

RHODE ISLAND DEPARTMENT OF HEALTH



Energy Facility Siting Board Advisory Opinion: Burrillville Interconnection Project

February 15, 2018

1.0 SUBMISSION OVERVIEW

On September 15, 2017, the Rhode Island Energy Facility Siting Board (EFSB) issued the “Preliminary Decision and Order for the Narragansett Electric Company d/b/a National Grid and Clear River Energy, LLC's Joint Application to Construct the Burrillville Interconnection Project in Burrillville, Rhode Island (SB 2017-01).” In that document, the EFSB ordered the Rhode Island Department of Health (RIDOH) to “render an informational Advisory Opinion of the potential public health concerns relating to the biological responses to power frequency, electric, and magnetic fields associated with the operation of the proposed transmission project.” Advisory opinions for this project must be submitted to the EFSB by March 15, 2018. This document is RIDOH’s response to the EFSB Order.

2.0 CONTENT OUTLINE

Due to the specificity of the Order and the limited scope of this project, the discussion in this document is limited to the public health implications of exposure to electromagnetic fields (EMF) associated with the proposed interconnection project.

3.0 CONTACT INFORMATION

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4.0 INTRODUCTION

The Applicants are proposing to construct a dedicated 6.8-mile-long, 345 kV transmission line (the 3052 Line) connecting the Clear River Energy Center (CREC) generating plant, which has been proposed by Invenergy Thermal Developments LLC (EFSB Docket No. 2015-06), to the existing electric transmission network. The 3052 Line would be constructed within a new CREC right of way (ROW) and an existing ROW of the Narragansett Electric Company (TNEC). Two 345 kV transmission lines, designated in the application as the 341 and 347 Lines, currently operate along the TNEC ROW. The Project also includes improvements to the existing Sherman Road Switching Station, including the realignment of an approximate 260-foot span of the existing 345 kV 328 Line at the station.

The proposed 3052 Line consists of three segments:

- Segment 1, on the CREC ROW, which is 250 feet wide. This segment extends, from the CREC to the TNEC ROW (0.8 mile)
- Segment 2, on the TNEC ROW, which is 300 feet wide in this segment. This segment extends from the junction of the CREC ROW to a point 0.19 mile west of the Clear River (1.6 miles)
- Segment 3, in the TNEC ROW, which is 500 feet wide in this segment. This segment extends from a point 0.19 mile west of the Clear River to the Sherman Road Switching Station (4.4 miles)

5.0 Health Effects Associated with Exposure to Electromagnetic Fields (EMF)

Over the past several decades, a number of studies have evaluated the health implications of exposure to EMF. These studies yielded equivocal results and are of varying scientific value, depending on their subject matter, scope, and methods. To evaluate such issues, public health agencies rely on “the preponderance of the evidence,” based on careful analyses and summaries of the literature.

The most substantial evaluation of EMF health data to date was led by the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health and the Department of Energy (DOE), with input from a wide range of public and private agencies. This evaluation, known as the Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) Program, was a six-year project with the goal of providing scientific evidence to determine whether exposure to power-frequency EMF constitutes a potential risk to human health.

In 1999, at the conclusion of the EMF RAPID Program, a NIEHS report was submitted to the U.S. Congress stating that the overall scientific evidence for human health risk from EMF exposure was weak. No consistent pattern of biological effects from exposure to EMF had emerged from laboratory studies with animals or with cells. However, epidemiological studies (studies of disease incidence in human populations) had shown a fairly consistent pattern that associated potential EMF exposure with a small increased risk for leukemia in children and chronic lymphocytic leukemia in adults.

Since 1999, several other assessments have been completed. Those assessments do not support a link between EMF exposures and adult leukemias, but do support a possible association between childhood

leukemia and exposure to power-frequency EMF. However, such associations were not seen consistently. According to the National Cancer Institute:¹

Numerous epidemiologic studies and comprehensive reviews of the scientific literature have evaluated possible associations between exposure to non-ionizing EMFs and risk of cancer in children. (Magnetic fields are the component of non-ionizing EMFs that are usually studied in relation to their possible health effects.) Most of the research has focused on leukemia and brain tumors, the two most common cancers in children. Studies have examined associations of these cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the workplace. No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found.

For both childhood and adult leukemias, interpretation of the epidemiological findings has been difficult due to the absence of supporting laboratory evidence or a scientific explanation linking EMF exposures with leukemia. The NCI summarizes the findings of studies exploring potential biological mechanisms for a link between exposure to 60 Hz (extra low frequency or ELF) magnetic fields and cancer as follows:

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.

Another difficulty with interpreting EMF research is that EMFs are ubiquitous in modern society, making it difficult to estimate a person's exposure to EMFs over time. EMFs are emitted by a variety of sources, including a number of sources in and near homes and workplaces, such as electronic and electrical equipment, building wiring and power lines. Therefore, potential dose-response relationships of EMFs to cancer can only be measured very crudely, using broad categories of exposure intensity. 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.

The NCI also states that “Studies of animals have not provided any indications that exposure to ELF-EMFs is associated with cancer.” Note that, in 2016, the National Toxicology Program (NTP) of the NIEHS published preliminary results of a large-scale study in rodents of exposure to radiofrequency energy (the type used in cell phones). The NTP summarized key points from that report as follows:²

- The nomination for NTP to study cell phone radiofrequency radiation was made by the U.S. Food and Drug Administration.
- These are the largest, most complex studies ever conducted by NTP.

¹ National Cancer Institute, “Electromagnetic Fields and Cancer,” <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet#q3>

² <https://ntp.niehs.nih.gov/results/areas/cellphones/>

- For the studies, rats and mice were exposed to frequencies and modulations currently used in cellular communications in the United States. The rodents were exposed for 10-minute on, 10-minute off increments, totaling just over 9 hours a day from before birth through 2 years of age.
- NTP found low incidences of tumors in the brains and hearts of male rats, but not in female rats. Studies in mice are continuing.
- NTP has provided these findings to its federal regulatory partners to enable them to have the latest information for public health guidance about safe ways to use cellular telephones and other radiofrequency radiation emitting devices.
- Previous human, observational data collected in earlier, large-scale population-based studies have found limited evidence of an increased risk for developing cancer from cell phone use.

Note that the applicability of these results to ELF-EMF exposures, such as those associated with power lines, is not known.

In short, epidemiological studies of the chronic health effects of exposure to EMFs have yielded only one possible link—between EMFs and childhood leukemia. This link is poorly understood, because no analogous link has been found for adults and because childhood leukemia is rare. In Rhode Island between 2005 and 2014, an average of 11 cases of leukemia (all forms of leukemia) were newly diagnosed each year among residents aged 0-19. Based on the weak association between EMFs and leukemia found in some (but not all) of the studies, the World Health Organization (WHO) estimated that EMFs from all sources may cause between “0.2% to 4.9% of the total annual incidence” of childhood leukemia cases³. In Rhode Island, this translates to a maximum of one case of childhood leukemia every two years across the entire State that may be linked to exposure to EMFs from all sources. Since most of that exposure is associated with household devices and wiring, it is very unlikely that the additional EMF generated by the transmission lines connecting to the CREC facility would cause an increase in the number of children who develop leukemia in the State.

Concerns have also been raised about electromagnetic hypersensitivity (EHS). People identifying as being hypersensitive to EMF report a variety of symptoms, including redness, tingling, and burning sensations in the skin; fatigue; difficulty with concentration; dizziness; nausea; heart palpitations and digestive disturbances. While some individuals report mild symptoms that are manageable by avoiding EMF as best they can, others are so severely affected that they make dramatic changes to their lifestyles.

The WHO convened a workshop in 2004 to evaluate scientific studies on EHS and concluded that “well controlled and conducted double-blind studies have shown that symptoms were not correlated with EMF exposure” and that “the majority of studies indicate that EHS individuals cannot detect EMF exposure any more accurately than non-EHS individuals.” Although the WHO acknowledged that the symptoms reported by affected individuals are real, the organization suggested that those symptoms may be caused by other environmental conditions, such as flickering fluorescent lights, glare, or poor indoor air quality, or by other factors.⁴

³ WHO, Extremely Low Frequency Fields, Environmental Health Criteria Monograph No.238,

http://www.who.int/peh-emf/publications/elf_ehc/en/

⁴ World Health Organization, “Electromagnetic Fields and Public Health: Electromagnetic Hypersensitivity,” 2005. <http://www.who.int/peh-emf/publications/facts/fs296/en/>

6.0 International EMF Standards and Guidelines

The International Commission on Non-Ionizing Radiation Protection (ICNIRP), an international agency recognized by the WHO, recommends that the general public's exposure be limited to 2,000 mG for magnetic fields and 5 kV/m for electric fields. Those guidelines were developed following a review of all the peer-reviewed scientific literature on EMF biological effects that have been established to have health consequences, including both thermal and non-thermal effects. The WHO review concluded that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health.⁵

7.0 EMF Impacts from Proposed Project

The maximum predicted magnetic and electric field impacts at the edge of the ROWs for each segment, as presented in the application, are shown in Table 1 for the existing lines (Lines 341 and 347) and the proposed configuration (Lines 341, 347 and 3052). Note that electric fields were modeled with all lines operating at maximum voltage and magnetic fields were modeled with the 3052 line at full capacity and the other lines operating both under peak and average loading conditions.

Table 1 – Impacts by Segment

Segment	Maximum Magnetic Field (mG) ICNIRP Guideline = 2,000 mG		Maximum Electric Field (kV/m) ICNIRP Guideline = 5 kV/m	
	Existing	Proposed	Existing	Proposed
1	N/A	84	N/A	1.7
2	34	69	1.2	1.3
3	8.4	12	0.1	0.4

Field strengths on the ROWs and 100 feet beyond the boundary of the ROWs are not presented in this application. However, those impacts were presented in information supplied to RIDOH in response to a data request concerning the CREC application ((EFSB Docket No. 2015-06), Those impacts are:

Table 2 – Impacts by Location

Location	Maximum Magnetic Field (mG) ICNIRP Guideline = 2,000 mG		Maximum Electric Field (kV/m) ICNIRP Guideline = 5 kV/m	
	Existing	Proposed	Existing	Proposed
On ROW	204	372	7.5	7.6
Edge of ROW	34	84	1.2	1.7
100 feet from edge of ROW	6.6	17	0.1	0.2

⁵ WHO webpage on EMF Standards and Guidelines, <http://www.who.int/peh-emf/standards/en/>

8.0 Summary and Conclusions

The proposed addition of the 3052 Line will increase the strength of magnetic fields and slightly increase the electric fields at the edge of the ROWs in each segment. However, even with those increases, the maximum impacts at the edge of the ROWs are considerably lower than the ICNIRP guidelines, and thus are unlikely to be associated with health impacts at or beyond the boundaries of the ROWs. The maximum predicted magnetic field on the ROWs is more than four times the maximum at the edge of the ROW, but is still considerably lower than the ICNIRP Guideline level. The maximum electric field on the ROW (7.6 kV/m) exceeds the ICNIRP Guideline (5 kV/m); however, as long as public access to that area is limited, it would not pose a public health threat.

Therefore, based on the impact calculations presented by the Applicants and a review of available health information, RIDOH concludes that electromagnetic fields associated with the proposed Project will have negligible or no impact on public health.

ATTACHMENT A

SB-2017-01 Burrillville Interconnection Project Service List as of 10/12/2017

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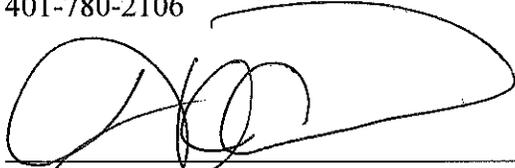
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CERTIFICATE OF SERVICE

I hereby certify that, on the 15th day of February 2018, I filed this Energy Facility Siting Board Advisory Opinion: Burrillville Interconnection Project, Docket No. SB-2017-01 (i) in hard copy via first-class mail to the person listed below and (ii) electronically to the persons listed on Attachment A.

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