



Department of Health

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Providence, RI 02908-5097

TTY: 711
www.health.ri.gov

September 15, 2009

Elia Germani, Chairman
Energy Facility Siting Board
89 Jefferson Blvd. Warwick, RI 02888.

Dear Mr. Gemani,

Attached is the RI Department of Health response to the request from the Rhode Island Energy Facility Siting Board to, *“render an informational advisory opinion on the potential public health concerns relating to biological responses to power frequency electric and magnetic fields associated with the operation of the Project. In particular it should review and comment on the report from Exponent (Appendix B to the ER)”*.

If you have any questions, please do not hesitate to contact me by phone (401-222-7766) or email (Robert.Vanderslice@health.ri.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Robert R. Vanderslice".

Robert R. Vanderslice, PhD
Healthy Homes and Environment Team Lead

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PUBLIC UTILITIES COMMISSION

September 15, 2009

BACKGROUND

On 19 December 2008 the RI Energy Facility Siting Board issued a **Preliminary Decision and Order** with regard to Docket No. SB-2008-02 [Narragansett Electric Company d/b/a/ National Grid (Rhode Island Reliability Project)]. Section VII.B.iii. of the Order requests HEALTH to “*render an informational advisory opinion on the potential public health concerns relating to biological responses to power frequency electric and magnetic fields associated with the operation of the Project. In particular it should review and comment on the report from Exponent (Appendix B to the ER)*”. NOTE: “Appendix B to the ER” references an Exponent, Inc. report titled Electric and Magnetic Field Research Update: Rhode Island Reliability Project, and dated 6 August 2008.

1. The Executive Summary (Page iii) of the Exponent report correctly identifies the primary public concerns regarding potential health effects of exposure to EMF: “*Childhood leukemia has remained the focus of EMF and health research, although epidemiologic and laboratory investigations have studied many other diseases, including other cancers in children and adults, neurodegenerative diseases, reproductive health effects, cardiovascular diseases, and suicide and depression*”.
2. The Executive Summary (Page iii) of the Exponent report also notes that the current consensus of scientists who have conducted reviews of the large body of peer-reviewed literature regarding potential health effects of exposure to EMF is that “*no cause-and-effect relationship between EMF and health has been established at the levels generally found in residential and occupational environments*”. Section 6 (Pages 34-43) of the Exponent report provides an extensive bibliography of the peer-reviewed literature that was evaluated in reaching this conclusion. The public health implications of epidemiology studies showing apparent associations between EMF and childhood leukemia (or other health effects) are unclear because these findings are not supported by evidence from animal or mechanistic studies.
3. Chapter 5 (Page 32) of the Exponent Report presents a Summary of EMF and Human Research and utilizes the following citation from a June 2007 WHO Report [Environmental Health Criteria 238 - Extremely Low Frequency Fields]: “*Acute biological effects have been established for exposure to ELF electric and magnetic fields in the frequency range up to 100 kHz that may have adverse consequences on health. Therefore, exposure limits are needed. International guidelines exist that have addressed this issue. Compliance with these guidelines provides adequate protection. Consistent epidemiological evidence suggests that chronic low intensity ELF magnetic field exposure is associated with an increased risk of childhood leukemia. However, the evidence for a causal relationship is limited, therefore exposure limits based upon epidemiological evidence are not recommended, but some precautionary measures are warranted*”. Chapter 13 of the referenced WHO report presents a detailed analysis of possible precautionary measures that may be undertaken.

Subsection 13.3.2 of the cited WHO Report notes that “*There is scientific uncertainty as to whether chronic exposure to ELF magnetic fields causes an increased risk of childhood leukemia. In addition, given the small estimated effect resulting from such a risk, the rarity of childhood leukemia, the rarity of average exposures higher than 0.4 μ T and the uncertainty in determining the relevant exposure metric, it is unlikely that the implementation of an exposure limit based on the childhood leukemia data and aimed at reducing average exposure to ELF magnetic fields to below 0.4 μ T, would be of overall benefit to society*”. Chapter 13 also notes other “precautionary policies” that have been implemented in various jurisdictions including: New lines must be buried unless technically infeasible and there must be buffer zones near residential areas, schools, day care facilities and youth

camps [Connecticut]; Increased distance between power lines and places where children can spend significant amounts of time to ensure that their mean exposure will not exceed $0.4 \mu\text{T}$ [Netherlands]; and No- or low-cost alterations to the design or routing if substantial field reduction (more than 15%) can be achieved (using 4% of project cost as benchmark) [California PUC]. These policies go beyond the guidance of national and international standard setting organizations with expertise in this area.

4. Depending on the various literature and measurements referenced, the EMF field strength has been reported in units of both Gauss (mG) and Tesla (μT). The June 2007 WHO report referenced in Item 3 above notes the following: *The SI unit of magnetic flux density is the tesla (T). Older literature, especially American, often uses the Gauss (G) [$1 \mu\text{T} = 10^{-4} \text{ G}$ ($1 \mu\text{T} = 10 \text{ mG}$)].* Therefore $0.4 \mu\text{T}$ would be equivalent to 4 mG.
5. Rhode Island, along with most other states, has not established any standards regarding maximum magnetic field intensity at the edge of an electric transmission line right of way. Only Florida (150 mG/15 μT) and New York (200mG/20 μT) have established maximum magnetic field intensity levels under maximum load conditions. Most of the member states of the European Union (EU) subscribe to the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1000 mG/100 μT (50 Hz) or 830 mG/83 μT (60 Hz) guideline, although lower values are imposed (under local authority) in some EU countries under certain circumstances.
6. The data in Tables 8-2 (Annual Average Load) and 8-3 (Annual Peak Load) of the Rhode Island Reliability Project Environmental Report – Volume 1 [Vanasse Hangen Brustlin, Inc, September 2008] specify calculated magnetic field levels (mG) at both the east and west edges of the right of way for eight (8) specified cross section points. Calculated values are provided for pre-construction (2012), post-construction (2012) and post-construction (2017). The highest calculated value is 65 mG (6.5 μT) at the west edge of the right of way (pre-construction 2012) for cross section 5. However, it is my understanding that this calculated value represents estimated field intensity even if the project is not undertaken. The highest calculated value that would represent projected magnetic fields after completion of the project is 44.9 mG (4.5 μT) at the same location (post-construction 2017).
7. A requested supplemental filing (NG-25) to Docket No. SB-2008-02, submitted by National Grid on 16 July 2009, also provided calculated magnetic field levels (Average Annual Load & Average Peak Load) at one hundred (100) feet beyond both the east and west edges of the right of way for same eight (8) specified cross section points. The highest calculated values that would represent projected magnetic fields after completion of the project are 6.1 mG (0.6 μT) at one hundred (100) feet beyond the west edge of the right of way and 6.6 mG (0.7 μT) at one hundred (100) feet beyond the east edge of the right of way, with both of these intensities also projected for cross section 5 (post-construction 2017).

RECOMMENDATIONS

- A. The Exponent report appears to include an extensive (although not necessarily exhaustive) review of the relevant peer-reviewed literature regarding potential public health concerns relating to biological responses to power frequency electric and magnetic fields associated with the RI Reliability Project. The Exponent report also provides an appropriate summary of the recommendations contained in this peer-reviewed literature.
- B. Although Rhode Island has not established any standards regarding maximum magnetic field intensity at the edge of an electric transmission line right of way, the projected magnetic field intensities at the edge of the right of way for the RI Reliability Project all appear to be within any enforceable standard that would be applicable in either Florida or New York, as well as the current European Union (EU)/International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline. The Rhode Island Department of Health does not have the technical expertise to independently recommend any alternative standard regarding maximum magnetic field intensity at

the edge of an electric transmission line right of way, and would not make such a recommendation in the absence of appropriate guidance from national and/or international standard setting organizations with technical competence in this area.

- C. The Exponent report provides detailed technical evaluations of several controversial issues, including: 1) the interpretation of the International Agency for Research on Cancer classification of EMF as a *possible human carcinogen*, 2) the lack of uniformity between different jurisdictions' regulations of EMF, especially the inconsistencies between Rhode Island and Connecticut, and, 3) the health impacts of EMF exposures within residential neighborhoods, especially low-income or minority neighborhoods with existing environmental justice and equity concerns. Technical evaluations may not be adequate to address the risk communication challenges that affect public perception of risk. Prior to public discussion of this project, special attention to risk perception/communication factors may be warranted for at least the three issues listed above.