

July 21, 2016

RE: Eversource, Seacoast Reliability Project Application

To Whom It May Concern;

Upon having the opportunity to thoroughly review the provided materials, I take exception to Exponent, Inc's "Current State of Research on Extremely Low Frequency Electric and Magnetic Fields and Health" report, commissioned and paid for by the applicant, Eversource and submitted to the New Hampshire Public Utilities Commission in support of Eversource's application for the Seacoast Reliability Project (SRP). The report raises many questions and concerns for the families who will be directly and immediately impacted by the SRP as it traverses their properties/ROW's. I find numerous faults with the report and am not willing to risk the future health of my children and family on inconclusive data on a possible human carcinogen.

The report's Summary (page 52) states:

"In conclusion, recent studies when considered in context of previous research do not provide evidence to alter the conclusion that ELF EMF exposure at the levels we encounter in our everyday environment including transmission lines is not cause of cancer or any other disease process."

When reading through the report in detail however, many references are outlined speaking directly to the still *inconclusive* evidence that ELF EMF exposure may have on disease. The least of which is the World Health Organization's (WHO) "overall classification of ELF as a possible human carcinogen (WHO, 2007, p. 347)". (page 18 of Exponent's report)

The report's Summary (page 52) also states:

"The conclusions of the most recent review of the European Union's SCENIHR, released in March 2015, are consistent with those of the 2007 WHO report..."

Along with keeping the overall classification of ELF as a "possible human carcinogen", the 2007 WHO report concluded:

"Two pooled analyses reported an association between childhood leukemia and TWA magnetic-field exposure >3-4mG (Ahlbom et al., 2000; Greenland et al., 2000); it is this data, categorized as limited epidemiologic evidence, that resulted in the classification of ELF magnetic fields as possibly carcinogenic by the IARC in 2002." (page 18 of Exponent's report)

These statements appear to be counter to the Summary by Exponent.

Page 19 of the report states:

"The WHO concluded that reconciling the epidemiologic data on childhood leukemia and the negative experimental findings (i.e., no hazard or risk observed) through innovative research is *currently the highest priority in the field of ELF EMF research.*"

I would like to point out that "(i.e., no hazard or risk observed)" are Exponent's words. It is difficult for one to agree with that statement when the IARC defines ELF EMF as a possible human carcinogen and the WHO believes more research is the "highest priority in the field".

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Comment submitted by
Matthew Fitch.

The report continues on page 19 to say:

“Given that few children are expected to have average magnetic-field exposures greater than 3-4mG, however, the WHO stated that the public health impact of magnetic fields on childhood leukemia would likely be minimal, if the association was determined to be causal.”

What is failed to be conveyed here is that this particular statement, from my perspective, refers to *my children*. While it quietly sweeps aside the fact that *IF* ELF EMF are determined to cause childhood leukemia (something that has not yet been fully proven or disproven), the impact would likely be “minimal”. I perceive that statement as cold, heartless and callous. My children and family reside within feet of the proposed transmission line and its associated ELF EMF radiation. The impact is anything but minimal to us and frankly, as it is deemed a possible human carcinogen, it poses an unreasonable adverse effect on public health and safety.

Further supporting the World Health Organizations classification is the International Agency for Research on Cancer (IARC) who classifies possible human carcinogens as **Group 2B** carcinogens. ELF and EMF share this list with agents such as:

- Chloroform
- Diesel Fuel
- Engine Exhaust
- Gasoline
- Lead
- Nitromethane
- Human Immunodeficiency Virus - HIV
- Human PapillomaVirus - HPV

Along with dozens more.

Eversource has also provided a report titled “Electric and Magnetic Fields Summary” that identifies various estimates regarding the ELF EMF radiation associated with the proposed SRP. I would like to reiterate that these are all estimates based on calculation “methods described in the Electric Power Research Institute’s *AC Transmission Line Reference Book*”. (page 5 of Eversource’s Electric and Magnetic Fields Summary) This report does not reference any actual, current measurements of ELF EMF throughout any part of the proposed SRP. These estimates for post project completion, specifically for the Durham Point Road to Little Bay Launch (where my residence is), are calculated from a low of **5.14mG** for an Average Annual Load to a high of **34.6mG** for a Maximum Annual Peak Load (Attachment A Tabulated Summaries of EMF Calculations from the Eversource Electric and Magnetic Fields Summary). These are all above and/or far above the 3-4mG exposure that the WHO references as having “an association between childhood leukemia and TWA magnetic-field exposure”.

The fact that all of these estimates are above the WHO’s 3-4mG exposure reference point for childhood leukemia is alarming. Compounding that is the fact that only *estimates* are used in the first place. The Exponent report continually points to the difficulty in estimating ELF EMF radiation and frequently discounts results from the studies cited in the report due to using similar estimates in their findings. The report also contradicts itself in multiple areas at once citing a method or metric as a “poor predictor” while subsequently referencing it used in an “improved model”. Few *actual ELF EMF measurements* are referenced in any of the materials provided pertaining to ELF EMF radiation.

I have attached a list of (16) instances that reference poor quality data and/or estimates used within various studies cited throughout the Exponent report. (Attachment A to this document)

The report continually references the difficulty in estimating ELF EMF exposures – over a dozen times. The report also appears to use this identified difficulty in a biased way to achieve its ultimate conclusion. If a study recognized a link between ELF EMF radiation and a disease, the report discounted the methods used as “a known poor predictor” of exposure. In this particular instance, the distance from power lines was identified as a “poor predictor”.

However, the report will then contradict itself when convenient to again further its conclusion. For example:

One excerpt referencing a study with inconclusive or negative results says:

“The authors used an improved model to predict exposure...(including) proximity to residential address.” (page 24, Swanson et al. (2014b))

While another that found a statistically significant connection between ELF EMF and breast cancer says: “Risk of female breast cancer showed no association with distance to power lines or with estimated magnetic fields.” (page 28, (de Vocht, 2013))

Throughout the report, the studies cited rarely utilize *actual* ELF EMF measurements. When actual measurements are cited, there is frequently a biological response, negative or otherwise that indicates ELF EMF exposure has some effect on the human body. Hence the continued classification of it being a possible human carcinogen.

Some examples of actual measurements referenced in, and quoted from, the report:

“Over a decade ago, two studies received considerable attention because of a reported association between peak magnetic-field exposure greater than 16mG and miscarriage” (page 33, Reproductive and developmental effects)

“...average exposure was assessed using 24-hour personal magnetic-field measurements” (page 33, Reproductive and developmental effects)

“There is some evidence for increased risk of miscarriage associated with measured maternal magnetic-field exposure” (page 34)

“...the authors reported an association with maximum magnetic-field values measured in the alleys in front of the homes.” (page 34, Recent Studies (August 2012 to November 2014))

“The measured magnetic-field levels were reported as statistically significantly higher among the cases than among the controls.” (page 34, Recent Studies (August 2012 to November 2014))

“...statistically significantly increase among 28 newborns 48 hours after being taken out from incubators with assumed elevated ELF EMF exposure, but not among the 28 control newborns who were not in incubators” (page 34, (Bellieni et al., 2012))

With all of the references to “estimates” throughout the report, the contradictory statements and biological effects noted when actual measurements are taken, there is a need to focus on the various diseases and statements within studies that speak to a potential link to ELF EMF radiation.

Childhood Leukemia

“...reported poorer survival among cases of childhood leukemia with increased average exposure to magnetic fields, suggesting the magnetic fields play a role in the progression in the disease following diagnosis” (page 24 (Schuz et al., (2012))

“...the association between childhood leukemia and magnetic fields observed in some studies remains unexplained. Thus, the results of recent studies do not change the classification of the epidemiologic data” (page 25, Assessment)

Breast Cancer

“Overall, the authors estimated a slight, but statistically significant association between breast cancer and ELF magnetic-field exposure” (page 29, (Chen et al., (2013))

“The combined analysis showed a statistically significant association between male breast cancer and exposure to ELF EMF” (page 29, (Sun et al., (2013))

Brain Cancer

“The authors, however, reported an association for both brain cancer types with exposure in the 1 to 4 year time-window prior to diagnosis.” (page 31, (Turner et al., 2014))

“...an association cannot be ruled out *entirely* because of remaining deficiencies in exposure assessment methods” (page 31, Assessment)

Adult Leukemia (ALL)

“...some studies reporting a positive association between measures of EMF and leukemia” (page 32)

“In some sub-analyses, however, the authors reported a statistically significant association for ALL.” (page 32, Recent studies (August 2012 to November 2014))

“...in some sub-type sub-analyses statistically significant associations were noted for acute myeloid leukemia and follicular lymphoma” (page 32, (Koeman et al. (2014))

“While the possibility that there is a relationship between adult lymphohematopoietic malignancies and magnetic-field exposure still cannot be ruled out” (page 33, Assessment)

Reproductive and developmental effects

“Over a decade ago, two studies received considerable attention because of a reported association between peak magnetic-field exposure greater than 16mG and miscarriage” (page 33, Reproductive and developmental effects)

“There is some evidence for increased risk of miscarriage associated with measured maternal magnetic-field exposure” (page 34)

Neurodegenerative diseases

“Early studies on ALS, which had no obvious biases and were well conducted, reported an association between ALS mortality and estimated occupational magnetic-field exposure.” (page 36)

“The majority of the more recent studies discussed by the WHO reported statistically significant associations between occupational magnetic-field exposure and mortality from Alzheimer’s disease and ALS” (page 36)

Throughout the report, Exponent verbally undermines the findings of the studies by furthering dialogue with statements that reference the inadequacies of the various studies as mentioned above. The problem however, is any references to ELF EMF potentially impacting health are cast aside to reach the report’s conclusion that ELF EMF radiation causes no long-term adverse health effects.

In Section 6 of the report, titled “Consensus Reviews by Scientific Organizations”(page 49), the report sums with the following:

“In summary, over the past decades, reviews published by scientific organizations using weight-of-evidence methods have concluded that the cumulative body of research to date does not support the hypothesis that ELF EMF causes any long-term adverse health effects at the levels we encounter in our everyday environments. An evaluation of current research does not point to better quality or stronger evidence that would change these assessments.”

The problem with this statement is reflected in the words: “levels we encounter in our everyday environments.” The families affected by the SRP who reside within feet of the transmission lines will have a dramatically different “everyday environments”.

Exponent provided Eversource with a graph (Figure 2 – Measured Magnetic Fields Recorded during Typical Daily Activities (Bethel, CT), page 3 of “Electric and Magnetic Fields Summary”) that shows various readings in mG throughout a typical day. The graph makes no mention of when the meter-wearer was near or around transmission lines similar in nature to that proposed with the SRP. The graph identifies various “bursts” of ELF EMF throughout the day at various locales however, it again does not identify a reading of what may be comparable to a household similar to a Durham family’s who will be affected by the SRP. Again, the “typical daily activities” or “everyday environments” for the family’s affected by the SRP could potentially be dramatically different than those outlined in the graph.

It seems clear that the Exponent report is biased with a goal of furthering the SRP application approval. Exponent is a compensated third party, commissioned and paid by Eversource to produce the findings in the report. Under the “Limitations” section of the report (page vii) Exponent states: “No guarantee or warranty as to future life or performance of any reviewed condition is expressed or implied.” Upon being paid for developing the report, Exponent has absolutely no liability whatsoever if their summary and/or conclusions are wrong. The townspeople affected by the SRP however, will suffer a life time.

Clearly the evidence remains inconclusive in the realm of ELF EMF radiation hence its current classification of a possible human carcinogen. Based on the evidence in the report of ELF EMF possibly being harmful to humans, I believe it poses an unreasonable adverse effect on public safety and health. Durham New Hampshire has stepped forward before and fought against major, powerful institutions that put their own agendas before the public welfare of the town's residents. We focus on the fragility of our local ecosystems and employ various protections out of an abundance of caution. Similarly, the negative, long term human effects that could potentially arise from the proposed SRP, which will be a permanent, always-on system, must be addressed with a comparable abundance of caution. The long term health and livelihood of the impacted town's residents is potentially at stake.

Consider this: The IARC and WHO did not conclude Secondhand Smoke causes cancer until May 28, 2004. How many decades and years of inconclusive research transpired before then? How many people suffered and/or died during that time frame?

I would like to ask the committee to consider several proposals in light of the evidence outlined in the reports provided.

- 1) Block and/or deny the approval of the SRP in its entirety per NH RSA 162-H:16, iv, (c) due to its unreasonable adverse effect on public health and safety
- 2) In lieu of blocking and/or denying approval, enforce a condition of approval that ALL SRP transmission lines within 300 feet of residences be mandatorily shielded and underground
- 3) In lieu of blocking and/or denying approval, enforce a condition of approval that ALL residences within 300 feet of SRP transmission lines have actual, measured, pre-project ELF EMF readings of their properties for a period of no less than 30 days by a third party, selected by the town(s), paid for by Eversource, prior to application approval (all measurement data must be supplied to the town(s) and homeowners directly affected by the SRP 90 days prior to 6/13/17)
- 4) In lieu of blocking and/or denying approval, enforce a condition of approval requiring a third party, selected by the town(s), paid for by Eversource, to take actual, measured ELF EMF readings for a comparable transmission line of equal voltage, in both above ground and underground segments within a range of 300 feet for a period of no less than 30 days, prior to application approval (all measurement data must be supplied to the town(s) and homeowners directly affected by the SRP 90 days prior to 6/13/17)
- 5) In lieu of blocking and/or denying approval, enforce a condition of approval requiring Eversource to prove and otherwise guaranty that post-project completion actual measurement data of ELF EMF readings taken by a third party, selected by the town(s), paid for by Eversource within a range of 300 feet of the transmission lines on the properties of affected homeowners be at or below pre-project actual measurements or the 3-4mG threshold identified by the WHO as having an association between childhood leukemia and magnetic-field exposure, whichever is greater. Measurements must be taken within 30 days of SRP completion and activation at full capacity of the transmission line
 - 5a) In the event Eversource fails to maintain the pre-project actual measurement or 3-4mG threshold identified by the WHO in post-project measurements, Eversource shall be required to

compensate the affected households at a rate of \$1 million per permanent household member no later than 60 days after final measurements are taken

To summarize, the fact that there is inconclusive evidence to determine the true biological effects on the human body and the possibility that ELF EMF radiation can cause serious, fatal diseases at the levels identified by Eversource for the SRP, I would like to see the project denied in its entirety. Potentially risking human life, those of the community's families and childrens long term health, is not worth the benefits of this project. If there is a known better, safer alternative with minimal impact to the community's at stake and health and welfare of the community members, I personally would be happy to review and support that alternative based on the merits.

Thank you,

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Attachment A

Numerous references to poor quality data and/or estimates used within various studies cited in the Exponent report (all page numbers are from the Exponent report):

"All of these studies, however, relied on distance to power lines as their main exposure metric, which is known to be a poor predictor of actual residential magnetic field exposure." (page 23)

"They concluded that reliance on postcode without the exact address, which may be the case for some of the study subjects in epidemiologic studies, are probably not acceptable for accurate magnetic-field assessment in the subjects' homes." (page 23)

"The limitations of the study include the use of wire code categories to assess exposure, which is known to be a poor predictor for actual magnetic-field exposure" (page 25)

"...with distance to power lines or with estimated magnetic fields. Following publication, the study received criticism regarding its exposure assessment, exposure categorization, and the potential for confounding" (page 28)

"It is, however, limited in exposure assessment because risk was not calculated by magnetic-field exposure levels, and incidence rates were compared to an external reference group." (page 29)

"...showed no association with the level of estimated ELF magnetic-field exposure" (page 29, Koeman et al. (2014))

"...showed no significant increase with either distance or estimated magnetic-field levels..." (page 31, The Elliot et al. (2013))

"...estimated cumulative, recent, and distant occupational exposure to ELF EMF." (page 31, Sorhan (2014a))

"While an association still cannot be ruled out *entirely* because of remaining deficiencies in exposure assessment methods..." (page 31, Assessment)

"The data remain inadequate as reported earlier (EHFRAN, 2012)." (page 31, Assessment)

"Reliance on distance to power lines and using the postal code for address information is a major limitation of the study's exposure assessment." (page 34, (Auger et al., 2012))

"The limitations of the study include its reliance on distance for exposure assessment..." (page 34, (de Vocht et al., 2014))

"Distance from the nearest power line to the residential address...The study, however, was limited by the methods used for the exposure assessment." (page 36, (Frei et al., 2013))

"The recent studies continue to be limited by uncertainties about the estimates of magnetic-field exposure...the difficulty of identifying a relevant exposure window...the difficulty of estimating

magnetic-field exposure...lack of consideration of both residential and occupational exposures” (page 38, Assessment)