) Well 3A, even in the summer months when the river is at its lowest points, to support it's operation. Invenergy is working with RIDEM to put in place measures that

can be taken to minimize CREC's water use during its operation if a stream depletion event were to occur.

***Review Team Comments and Recommendations:*** Supplemental water sources need to be developed for the proposed process water usage at the proposed CREC facility. Alares questions the adequacy of using Well 3A during the summer months when a large component of the Clear River 7Q10 stream flow is likely or reportedly reserved by the Pascoag and Harrisville Utility Districts. In an effort to ensure that an adequate supply of process water is available to the proposed CREC facility, please provide additional information regarding the adequacy of using Well 3A as the sole source for process water at the proposed CREC facility in consideration of the reserves that have been placed on the 7Q10 stream flow for the Clear River.

#### ***Wetlands***

The CREC has been designed to avoid and minimize impacts to jurisdictional wetland resource areas. Invenergy will apply for a Permit to Alter Freshwater Wetlands from RIDEM and an Individual Permit from the United States Army Corps of Engineers (ACOE) for all proposed wetland impacts, including the power plant, the transmission line and the water treatment facility to be installed at PUD Well #3A. In order to obtain these permits, Invenergy must demonstrate that the proposed CEREC wetland impacts have been minimized and that all feasible alternatives to future avoid permanent wetland impacts have been considered.

Invenergy is currently investigating construction laydown locations that would minimize any additional impacts to wetlands associated with construction. Any unavoidable temporary impacts to wetlands associated with the staging of construction vehicles, equipment and materials during CREC construction will be restored once construction is completed where feasible.

In coordination with RIDEM and the ACOE, Invenergy will develop a Wetlands Mitigation Plan (WMP) to compensate for all unavoidable direct, indirect and secondary wetland impacts from the CREC. The WMP will include a combination of proposed wetland restoration, creation, enhancement and preservation measures within the affected watershed in the required compensatory mitigation ratios.

***Review Team Comments and Recommendations:*** As part of the avoidance and minimization required by both RIDEM and ACOE, the construction laydown areas should be further reduced from the original proposal to not include parking of vehicles. Parking of vehicles and placement of building materials will compact soils in this area. These forested wetland soils also need to be further investigated as the substrate may not be adequate for support of heavy materials. This may cause sinking of equipment and additional unnecessary destruction to the wetland and sedimentation. The "temporary" removal of forested wetland should be considered as a wetland which requires additional consideration. This wetland will not be restored with its original functions and values. Forested wetlands requires a substantial amount of time to return to their original state and usually with some successional forest issues (invasive/undesirable species) taking place of mature growth. This creates less suitable habitat for displaced species.

Invenergy should try to utilize the existing drive which leads into Spectra, which it will be sharing its energy supply with. This would eliminate additional wetland crossings and additional unnecessary impervious areas. This was never addressed if this option was fully considered.

Though the construction site itself, may not be within a 100-year flood zone, wetlands as a whole act as flood storage areas, the removal of these wetlands and placement of impervious surface should also be considered from a compensatory flood storage perspective. This should be taken into consideration for the entire project area.

Please predict the amount of compensatory mitigation needed for the wetlands which will be impacted. Please identify suitable areas and the type of planned wetlands which will be created. Have original wetland functions and values been considered? Is the shared driveway with Spectra possible? What secondary wetlands impacts are expected? How has the project reduced the impact to wetlands from its original concept design?

#### ***Stormwater***

A Stormwater Management Plan (SMP) is being developed to minimize impacts to surface waters from stormwater runoff during operation. The SWP will meet all of the applicable criteria of the RI Stormwater Design and Installation Standards Manual and will utilize each of the required best management practices. A SWPPP will be developed and maintained to satisfy the requirements of the MSGP for Industrial Activities. A RIPDES Construction General permit will be obtained, which will include the development of a Soil Erosion and Sediment Control Plan.

***Review Team Comments and Recommendations:*** Please advise on construction schedule and timeframe for the generation of these documents. The Town of Burrillville and it's CREC review team requests the opportunity to review the documents prior to the submittal to the applicable regulatory agencies.

#### ***Geology and Soils***

CREC will have minimal impacts to earth resources as it has been designed to be compatible with the local geologic conditions. Detailed geotechnical evaluations will be performed prior to construction to further determine the subsurface conditions and the necessary design criteria. A Soil Erosion and Sediment Control Plan will be developed to protect resource areas throughout construction. Excavated material will be re-used when possible. Any off-site disposal of excavated materials will be in accordance with applicable regulations and guidance. Operational impacts to geology will be negligible.

***Review Team Comments and Recommendations:*** Hydric soils should be conserved to the greatest extent possible, as practicable. Compaction of the wetland soils from laydown areas may not be able to be restored to pre-construction conditions. Site suitability and stability of soils should be considered for appropriate areas to place heavy machinery and materials. This will ensure that greater damage is not done to the site and that the soils will not erode more than necessary. This will also reduce sedimentation on site.

In an effort to ensure that the proposed CREC facility is not contaminated by incoming fill material, all imported fill material should include laboratory analysis in accordance with RIDEM requirements to ensure that clean fill is being used for construction activities at the Site.

Clean soil should be used in accordance with the 2011 Rhode Island Department of Environmental Management (RIDEM) "Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases." (2011 RIDEM Remediation Regulations). As defined in Section 3.12 of the 2011 RIDEM Remediation Regulations, **Clean Soil** shall be defined as soil that has not been impacted, contaminated, adversely affected, or subject to a Release of Hazardous Materials, State or federally defined Hazardous Waste, petroleum, asbestos, PCB's, radioactive materials, or solid waste. Soil meeting:

- i. The Department's Method 1 -- Residential Direct Exposure Criteria (Table 1), and
- ii. The TPH direct exposure, and leachability criteria of 500 ppm, and
- iii. Meeting all other State, and federal requirements specific to petroleum, asbestos, radioactive material, PCB's, solid waste, and other criteria as determined by the Director;

shall be deemed "Clean Soil" as defined above. For cases where naturally occurring background levels of arsenic or beryllium may exceed the above standards (i, ii, and iii) the Department may be petitioned to make a site specific background determination for compliance with the regulatory definition.

Alares recommends that fill material coming onto the CREC project site be analyzed in 500 cubic yard increments for total petroleum hydrocarbons (TPH) by EPA Method 8100, volatile organic compounds (VOCs) by EPA Method 8260, polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270, Priority Pollutant (13) metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc), and polychlorinated biphenyls (PCBs) by EPA Method 8082.

To protect the liability of the Town and also CREC, Alares also recommends that any excavated soil exported from the site should also be evaluated in the same manner in 500 cubic yard increments.

#### ***Traffic***

The CREC will have minimal impacts on traffic during operation. Employee vehicle trips will be spread out over multiple work shifts. There will be daily deliveries of supplies and equipment but such deliveries will be intermittent. There will be truck deliveries of ultra-low-sulfur diesel (ULSD) when ULSD is fired.

Invenergy will coordinate closely with the RI Department of Transportation (RIDOT) and the Town of Burrillville to implement a pragmatic Traffic management Plan during construction activities to minimize impacts on local roadways. Invenergy has engaged the services of an expert traffic consultant to help develop the CREC Traffic Management Plan, which will be made available to the public when completed.

***Review Team Comments and Recommendations:*** We have reviewed and commented on the Traffic Study prepared by McMahon. Based on the Study and McMahon's response to our comments, we generally agree with the findings of the Study. Traffic impacts during operation of the CREC will be minimal. There will be noticeable delays to traffic during construction. Parking regulations near intersections should be strictly enforced and consideration should be given to extending parking restrictions in the vicinity of the impacted intersections. Pavement striping should be maintained.

***Wastes***

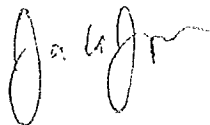
CREC will generate relatively little industrial solid waste during construction or operation, and the waste generated will be managed in accordance with the applicable regulations. All waste will be stored in an area with cover, secondary containment and an impervious surface. All waste accumulation areas will be equipped with appropriate spill response equipment. Employees will be trained to manage wastes safely and in accordance with applicable regulations.

***Review Team Comments and Recommendations:*** Please provide the proposed construction and operations employee waste management and spill response training protocols to the Town for review 120 days prior to the initiation of either construction or CREC facility operations. Please provide the proposed coordination and training efforts with the local fire departments in Town for review 120 days prior to the initiation of either construction or CREC facility operations. Local fire department coordination should include Pascoag, Harrisville, Nasonville, Chepachet, Harmony, Oakland-Mapleville, Putnam-CT, and Webster-MA. In an effort to provide a higher level of safety to the Town and its residents, this recommendation is presented in light of the fact that a significant response event may require assistance from other fire departments in addition to the Pascoag Fire Department.

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience

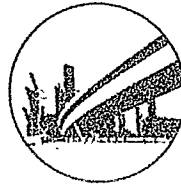
Very truly yours,

CDR MAGUIRE INC.

A handwritten signature in black ink, appearing to read 'James A. Jackson'.

James A Jackson, P.E.  
Project Manager

TAB 4F



**CDR** | MAGUIRE

August 11, 2016

Mr. Michael Wood  
Town Manager  
Town of Burrillville  
100 Main Street  
Harrisville, RI 02830

**Re: Clear River Energy Center Invenergy Response to DOH Advisory Opinion**

Dear Mr. Wood:

At your request, CDR Maguire and Alares LLC (Alares) has provided a review of the Invenergy Response to the Department of Health's (DOH) Draft Advisory Opinion. We have reviewed the document and offer the following comments and recommendations:

**Issue 3 – Drinking Water Quality**

***RIDOH's Opinion:*** The RIDOH recommended that efforts be made to protect source water for nearby wells, including private wells and Wallum Lake, from contamination through each phase of the project, including construction and operation.

The RIDOH also stated that the MTBE-contaminated wells cannot be used to provide water to the plant's offices. Should the power plant use well water on-premises for human use and consumption, and its offices serve more than 25 persons more than 60 days out of the year, then the plant will have to obtain a public water system license through RIDOH's Center for Drinking Water Quality.

***Invenergy's Response:*** Invenergy will be required to implement numerous controls and best management practices both during construction and operation through the stormwater and water quality permitting processes to ensure the protection of source water from contamination. Invenergy will obtain a RIPDES Construction General Permit, which will require the development and implementation of a Soil Erosion and Sediment Control Plan which will include extensive pollution prevention practices throughout all construction activities.

The Stormwater Management Plan for the Project will include stormwater control systems and best management practices to fully comply with the Rhode Island Stormwater Design and Installation Standards Manual during operation. An Operation and Maintenance Plan will also be developed for post-construction monitoring and maintenance of stormwater control systems.

Invenergy will obtain a RIPDES Multi-Sector General Permit for Industrial Activities, which will require the development of a Stormwater Pollution Prevention Plan.

All chemicals will be stored on-site in sealed containers in designated areas equipped with secondary containment systems as required. All plant employees responsible for chemical storage and handling will be trained to handle chemicals responsibly and in accordance with applicable regulations. A routine inspection and maintenance program will be established to ensure that all containment and spill control equipment at the facility is in proper working order at all times. A Spill Prevention, Control, and Countermeasures Plan will also be developed for the storage of fuel oil at the facility.

Invenergy is proposing an on-site well to provide potable water for plant personnel during operation (post-construction). The well will not service more than 25 people more than 60 days out of the year so a public water system license will not be required. Invenergy will submit an Application for Source Approval to the RIDOH for approval of the potable well as a non-community, non-transient water system.

***Review Team Comments and Recommendations:*** Acknowledged from a drinking water perspective as it pertains to the authority of RIDOH to regulate drinking water. In the RIDOH evaluation, RIDOH did clearly state that they are principally concerned with the "protection of sourcewater for nearby wells, including private wells and Wallum Lake, the source serving Zambarano Hospital." The information presented by the CREC design team adequately addresses how operations at the proposed CREC facility would limit the possibility of a release of oil or hazardous materials to the environment.

The CREC response does not appear to address the reactivation of Well 3A which was also part of the RIDOH analysis. As stated in the RIDOH analysis, the reactivation of Well 3A is not subject to the RIDOH regulations since the use of the water will be for process water at the proposed CREC facility. However, with the stated RIDOH principal concern of protecting the "sourcewater for nearby wells, including private wells and Wallum Lake, the source serving Zambarano Hospital," the reactivation of Well 3A does have potential implications for these sensitive receptors. Please advise how the reactivation of Well 3A would not impact the "sourcewater for nearby wells, including private wells and Wallum Lake, the source serving Zambarano Hospital."

Additionally, to restate the previous Review Team summaries from the recent planning board meetings:

- It should be demonstrated that the reactivation of Well #3A should have no hydraulic impact on the operation of the Eccleston Well Field for Harrisville Water District. Harrisville Water District has recently undertaken this modeling initiative with an independent engineer and available information indicates that information may be ready as soon as August 10, 1026.
- The groundwater conditions should be modeled to establish if the reactivation of Well #3A would potentially introduce air impacts to the residential properties in the vicinity of Well #3A. Due to the time necessary to reach equilibrium conditions in the aquifer, in the vadose zone soil gas, and potentially indoor air; it may be likely infeasible to conduct a pump test of sufficient duration to assess these conditions. In the event that an impact is identified post Well #3A



activation, contingency arrangements should be in place by CREC for assessment and mitigation of indoor air intrusion, as necessary to protect human health.

- It should be demonstrated that the reactivation of Well #3A will have no impact on the low flow stream conditions of the Clear River.
- A groundwater treatment process and instrumentation diagram (P&ID) should be presented by the CREC Design Team. It should detail the proposed flow rates, the design criteria, the system components, and the proposed building size. The treatment system should be capable of removing petroleum constituents in groundwater to non-detect laboratory limits consistent with EPA Method 8260 analysis. Treatment and mechanical redundancy should be factored into the design.
- Supplemental sources for process water should be proposed by the CREC Design Team in addition to the reactivation of Well #3A. These may include additional groundwater sources, surface water sources, or interconnections with other municipalities.
- Consideration should be given to discharging a portion or the majority of the spent process water from the proposed CREC plant to an upgradient location on the Clear River. Treatment will likely be required as the proposed CREC plant to facilitate this sustainable water reuse option.

#### **Issue 6 – Emergency Response and Prevention**

**RIDOH's Opinion:** The RIDOH recommended that Invenergy establish written procedures to maintain the integrity of the ammonia storage tank containment area as well as written emergency procedures. The RIDOH also recommended that the ALOHA model be run assuming a failure of the passive controls to be used to reduce the evaporation rate, and if the distance to the toxic end-point extends off-site, appropriate planning should be implemented. The RIDOH also recommended that Invenergy coordinate with local emergency responders.

The RIDOH recommended that Invenergy put in place written procedures for the inspection, testing, and maintenance of all equipment related to the storage of hydrogen at the facility. All staff involved with the storage, transfer and use of hydrogen should have the appropriate training. Coordination with local emergency responders is essential.

The RIDOH recommended that all potential hazards be evaluated in a facility-wide RMP-like hazard analysis.

***Invenergy's Response:*** Aqueous ammonia for the gas turbine selective catalytic reduction ("SCR") systems will be stored at 19% concentration in a 40,000 gallon aboveground storage tank. The EPA requires facilities that store 10,000 pounds or more of aqueous ammonia which is stored at a concentration of 20% or greater to conduct an off-site consequence analysis and prepare a Risk Management Plan (RMP) to prevent and mitigate the consequences of accidental releases. The RMP does not apply to aqueous ammonia stored at a concentration of less than 20% in any amount.

The Facility will not be subject to the RMP requirements, but will be subject to the EPA's General Duty Clause, which requires facilities to assess hazards, prevent accidental releases, and minimize the consequences of any releases which occur. Consistent with the General Duty Clause, Invenergy is proposing the following to ensure the safe storage of aqueous ammonia on-site, and to minimize the consequences in the unlikely event that an accidental ammonia release were to occur:

- The ammonia storage tank and its associated transfer pumps and piping will be enclosed within a concrete containment area designed to contain up to 110% of the capacity of the storage tank.
- The containment area will be filled with a passive evaporative control system designed to reduce the exposed surface area of any ammonia within the containment system by at least 90%.
- The containment area will be equipped with ammonia sensors to alert Facility operators of any system leaks.
- Procedures will be established and documented for the periodic maintenance, inspection and testing of the containment area, the leak detection system, and the evaporative control system.
- Emergency procedures will be established and documented, including the training of staff in the procedures and the proper use of the personal protective equipment which would be required during a release.
- Invenergy will coordinate with local emergency responders and the nearest hazardous materials response team to establish emergency procedures in the unlikely event of a release of ammonia from the Facility.

Acute Exposure Guideline Levels ("AEGLs") are used by emergency planners and responders as guidance in dealing with accidental releases of chemicals into the air. AEGLs are expressed as concentrations of airborne chemicals at which health effects may occur and are designed to protect the elderly and children, as well as other individuals who may be susceptible.

AEGL levels are dictated by the severity of the toxic effects caused by the exposure, as follows:

- AEGL-1 (Level 1): Notable discomfort, irritation, or certain asymptomatic non-sensory effects. Any effects are not disabling and are transient and reversible upon cessation of exposure.
- AEGL-2 (Level 2): Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
- AEGL-3 (Level 3): Life-threatening health effects or death.

Airborne concentrations below the AEGL-1 are exposure levels which could produce mild, transient, odor, taste, and sensory irritation. These effects are non-disabling, allowing for safe evacuation from any impacted areas.

For ammonia, the 1-hour AEGL concentrations have been defined as follows:

- AEGL-1: 30 parts per million (ppm)
- AEGL-2: 160 ppm
- AEGL-3: 1,100 ppm

Although the CREC is not subject the Risk Management Program, a worst-case accidental release scenario has been evaluated to assess the potential consequences in the extremely unlikely event of a release of the full 40,000 gallons of 19% aqueous ammonia into the containment area. This assessment was performed using the Area Locations of Hazardous Atmospheres ("ALOHA") Model developed by the EPA and the National Oceanic and Atmospheric Administration and included as a prescribed technique under the Risk Management Program. It was completed in accordance with the procedures contained in the EPA's "Risk Management Program Guidance for Offsite Consequence Analysis".

The analysis was first conducted without and then with the proposed passive evaporative control system. The results of the worst-case accidental release scenario assessment completed for the CREC aqueous ammonia storage tank are shown in both tabular and graphical form in **Exhibit 1 (Not included in this response)**.

Based on the ALOHA modeling results, the furthest downwind distances from the ammonia storage tank at which the in-air ammonia concentrations would exceed each of the ammonia AEGL levels during a worst-case accidental release are as follows:

**AEGL Level**

	<b>w/o Evaporative Controls</b>	<b>w/ Evaporative Controls</b>
AEGL-1	389 yards	121 yards
AEGL-2	174 yards	53 yards
AEGL-3	64 yards	20 yards

As shown on the figures in **Exhibit 1**, all of the areas in which the inair ammonia concentration would exceed the AEGL-1 level are within the Project and/or Spectra site, which is private property not accessible to the general public. Emergency procedures will be established to evacuate Algonquin (Spectra) and CREC personnel from these areas in the event of a release and to require emergency

personnel to utilize the proper personal protective equipment before entering these areas until the released ammonia has been properly recovered.

The in-air ammonia concentrations in all areas beyond the Spectra site during a worst-case accidental release would be below the AEGL-1 level, thus resulting in no adverse health effects upon exposure. Although there would be no public health risk, Invenergy will work with local emergency responders to establish emergency procedures in the unlikely event that there is an accidental release of ammonia from the facility.

Invenergy will put in place written procedures for the periodic inspection, testing, and maintenance of all equipment, controls, and sensors related to the storage and use of hydrogen at the facility. All staff involved with the storage, transfer and use of hydrogen will be provided with the appropriate training in procedures necessary to ensure the safe maintenance and operation of the hydrogen system, including emergency procedures. Periodic refresher training of this training will be provided to the relevant staff. Invenergy will coordinate with local emergency responders, including the nearest hazardous materials response team. Invenergy will provide them with all relevant information regarding the quantity of hydrogen stored on site and its location, transport routes and procedures.

Although not subject to the RMP requirements, Invenergy will conduct a facility-wide RMP-like hazard analysis to ensure full compliance with the General Duty Clause. This assessment will include the ammonia, hydrogen, and fuel oil storage and delivery systems, the storage and transportation of hazardous waste generated at the facility, and the transport and use of natural gas at the facility or in the pipeline or related infrastructure.

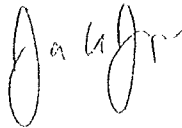
***Review Team Comments and Recommendations:*** As presented, the proposed CREC facility is not subject to the RMP requirements and the proposed CREC facility is required to be in full compliance with the General Duty Clause. The proposed "facility-wide RMP-like hazard analysis" that is proposed to be conducted by the CREC design team is intended to provide a higher level of safety for the employees working at the proposed CREC facility as well as the residents in the vicinity of the proposed CREC facility. It should be noted that the proposed "facility-wide RMP-like hazard analysis" constitutes an act of good faith by the CREC design team and exceeds the Standard of Care required by the proposed facility configuration.

Mr. Michael Wood  
August 11, 2016  
Page 7 of 7

We appreciate the opportunity to assist the Town of Burrillville with these issues. If you have questions please contact me at your convenience

Very truly yours,

CDR MAGUIRE INC.

A handwritten signature in black ink, appearing to read "Ja Jackson".

James A Jackson, P.E.  
Project Manager

# TAB 5A



**Hessler Associates, Inc.**  
WORLDWIDE CONSULTING IN ENGINEERING ACOUSTICS

2024-05-18 10:11:17 AM EDT

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May 26, 2016

Mr. Michael Wood  
Burrillville Town Manager  
105 Harrisville Main St.  
Harrisville, RI 02830

Reference: L-2024-051816-A

Subject: Invenergy Clear River Energy Center  
Facility Noise and Community Noise Impacts

Dear Mr. Wood:

As you know, we have reviewed the initial noise study submitted with Invenergy's permit application for the Clear River Energy Center (CREC) project and their responses to subsequent data requests. At this point we are generally comfortable with what is being proposed in the sense that Invenergy has been appropriately responsive and has committed to an acoustical design that, as long as it's fully realized, should lead to minimal and most likely acceptable community noise levels during all operating modes.

Summarized below are our opinions and views on some specific noise issues we feel are important to the Town.

#### **Town Noise Ordinance Compliance - Overall A-weighted Limits**

Section 16-39 of the Burrillville Noise Ordinance restricts the sound emissions from the plant (or any source) to 53 dBA during the day and 43 dBA at night. For a source that will operate around the clock, at least at times, the nighttime limit of 43 dBA is the effective design limit. This level is unusually low and restrictive because essentially all known State and local ordinances and regulations do not go below a limit of 45 dBA at night. Consequently, we believe that compliance with such a low level at all of the nearest residences will be adequately protective of the community. To put it in context, a sound level of 43 dBA is low in absolute terms and might be the sound level that is found in a typical conference room or library and it is also low in relative terms compared to the existing background sound level at the nearest residences, which was



measured by Invenergy's acoustical engineer to range from about 41 to 49 dBA. This means that during the quietest overnight hours, when 41 dBA was measured, a plant sound level of 43 dBA will be unobtrusive, if not entirely imperceptible relative to the background level at the nearest residences on Wallum Lake Road. Because of the way decibels add logarithmically the new total would theoretically be 45 dBA (and *not* 84 dBA, as might be imagined). A new source generally has to exceed the prevailing background level by about 5 dBA or more before it starts to become noticeable, so we would not expect a sound level of 43 dBA (attributable solely to the plant) to be intrusive or even perceptible relative to the minimum observed background level of 41 dBA. Consequently, it should subjectively sound about the same as it does now at the nearest residences, even in the middle of the night. By "the same" we mean that noise from the compressor station will continue to be what is heard and the CREC will be quiet enough that it is essentially covered up by existing sounds, even in the absence of road traffic.

At the next nearest residences in other directions somewhat lower facility sound levels can be expected simply because they are further away than the closest residences on Wallum Lake Road - which is the effective design point for the plant and where the Ordinance limit of 43 dBA must be met. These lower levels are on the order of 40 dBA or less, which is extremely quiet. Many years of experience with power plant noise indicates<sup>1</sup> that such a sound level is so low in absolute terms that disturbance is highly unlikely - even in rural environments where the background sound level is essentially negligible, as it appears to be at locations like Doe Crossing Drive and Jackson Schoolhouse Road. Consequently, we would not expect any issues at any other residences, despite the absence of any significant masking noise, so long as the facility is meeting the Ordinance limit at the closest houses on Wallum Lake Road.

### **Town Noise Ordinance Compliance – Octave Band Limits**

In addition to the overall A-weighted sound limits, the Town Ordinance also contains a restriction on the frequency content of the sound in the form of nine octave band limits, each covering a section, or band, of the audible frequency spectrum. In general, octave band limits are fairly uncommon because, among other things, it takes somewhat sophisticated instrumentation to measure them, they add technical complexity to what would otherwise be a fairly simple regulatory statute and they effectively impose 10 noise limits (9 octave bands and the overall A-weighted limit) on an applicant or noise generator instead of one. Their only real usefulness is in placing very specific limits on low frequency noise; i.e. below about 125 Hz, and even that could be handled by other means (a C-weighted limit, for example).

In this particular case, there is no need for a special restriction on the lower frequencies, or on any other frequencies, because combined cycle plants like the CREC do not produce problematic levels of low frequency noise and more generally emit a bland, broadband sound that is evenly spread

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<sup>1</sup> A conference paper I wrote some years ago on this very topic is attached for reference:  
Hessler, D. M., "Recommended Noise Criteria for Siting Industrial Facilities Near Residential Communities with Extremely Low Ambient Sound Levels", Noise-Con 2005, Minneapolis, MN, Oct. 2005.



across the frequency spectrum; a sound that is not typically considered noticeable or intrusive at the levels and receptor distances associated with this project. Other types of plants, such as simple cycle gas turbines and gas compressors, on the other hand, do commonly generate excessive and detrimental levels of low frequency noise, but the boilers associated with combined cycle plants act, coincidentally, as expansion chamber mufflers (like very large car mufflers), which, because of their physical size, happen to be effective at breaking up long wavelength low frequency noise coming from the gas turbine exhaust. Consequently, in our decades of experience designing and testing combined cycle plants we have never seen complaints or issues specifically associated with low frequency noise, irrespective of the plant sound level at nearby neighbors or its proximity to sensitive receptors.

In addition to this it is important to realize that the octave band limits contained in the Town Ordinance, especially in the lower frequencies, are well below all the other octave band regulatory limits that we're familiar with. The chart below shows a series of nighttime octave band noise limits from a variety of jurisdictions compared to the Town's limits (thick red line).

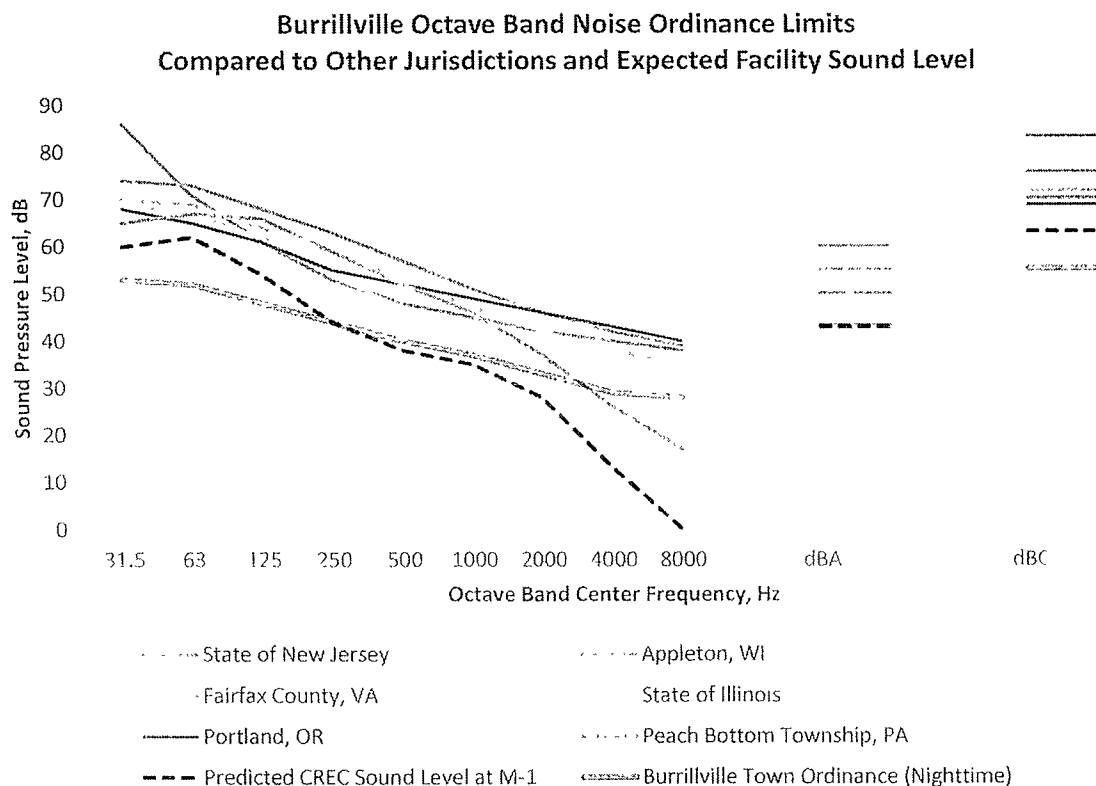


Figure 1

This graphic shows that the Town's limits are well below what might be considered the norm, but, more to the point, there is no actual need for the limits to be this low. The expected plant sound level at the closest residences is shown as the blue dotted line. Although it's not intuitively obvious, the plant would not be any less audible or sound any quieter if its sound levels in the three lowest octave bands were equivalent to the Ordinance rather than over the limits as currently predicted because, in a nutshell, the human ear is not very sensitive to frequencies below about 200 Hz, so the facility would effectively sound the same either way. In fact, subjective audibility is basically quantified by the overall A-weighted sound level and both the Ordinance spectrum and the plant sound spectrum in the chart both total up to 43 dBA, indicating that the sounds are of the same subjective magnitude. This overall limit of 43 dBA fully serves the purpose of limiting the project's noise to an acceptable level in the community. Invenergy has repeatedly argued that it is not feasible to meet the lower octave band limits and they have asked for a waiver on the octave band requirements. This is a legitimate assertion and a legitimate request. We would agree that it is probably technically impractical - and would add that it would do nothing to reduce the subjective audibility of the plant if it were.

#### **Facility Noise during Plant Start-ups**

In the noise study in the initial permit application the sound emissions from the plant were evaluated during normal steady-state operation at full load. While this sounds like it would be the time when the plant produces its maximum noise, it isn't. Combined cycle plants have to go through a warm up period when they start-up that generally takes anywhere from 40 minutes to 2 hours. During this time there are various processes that occur that, if inadequately mitigated, can result in substantially higher noise levels during this period, which is often in the early morning hours (5 to 6 a.m.) when additional noise is clearly undesirable.

There is no proviso in the Burrillville Ordinance, or in any other regulatory statute, that makes an exception for start-up noise or distinguishes between different operating modes. In fact, all noise ordinances are mute on the subject, which implies that the limit is the limit irrespective of what process happens to be occurring at the plant.

Despite the fact that regulatory noise limits implicitly cover all non-emergency operating modes, start-up noise, or the potential for it, is not commonly brought up in noise impact studies prepared for permit applications - or is swept under the rug as a short-lived and intermittent noise of no consequence. We believe there are several reasons for this:

- Start-up noise is frequently specifically excluded from contractual noise guarantees; i.e. the performance guarantees between a plant owner and the company that actually builds the plant for them normally specify the maximum permissible sound level from the facility during normal, full load operation only. Start-up, shutdown and transients are usually excluded; even, sometimes, in cases where they shouldn't be, such as when a state or local noise limit exists.

- The potential for louder facility noise emissions during start-up is something that might be perceived as a negative in the eyes of permitting authorities. Moreover, the very possibility of higher noise levels during start-up is an esoteric fact that only those intimately familiar with power plants are even aware of -- so why unilaterally bring it up.
- And, somewhat surprisingly, many in the industry, including some developers and many acoustical consultants, are themselves unfamiliar with the mechanics of combined cycle plants and the potentially serious noise issues associated with start-up.

Consequently, while not all that unusual, we would fault the Applicant for avoiding any mention of start-up noise in their initial noise study for the important reason that the plant will employ air cooled condensers (ACC's). In our experience, ACC's are particularly prone to extremely high noise levels during start-up because very high pressure steam, not yet suitable for introduction into the steam turbine, is bypassed directly into a cavernous duct leading to the condenser (Figure 2). Because this duct is maintained at less than atmospheric pressure by vacuum pumps and noise generation over a valve is largely proportional to the pressure differential, it is quite difficult to keep this process, essentially a continuous explosion, quiet, even with "low noise" valves.

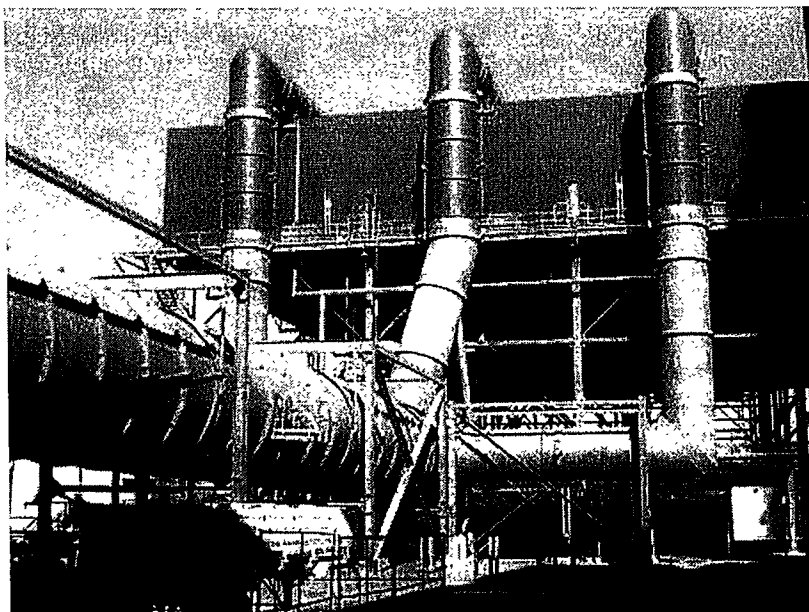


Figure 2 Typical ACC Steam Duct

To their credit, when queried about this issue through the data request process, Invenergy did the right thing and commissioned an additional, detailed noise modeling study to evaluate the sound emissions from the facility specifically during start-up and steam turbine bypass. We have reviewed this new study and consider it competently done; however, the model inputs representing noise from steam turbine bypass into the condenser duct appear to be rather optimistic and much



lower than we would realistically expect. Even with these low sound levels the conclusion of the study was that the plant sound level would increase to 46 dBA at the nearest residences on Wallum Lake Road on a temporary basis during start-up.

In response to this information a set of further data requests was submitted with technical questions about the report and its conclusions. When asked about the origin of the apparently low sound levels assumed for bypass noise, the response from Invenergy's consultant was that they were obtained from the bypass valve supplier and represented the supplier's guaranteed sound levels. Because we have never seen a case where bypass noise was anywhere close to the valve manufacturer's guarantees, we are skeptical that such levels will be realized. If we were designing this plant we would seriously consider extending the turbine building to encompass the ACC steam duct and add heavy duty acoustical lagging to any parts of the horizontal manifold or risers that end up outside the building envelope. Or, in other words, we would not rely entirely on the valve noise guarantees, if only because it would be quite expensive and difficult for the facility EPC (engineering, procurement and construction) contractor or owner to enclose or lag this duct on a retrofit basis.

The data requests following the submission of the start-up noise report also questioned the predicted Ordinance exceedance of 46 dBA at the nearest houses (vs. the 43 dBA Town limit). The unequivocal response was that Invenergy would do whatever was needed to ensure that 43 dBA would be maintained during all normal modes of operation including start-up and shutdown. It was also pointed out in the data request responses that the EPC contractor, the plant builder Invenergy hires to actually construct the facility, would be contractually required to realize this performance. This last statement is highly reassuring because contractual performance guarantees are taken very seriously by EPC contractors, who are obligated to meet each requirement in a timely manner or risk significant financial penalties known as liquidated damages.

A compliance test, performed by the owner or, more commonly the EPC contractor, is normally required to verify that the contract conditions on noise have been satisfied. Although such a test is practically inevitable here given the stringent noise limits associated with the project, the Town may want to make this test a mandatory condition of the permit and reserve the right to witness the test and/or conduct its own independent testing.

Although we foresee some significant additional costs for transient noise abatement, we are satisfied that Invenergy has now been fully alerted to this potentially serious noise problem (along with most of the townsfolk during the April 28<sup>th</sup> board meeting) and will pay appropriate attention to keeping steam turbine bypass noise in check.

In summary, then, it is our opinion that the CREC facility will have a minimal and generally acceptable noise impact on the community so long as the overall, A-weighted nighttime Ordinance noise limit of 43 dBA or less is maintained during all normal, non-emergency operating modes at all of the nearest residences. Compliance with the octave band frequency limits also contained in



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the Ordinance is not a precondition to this outcome and these unusually and unnecessarily demanding limits may be waived as requested by the Applicant without detriment to the community, if only because combined cycle plants do not generate problematic levels of the low frequency noise. Furthermore, we are satisfied with the data request responses and believe that the Applicant has been alerted to the seriousness of the steam turbine bypass noise situation during plant start-ups and will ensure through contractual performance guarantees that the facility EPC contractor will take appropriate steps to contain and control this noise - something that might otherwise have been a unpleasant surprise to all and something that would have been difficult to resolve on a retrofit basis.

Of course, please let me know if you have any questions.

Sincerely,

David M. Hessler, P.E., INCE  
Principal Consultant  
Hessler Associates, Inc.

**TAB 5B**



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July 12, 2016

Mr. Oleg Nikolyszyn  
Town of Burrillville  
105 Harrisville Main St.  
Harrisville, RI 02830

Reference: L-2024-071216-0

Subject: Invenergy Clear River Energy Center  
Additional Comments on Facility Noise Issues

Dear Mr. Nikolyszyn:

In light of the public comments and other testimony presented prior to and during the June 20<sup>th</sup> and July 11<sup>th</sup> public hearings on the Clear River Energy Center project, I would like to add some additional comments and clarifications to the summary report, L-2024-051816-A, I submitted on May 26, 2016.

#### **Public Meeting Noise Demonstration**

I understand from your description that a speaker was brought to one of the public meetings at the high school by a local resident, prior to the June 20<sup>th</sup> hearing, and used to supposedly demonstrate the noise from the proposed facility. I was not in attendance at that meeting, but it seems quite clear that the loud, “screeching” noise, which the resident variously described in terms of decibels and “MegaHertz”, was not in any way representative of the likely operational sound level thousands of feet from the plant. MegaHertz, by the way, refers to frequency rather than loudness or magnitude and would, in any case, be well beyond the high end of the audible spectrum, which tops out at around 20 kiloHertz. As you know, the Town Ordinance limits facility noise to an overall sound level of 43 dBA at the nearest homes. Such a level is so quiet that it may well be below the background level in the high school auditorium when no one is talking and possibly when the room is completely unoccupied. Consequently, I’m sure that the purported demonstration grossly misrepresented the sound emissions from the proposed facility.

## **Town Noise Ordinance – Waiver of Octave Band Limits**

I gather from some of the public comments that my recommendation to grant Invenenergy's request to waive the octave band noise limits in the Ordinance (while maintaining compliance with the overall nighttime sound level of 43 dBA under all operating conditions) is viewed as an unwarranted concession that will expose neighbors to disturbing levels of low frequency noise or some other form of harm. That is not at all the case. Although clearly counterintuitive on the surface, the crux of the matter is that the Ordinance limits in the lower octave bands (31.5 to 125 Hz) are dramatically below the norm for regulatory frequency limits and needlessly so, in the sense that they are roughly 20 dB below the threshold of perceptibility or for any kind of potential disturbance from low frequency noise. Sound levels, say, 15 dB higher in these bands would be just as inaudible and innocuous as levels that were equal to the Ordinance limits. Once below the threshold of perception going lower doesn't make any difference. Moreover, combined cycle plants in general do not generate problematic levels of low frequency noise simply because the boilers automatically act as very effective mufflers with regard to turbine exhaust noise – so there is no actual need for a restriction on the low frequency emissions from this particular type of plant<sup>1</sup>.

So why not just keep the octave band limits anyway? In all fairness, the extremely low octave band limits in the lower frequencies, which are generally comparable to the background sound levels that might be observed in a rural area (remote from any compressor stations), would most likely be technically impractical to achieve – and, importantly, would not result in any tangible improvement in community sound levels. The facility would subjectively sound exactly the same whether the plant levels were meeting the Ordinance in the lower bands or were 5 to 10 dB over, as currently predicted. The short answer is that a waiver would be fair and reasonable.

## **Start-up Noise and Abatement**

At the April 28<sup>th</sup> informational board meeting I made it a point to publically detail and emphasize the very significant noise issues associated with start-up and shutdown noise at plants that use air cooled condensers. The objective of doing that was to make it painfully clear to Invenenergy that they would have to take steam turbine bypass noise extremely seriously and do whatever was necessary to mitigate this noise to the point of insignificance so that compliance with the 43 dBA Ordinance limit could be maintained through starts and stops. Based on Mr. Hankard's testimony at the June 20<sup>th</sup> hearing I believe that message has been received and I am convinced that this noise will be adequately brought under control. The details of how that will actually be accomplished are not up to me nor should they be a concern of the town.

---

<sup>1</sup> Gas turbine installations that do not employ boilers to capture heat from the turbine exhaust, on the other hand, commonly produce severe and disturbing levels of low frequency noise. This certainly appears to be the case with the simple cycle gas turbines driving compressors at the Spectra facility. Low frequency noise limits are of paramount importance for such plants.



Notwithstanding this favorable outcome, a misunderstanding has somehow arisen that this noise cannot be controlled because I said that I have not seen an ACC plant with a quiet steam turbine bypass system. That is true but it does not mean that it cannot be successfully attenuated. It is simply a matter of motivation and proper design – and the motivation is now in place in terms of Invenergy's written commitment to maintaining compliance with the Ordinance limit of 43 dBA under all operating conditions and the town's now-abundant awareness of the issue. As far as design goes there are essentially two approaches that could be taken to ensure - in advance - that bypass noise will be properly controlled:

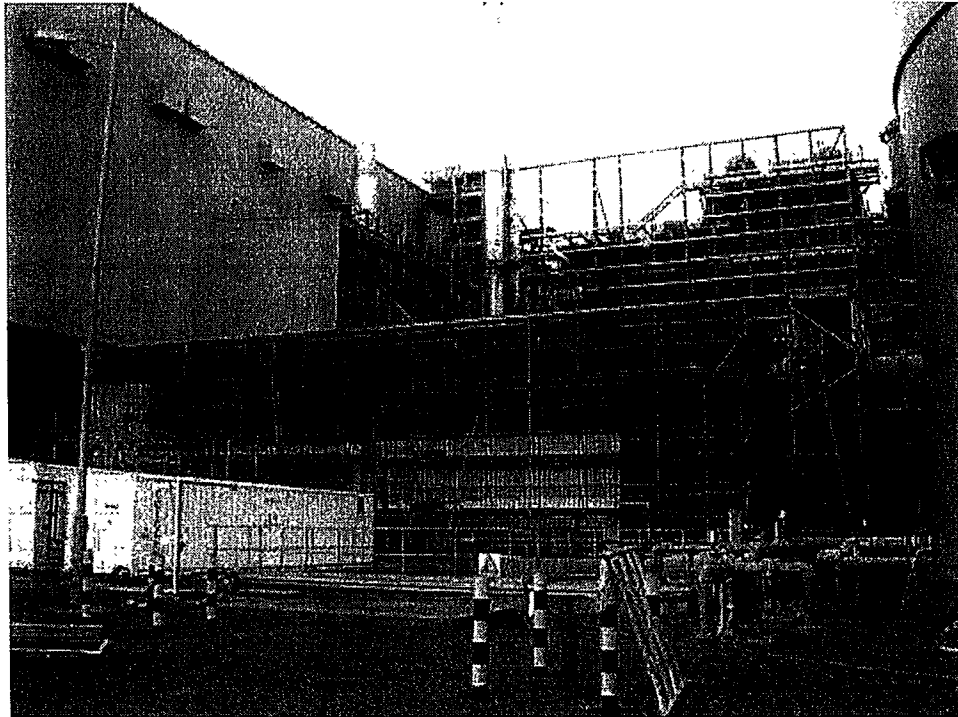
#### *Field Verification*

The current noise guarantee from the bypass valve supplier (Control Components, Inc.) is a maximum sound pressure level of 82 dBA outside the steam duct opposite the valves during bypass and lower values at other points downstream. In order to verify this guarantee I would suggest field testing an installation using similar or representative valves and diffusers, if such a test can be worked out with CCI and the plant. If the actual performance conforms to the guaranteed value then appropriate noise mitigation can be designed (probably lagging only) to bring the overall system sound power down to the allowable value determined from the facility noise model. If the actual performance is higher than 82 dBA then the system noise abatement can be designed to whatever the higher level is.

#### *Assume Worst-Case*

If a field test is impractical then I would ignore the guarantee and assume that the steam duct sound level will be in the 95 to 100 dBA range during bypass (based on past first-hand measurements of ducts using CCI low noise valves). The mitigation required for such a situation would probably involve a free-standing rigid enclosure over the initial (Figure 1) or entire horizontal run and lagging on the vertical risers. However, the appropriate amount of attenuation for each section or component must be calculated through analytical modeling.

If field testing or design assumptions suggest an enclosure, it should be built along with the rest of the plant and not held back as a potential retrofit, since that would create a period during which start-up noise would presumably be non-compliant.



**Figure 1** ACC Steam Duct Enclosure Under Construction

### **Compliance Guarantees**

Several comments from the public asserted that the company would violate the Ordinance noise limit without concern for any civil economic penalties and largely without fear that the town would sue. I cannot and do not wish to speak for Invenergy but in my experience working for numerous engineering, procurement and engineering (EPC) firms the town's noise requirements will be passed through as a contractual requirement to the company that actually designs and constructs the plant. It is this underlying contractual requirement that, I believe, will ensure that the noise emissions from the plant are compliant because the EPC contractor will do everything possible to avoid paying liquidated damages for defaulting on a contractual requirement. If some noise source is not properly mitigated it will be quickly fixed to avoid this financial penalty.

Above and beyond this it is my understanding that failure to comply would ultimately lead to a cease and desist order from the State, which, clearly, would not be an option for Invenergy.



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NOISE CONTROL ENGINEERING FOR POWER GENERATION AND INDUSTRIAL FACILITIES

Of course, please let me know if you have any questions.

Sincerely,

David M. Hessler, P.E., INCE  
Principal Consultant  
Hessler Associates, Inc.

TAB 5C



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August 8, 2016

Mr. Michael Wood  
Burrillville Town Manager  
105 Harrisville Main St.  
Harrisville, RI 02830

Reference: L-2024-080616-0

Subject: Invenergy Clear River Energy Center  
Invenergy Peer Review Responses on Noise and Community Noise Impacts

Dear Mr. Wood:

We have reviewed Invenergy's recent responses to the peer review comments on noise and consider them satisfactory.

In particular, they have agreed or otherwise provided assurances that:

- The noise emissions from the completed plant will be measured as a condition of the construction contract to demonstrate that the facility is compliant with the effective Town Ordinance noise limit of 43 dBA under all operating conditions<sup>1</sup>. The testing will be monitored by the lender's independent engineer to verify the validity of the test results and permission has been granted for any parallel or additional testing that may be desired by the Town.
- They will pursue, as recommended, a field test of an existing facility with a similar steam turbine bypass system in order to witness and measure the actual acoustical performance of the low noise valves planned for the CREC project -- rather than rely entirely on the valve supplier's noise guarantees -- so that an appropriate acoustical design for the system can be developed during the design phase of the project.

---

<sup>1</sup> This specific performance has been previously guaranteed in writing by Invenergy in earlier data request responses and in subsequent oral testimony.



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- They will take whatever appropriate steps are required to adequately mitigate noise during steam turbine bypass to maintain compliance with the nighttime Ordinance noise limit. The decision on Invenergy's part to only erect an enclosure over the ACC steam duct if testing at a prototype plant or credible field data from the valve supplier indicates that it is necessary is considered a reasonable approach. Our suggestion to build it as a precaution was only in the event that no pre-construction verification measurements could be taken to ascertain ahead of time what the sound emissions were going to be. However, in the event that such measurements are not possible and the sound emissions are higher than currently estimated, we would expect that a noise enclosure or other appropriate retrofit mitigation has been pre-designed and is ready to install immediately.
- In general, we believe the point has been made with regard to transient noise and that Invenergy has been adequately alerted to the extreme significance of steam turbine bypass noise and will act accordingly to successfully mitigate it.

Because compliance with the Town Ordinance at the nearest residences will be a contractual obligation of the engineering, procurement and construction (EPC) contractor and, in addition, a requirement that must be satisfied as a condition of the loan to finance the project, it appears to be a virtual certainty that the plant's noise emissions will meet the town's overall nighttime noise limit of 43 dBA. As explained in our supplemental comments letter to the Town dated July 7, 2016, there is no need to require compliance with the octave band noise limits also contained in the Ordinance because doing so would not make the plant any less audible but, importantly, would impose an essentially unachievable condition on the project. This recommendation is not in any way an endorsement of the project but simply the right and fair approach from a completely impartial technical viewpoint. The overall Ordinance limit of 43 dBA in and of itself is an appropriately protective noise limit for this particular facility because its low frequency sound emissions will be inherently insignificant.

Of course, please let me know if you have any questions.

Sincerely,

David M. Hessler, P.E., INCE  
Principal Consultant  
Hessler Associates, Inc.

TAB 5D



Mike McElroy <mcelroymik@gmail.com>



**Fwd: Invenergy's Responses to the RIDOH Draft Advisory Opinion - Attached**

1 message

David Hessler <davidhessler@earthlink.net>

Wed, Aug 10, 2016 at 7:30 AM

Reply-To: david@hesslerassociates.com

To: Michael McElroy <Michael@mcelroylawoffice.com>

Cc: "Michael C. Wood" <mcwood@burrillville.org>, Oleg Nikolyszyn <nikolyszyn@gmail.com>, Tom Kravitz <tkravitz@burrillville.org>

Mike,

I've read through Invenergy's responses to the RIDOH's Advisory Opinion on noise issues and think the rebuttals are generally valid and acceptable. Right now and probably well into the future the real community noise issue is the compressor station. The CREC plant, when designed to comply with the effective Town noise limit of 43 dBA, will be a minor contributor that won't significantly change or increase what is actually heard at the surrounding residences. That's really the simple bottom line. The only thing I would disagree with is Invenergy's assertion that the addition of new, presumably more modern and well-designed, gas turbines will lead to decreased sound emissions from the compressor station. I think the opposite is true, which would only make the compressor station noise more dominant, further burying noise from the CREC. While there may be many potentially adverse impacts from the CREC (water, traffic, ammonia, etc.), noise really isn't one of them. That issue has been dealt with. The focus now should be on seeing what can be done about the clearly excessive noise from the compressor station.

Regards,

David



**TAB 5E**



Mike McElroy &lt;mcelroymik@gmail.com&gt;

**Re: Burrillville octave band waiver question**

1 message

**David Hessler** <davidhessler@earthlink.net>

Tue, Aug 16, 2016 at 9:57 AM

Reply-To: david@hesslerassociates.com

To: Michael McElroy &lt;Michael@mcelroylawoffice.com&gt;

Cc: Tom Kravitz &lt;tkravitz@burrillville.org&gt;, "Jeffrey Partington (jeffreywpartington@gmail.com)"

&lt;jeffreywpartington@gmail.com&gt;, "Michael C. Wood" &lt;mcwood@burrillville.org&gt;, Oleg Nikolyszyn &lt;nikolyszyn@gmail.com&gt;

Mike,

The main reason the octave band limits do not need to be enforced is that the low frequency sound emissions from a plant of this particular type (combined cycle) are typically inconsequential and below the threshold for any kind of disturbance, in terms of human audibility or the perception of vibrations, even a short distance beyond the plant fence. That is not the case, however, with the existing compressor station, which is essentially a simple cycle gas turbine power station only without the electrical output (the turbines drive gas compressors instead of generators). Consequently, the low frequency sound emissions in the immediate vicinity of the CREC site are already rich in low frequency noise from the Spectra turbine exhausts and the addition of the CREC won't substantially change or increase the low frequency sound levels in any meaningful way. That means that any potential impact on wildlife from low frequency noise, if there is one, is already present. I have never heard of any such sensitivity in animals, but that's not to say it doesn't exist. By the way, based on the model projections, the higher frequency sound emissions from the CREC are expected to be below the Town Ordinance limits; i.e. in compliance, at the nearest houses. It is only the lower frequencies (<250 Hz) that may exceed the extremely (unnecessarily) low town limits.

David M. Hessler, P.E., INCE  
Principal



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On 8/16/2016 5:58 AM, Michael McElroy wrote:

David:

Last night the Planning Board met. A motion was made to waive the octave band limits for the facility. During discussion on the motion, some members of the Planning Board said they did not feel they had enough information to vote on the waiver. They said they understood that the waiver would have no detrimental effect on humans based on your input, but did not know if granting the waiver would have any detrimental effect on wildlife in the area. The motion was then withdrawn and the Planning Board will consider the issue again next Monday evening.

Can you address in writing for me (an email is fine) whether granting the octave band waiver would result in any detrimental effect on wildlife in the area?

TAB 5F



Mike McElroy &lt;mcelroymik@gmail.com&gt;

**Re: FW: Low Octave Band Noise (LFN) report**

1 message

**David Hessler** <davidhessler@earthlink.net>

Mon, Aug 22, 2016 at 3:02 PM

Reply-To: david@hesslerassociates.com

To: Tom Kravitz &lt;tkravitz@burrillville.org&gt;

Cc: "Michael McElroy (Michael@mcelroylawoffice.com)" &lt;Michael@mcelroylawoffice.com&gt;, "Jeffrey Partington (jeffreywpartington@gmail.com)" &lt;jeffreywpartington@gmail.com&gt;, Chris Langlois &lt;clanglois@burrillville.org&gt;

Tom,

I received an e-mail the other day from what appeared to be the parent of college student who was doing some sort of research on power plant noise and its abatement. The parent said they had contacted numerous other acoustical engineering firms for insights on the subject and that, because they were all greedy and callous, none had responded and that the daughter was very disillusioned. I thought that last bit was touching and sad, so I took some time on Sunday to reply with some basic information and, in particular, stated that combined cycle plants don't normally produce any kind of problematic levels of low frequency due to the presence of HRSG's - and why that is. I now see it was all an underhanded trick to dig up some failing on Invenergy's part to mitigate low frequency noise from the CREC project - and I wish I had my Sunday afternoon back.

I stand by all my previous conclusions and recommendations on the matter of the Town's octave band limits. The fundamental situation is that even if the plant could be built to meet all the octave band limits including the lowest bands, which is doubtful purely from a technical feasibility perspective, it would not make the plant any less audible or prevent an otherwise adverse impact from low frequency noise. The low frequency sound emissions from the CREC would be insignificant in this environment even if the compressor station did not exist, and will be extremely insignificant relative to what are probably some very high existing levels of low frequency noise from the compressor station gas turbine exhausts. If any adverse health effects were going to occur they would already be occurring. Nor have I ever heard of any health issues from gas turbine noise. After having just skimmed the "report", I would say that Ms. Slocum's conspiratorial fears about this matter are completely misplaced and overblown.

Regards,

David M. Hessler, P.E., INCE  
Principal



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On 8/22/2016 12:35 PM, Tom Kravitz wrote:

David, Is there any information here that would change your thoughts from your most recent email of 8-16-2016?