DOE F 1325.8
(12-84)

United States Government

Department of Energy

memorandum

DATE: November 2, 1987

REPLY TO ATTN OF: EH-25

SUBJECT: Approval of the Addendum to the Final Environmental Impact Statement for the New England/Hydro-Quebec Phase II Interconnection (DOE/EIS 0129F)

TO: Marshall A. Staunton
Administrator
Economic Regulatory Administration

This is in response to the October 21, 1987, memorandum from Robert L. Davies, Director, Office of Fuels Programs, requesting concurrence in the subject addendum. Shortly after approval of the subject final Environmental Impact Statement (EIS), two studies were released which deal with the possible linkage between magnetic fields produced by transmission lines and childhood cancer. As a result of these studies, which received wide publicity, our staffs mutually decided that the EIS would not be released until the studies could be reviewed and their significance to the EIS assessed.

This review has been completed and indicates that the basic conclusions in the EIS regarding health effects of AC magnetic fields do not need to be altered. However, an addendum to the EIS was prepared which references the studies and addresses their relevance to this proposal. This addendum is intended to supplement Section 4.1.8.2 of the EIS. Based on my staff's review and analysis and their recommendations and after consultation with the Office of General Counsel, I have determined that the addendum adequately addresses the issue and is hereby approved as part of the EIS.

Mary L. Walker
Assistant Secretary
Environment, Safety and Health

October 1987

Addendum
to
New England/Hydro-Quebec ± 450 kV Transmission Line Interconnection -- Phase II Final Environmental Impact Statement (DOE/EIS-0129F)

In July 1987, a report entitled "Biological Effects of Power Line Fields" was released by the New York State Power Lines Project Scientific Advisory Panel. One area covered in this report is the relationship between small magnetic fields produced by alternating current (ac) power lines and childhood cancer. The report reviewed previous research in this area and analyzed the results of a new study entitled "Case-Control Study of Childhood Cancer and Residential Exposure to Electric and Magnetic Fields" which was commissioned by New York State and conducted by Dr. David A. Savitz, Ph.D. This study by Dr. Savitz produced results consistent with those obtained in an earlier study (Wertheimer and Leeper 1979) in which the suggestion of a statistical correlation between low-level ac magnetic fields and childhood cancer, itself a very rare event, was indicated. Dr. Savitz found that children exposed to ac magnetic fields of 0.0025 gauss (G) and greater might be 1.5 to 2.0 times as likely to contract cancer as children in lower exposure categories.

DOE planned on publishing this final EIS during August 1987 but stayed distribution of the document until the New York State report and Dr. Savitz's study could be reviewed and evaluated. After having completed these evaluations, DOE believes that neither document presents sufficiently convincing results to establish a possible link between low-level, ac magnetic fields and childhood cancer. Furthermore, both the New York State Report and Dr. Savitz (in the attached letter) point out that there is no known biophysical mechanism which could explain how magnetic fields might cause cancer.

Although the results of Dr. Savitz's study do not constitute reliable evidence of a link between magnetic fields and cancer, an analysis was performed to determine the number of additional cancer cases that might be expected if Dr. Savitz's estimates of risk elevation are correct. This addendum is intended to supplement the discussion of ac magnetic fields contained in Section 4.1.8.2 (pages 4-33 and 4-34).

From information submitted by the applicant in the Environmental Report (ER Vol. 5B, pp. II-11 thru II-14), the point at which the existing ac transmission lines would produce a magnetic field of 0.0025 G or less was determined. This level of magnetic field was chosen because it was at field strengths of 0.0025 G or greater that Dr. Savitz obtained the highest correlation with cancer.

For the Sandy Pond to Millbury right-of-way, this point was approximately 400 feet from the eastern edge of the right-of-way. This "0.0025 G point" was then calculated for the right-of-way configuration with the proposed line in service. Based on the information available in the ER, no discernible increase in distance could be determined. However, in order to come up with a worst case analysis, it was assumed that the "0.0025 G point" would be extended by 100 feet from the eastern edge of the right-of-way.

From land use data submitted in the applicant's comments on the draft EIS, it was determined that approximately 57 homes are located between 400 to 500 feet from the eastern edge of the right-of-way.

A similar analysis was performed for the Millbury to West Medway right-of-way. This analysis indicated that the "0.0025 G point" would be extended from 300 feet from the southern edge of the right-of-way to approximately 500 feet, thus potentially exposing approximately 43 additional homes to magnetic fields greater than 0.0025 G.

Assuming a child population of 2 per household, a total of approximately 200 children may be exposed to magnetic fields of 0.0025 G or greater from construction of the proposed 345 kV ac lines.

In the attached letter from Dr. Savitz, he notes a naturally occurring rate of childhood cancer of 1 in 10,000. If one assumes Dr. Savitz's highest risk factor of 2.0, this would result in a total of 0.04 cancers, or an increase of 0.02 above the naturally occurring rate of 0.02 in a population of 200. This is an immeasurable effect when one considers, as Dr. Savitz notes in the attached letter, that the population in general is likely to be exposed to other known contributors to cancer.

It should be noted that there is no way of calculating the actual exposure of each household along the right-of-way without actual in-house measurements. Furthermore, this analysis does not account for other sources of magnetic fields to which each home may be exposed. This analysis is only valid if one assumes that the proposed 345 kV ac lines are the sole contributor of the magnetic field exposure along the right-of-way -- an unlikely event. No estimate of the additional effects on residences already exposed to magnetic fields greater than 0.0025 G could be made because the dose/response function is not known and no clear gradient in dose/response was evident from Dr. Savitz's results.

Therefore, the results of these studies do not suggest that the public health would be adversely affected by the magnetic fields produced by the proposed ac transmission lines.

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To: Persons concerned about reports of electromagnetic fields and childhood cancer

From: David A. Savitz, Ph.D.
Department of Epidemiology
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The recent publicity concerning our study of childhood cancer and electromagnetic field exposure has resulted in a number of inquires regarding my judgment of the appropriate response by individuals. This memo reflects the best information which I can offer at the present time.

As indicated in the press coverage, our study suggests a link between prolonged magnetic field exposure from electric power lines near residences and risk of childhood cancer. It should be kept in mind, however, that we have not proven that magnetic fields cause cancer. Subsequent research will indicate whether we are on the right track or whether our results are in error. Thus, there is a suggestion of a possible hazard which has yet to be resolved. Given these circumstances, it seems that interest or concern may be justified, but our study is not sufficiently convincing to warrant drastic action by homeowners. Ultimately, the response to this type of information (possible, but unproven hazard) requires an individual judgment about risk, much as the decision regarding suspected dietary hazards, flying in airplanes, or drinking alcohol or coffee reflects differing individual judgments.

If it is learned, eventually, that magnetic fields do increase risk of childhood cancer, this would be of great concern as a public health issue. Nonetheless, childhood cancer is fortunately a very rare event, with about 1 in 10,000 children developing cancer. If the risk really were 1.5- to 2-fold greater among persons with elevated magnetic field levels, the risk would be 1.5 or 2 cancers in 10,000 children. Again, this would be very important, but minor relative to childhood injuries or risks from known cancer hazards to adults such as cigarette smoking or asbestos exposure.

The question has also been raised regarding what an individual can do to reduce magnetic field exposures. Unfortunately, the magnetic fields from electric power lines are not easily reduced. Magnetic fields readily penetrate building materials, so that the exposure level is determined by the current flow in the nearby power lines and the proximity of the residence to those lines. The further away one is, the lower the exposure. The only readily changed personal exposure to magnetic fields would be through avoidance of electric blankets or heated waterbeds. The question of what distance from what types of power lines is "safe" is really not answerable: We don't yet know with certainty that any distance is unsafe. If there are health effects from magnetic fields, there is no firm basis for estimating at what level of exposure risk is increased. In our data from the Denver area, high exposure was defined based on levels above 2-3 milligauss, a unit of magnetic field strength. These exposure levels are related to the type of power line, current flow, and distance but there is no simple way to determine what the exposure will be from the wires near a given home.

I recognize that this information fails to answer the question of whether there is a health hazard from power lines and what an appropriate response should be. At the present time, the first question is unresolved so that the individual's response can only be based on his or her best judgment with the existing uncertainty.