STATE OF CONNECTICUT

SITING COUNCIL

Re:	The Connecticut Light and Power Company and The United Illuminating Company Application for a Certificate of Environmental Compatibility and Public Need for the Construction of a New 345-kV Electric Transmission Line and Associated Facilities Between Scovill Rock Switching Station in Middletown and Norwalk Substation in Norwalk, Connecticut Including the Reconstruction of Portions of Existing 115-kV and 345-kV Electric Transmission Lines, the Construction of the Beseck Switching Station in Wallingford, East Devon Substation in Milford, and Singer Substation in Bridgeport, Modifications at Scovill Rock Switching Station and Norwalk Substation and the Reconfiguration of Certain Interconnections	)	Docket 272
		)	July 19, 2004

APPLICANTS' RESPONSE TO COUNCIL'S INTERROGATORY CONCERNING "BUFFER ZONE" DETERMINATIONS PURSUANT TO PUBLIC ACT 04-246

A. INTERROGATORY

By notice of July 1, 2004, the Council has requested that parties and intervenors respond to the following interrogatory:

> Provide a description of "buffer zone" for the proposed 345-kV transmission line including but not limited to the following criteria: maximum specific milliguass, minimum specific distance, and maximum specific tower height pursuant to Public Act 04-246, An Act Concerning Electric Transmission Line Siting Criteria.

The Applicants are responding to this interrogatory by this brief of counsel.

B. STATUTORY PROVISION

In pertinent part, Public Act 04-246 (the "Act") amends section 16-50p(a)(4)(C) of the Public Utilities Environmental Standards Act ("PUESA"), which specifies findings

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that the Council must make with respect to the overhead portions of any electric transmission line that it approves. As amended, this section now requires that such "overhead portions...of the facility...are to be contained within an area that provides a buffer zone that protects the public health and safety, as determined by the council." (P.A. 04-246, § 3 (amending Conn. Gen. Stat. § 16-50p(a)(4)(C)).

The Act provides the following guidance as to how that "buffer zone" determination is to made:

> In establishing such buffer zone, the council shall take into consideration, among other things, residential areas, private or public schools, licensed child day care facilities, licensed youth camps or public playgrounds adjacent to the proposed route of the overhead portions and the level of the voltage of the overhead portions and any existing overhead transmission lines on the proposed route. At a minimum, the existing right-of-way shall serve as the buffer zone... (Id.)

Additional guidance is provided earlier on in section 16-50p(a), as amended by the Act, which provides:

> The council shall not grant a certificate...unless it shall find and determine:...(2) the nature of the probable environmental impact of the facility...alone and cumulatively with other existing facilities, including a specification of every significant adverse effect, including, but not limited to, electromagnetic fields.... (Id.)

C. SHORT ANSWER

The "buffer zone" finding required by Public Act 04-246 (the "Act") is a factual determination that is specific to the Docket in which the finding is made. In making this finding, the Council must be guided by its own evaluation of the evidence as to whether EMF associated with electric transmission lines affects "public health and safety;" and it must base its buffer zone determination on all of the record evidence that it finds credible.

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In this Docket, the Council may and should find that no buffer zone beyond the existing right-of-way is required to protect the public health and safety because there is no scientific basis for concluding that EMF associated with electric transmission lines is unsafe. Nevertheless, the Council may decide to evaluate the buffer afforded by an existing right of way on a precautionary – or "prudent avoidance" basis. In any case, the Council's evaluation of the sufficiency of the existing buffer – and whether any additional buffer should be required – should take into account multiple variables that are specific to the approved overhead portions of electric transmission lines, including:

- The magnetic fields likely to be produced by the line, if built using conventional line designs, estimated using reasonable assumptions as to likely future line loads;
- Field reductions achievable through the use of the Council's EMF Best Management Practices in the design of the line;
- The cumulative magnetic fields that would be produced by the proposed line together with those produced by other lines on the same right-of-way, including increases or decreases in the field levels that would likely to be associated with the existing lines if the proposed lines were not built.
- Distances from the line, as it will be constructed, to each adjacent use of special statutory concern, i.e. "residential areas, private or public schools, licensed child day care facilities, licensed youth camps or public playgrounds"
- The nature and extent of the probable use of each such facility by children;
- The likely magnetic field exposure to children using the adjacent facilities from the line as approved;
- The likely magnetic field exposure to children using the adjacent facilities from any existing facilities on the proposed right-of-way, in the event that the new facility were not constructed in that location.

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The Council should make the determination as to whether an existing right-of-way will provide an adequate buffer zone, or whether an additional "buffer" will be required, in the same way that it makes the other findings required by Section 16-50p (such as, for instance, that the approved line "will serve the interests of system economy and reliability"); that is, on the basis of a consideration of all of the relevant evidence and facts found in the particular docket concerning the particular facility.

There is nothing in the Act that requires the Council to establish buffer zones by rules or regulations of general application – or to adopt criteria that apply uniformly to the entire length of an overhead line, including such criteria mentioned in the Council's Interrogatory as; "maximum specific milliguass, minimum specific distance, and maximum specific tower height."

In the remainder of this response, the Applicants provide detailed support for this "Short Answer." Separately, by testimony and documentary evidence already presented and to be presented, the Applicants will demonstrate to the Council that, with respect to the proposed overhead sections of this project, the existing right-of-way will provide an adequate buffer zone for the proposed line for all locations.

D. DISCUSSION

1. The buffer zone evaluation is a factual determination to be made on the specific facts of the docket, as to which the council has broad discretion, and it is similar to determinations that the Council has frequently made.

The findings required by section 16-50p(a) are findings of fact, as to which the Council has broad discretion, and which must stand so long as they are supported by substantial evidence in the record. Conn. Gen. Stats. § 4-183; *see*, Sielmen v. Connecticut Siting Council, 36 Conn.

L. Rptr. 400, 2004 WL 20-3046 (2004). Fundamentally, the addition to section 16-50(p) of a requirement that the Council find that an approved line will be contained within a buffer zone (which may be the existing right of way) so that "public health and safety" will be protected adds little to the pre-existing fact-finding requirements of the PUESA. Since PUESA was enacted, the Council has been required to find, with respect to any electric transmission line that it certifies, "that the location of the line will not pose an undue hazard to persons or property along the area traversed by the line." Conn. Gen. Stats. § 16-50p(a)(5).

Pursuant to this requirement, the Council has been evaluating EMF research for years in the context of ruling on applications for electric transmission lines and substations. A brief review of some of the Council's conclusions on this subject since the EMF / health effects issue first came to public attention provides a striking demonstration that (notwithstanding the heat and publicity with which claims have been made in this Docket) the Council's consistent evaluations of EMF science remain valid and current today:

For many years, the Council has evaluated EMF health effects research in the course of determining that proposed electric facilities would not present an undue hazard to persons and property along the certified route. See, for instance:

> Although the Council believes that the involuntary risks of living nearby a source of electric and magnetic fields should be minimized, there is insufficient evidence for the Council to conclude that this proposed line or other transmission lines in the State are hazardous to human biological health. Such implications remain an open issue, still debated within the regulatory and scientific communities. (Opinion, Docket No. 105, Reconstruction of Stevenson-Newtown-Plumtree 115-kV Line Aug. 30, 1989, at 4)

> [T] here is insufficient evidence at this time to conclude that the proposed transmission line or the electric and magnetic fields that would emanate from the line would be detrimental to human health.

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(Opinion, Docket No. 141, Construction of a 115-kV Line between Pequonnock Substation in Bridgeport and Ely Ave. Junction in Norwalk, Sept. 18, 1991, at 3; *and see* Findings of Fact ¶¶ 128-145 concerning EMF)

Although magnetic fields of 2 mG are not unusual in homes, the state of scientific knowledge at this time does not permit firm judgments about possible adverse effects of extremely low frequency magnetic fields on human health. Absolute proof of the occurrence of adverse effects of such fields at prevailing magnitudes cannot be found in the available evidence, and the same evidence does not permit a judgment that adverse effects could not occur...
(Findings of Fact, Docket No. 153, Construction of Sandy Hook Substation, April 7, 1993, at 3)

In Braun v. Connecticut Siting Council, Sup. Ct. J.D. Htfd. At Manchester, No. CV 89-0367916, Memorandum of Decision d. March 14, 1990 (Copy attached as Exhibit A hereto.) the court affirmed the Council's issuance of a certificate for the reconstruction of the Stevenson – Newtown – Plumtree 115-kV transmission line to increase its current carrying capacity, and rejected the argument that the Council could not make the required "no undue hazard" finding, when it was stipulated there is "some evidence based upon epidemiological studies which suggests that [transmission line] magnetic fields may have an adverse effect on health, although this is still open for debate in the scientific community."

The Act does not diminish the Council's fact finding discretion, but indeed emphasizes it, by characterizing the buffer zone as one that will "protect... the public health and safety, *as determined by the council.*" P.A. 04-246, § 3 (emphasis added)

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2. *The "buffer zone" contemplated by the Act is unambiguously a separation between the transmission line and adjacent uses. It is not a separation between the edge of the right of way and adjacent uses.*

The finding required by the Act is that the overhead portion of the "facility" or "electric transmission line" will be contained within a "buffer zone," which will be at a minimum, the "existing right of way." P.A. 04-246, §3; Conn. Gen. Stats. § 16-50i(a) (definition of "Facility"). The words of the statute do not admit of the construction – now urged by some – that the "buffer" must be imposed between the edge of the existing right-of-way and adjacent uses. This is so for at least two reasons: (1) the overhead "facility" for which the buffer is required is, by statutory definition, the transmission line, not a right-of-way; and (2) if the buffer were to start at the edge of the existing right of way, there would be no way in which "the existing right-of-way" could "***serve*** as the buffer zone." (emphasis added). Since the text of the Act is clear in this respect, no resort to extrinsic evidence of "legislative intent" is permissible. Public Act 03-154.[1]

A right of way is, by its very nature, a "buffer zone." As the Council found in Docket No. 97 (Reconstruction of Farmington – North Bloomfield 115-kV Line):

> Safe distances between line conductors and residences are governed by the National Electric Safety Code. The 115-kV conductors, when blown sideways by 60 m.p.h. transverse winds, are not permitted to be closer than 10.67 feet to a structure. This is determined for the maximum span length associated with a given line design. A 29-foot, 6-inch standstill separation between outer conductors and right-of-way edges proposed by NU would be sufficient to meet this requirement for the proposed line.

[1] "The meaning of a statute shall, in the first instance, be ascertained from the text of the statute itself and its relationship to other statutes. If, after examining such text and considering such relationship, the meaning of such text is plain and unambiguous and does not yield absurd or unworkable results, extratextual evidence of the meaning of the statute shall not be considered." P.A. 04-246 § 1

(Id., Findings of Fact, Jan. 30, 1989, ¶ 134)

The question that the Council must now determine is not whether the right of way provides a buffer zone, but whether, the buffer that it provides with respect to each of the statutory uses along the right of way is sufficient for the purposes of protection against any health hazards from EMF that it finds proven, given the anticipated field strengths, the location of the use and the lines with respect to one another, and the anticipated use of the property.

One important consequence of the statutory requirement that the right of way provide a buffer to certain "adjacent" uses is that the area of the right of way itself can no longer be devoted to those uses. Since structures have never been permitted in the right of way, the principal impact of this development will be that use of the right of way for activities by "youth camps" and "public playgrounds" will have to be terminated. In general, the owner of land subject to a transmission line easement may not use it for any purpose that is incompatible with the transmission use for which the easement was granted. The legislature has now determined that use of the area within the easement for youth camps and playgrounds is incompatible with the transmission use.

In a few cases, structures of adjacent statutory uses, such as residences or schools, may encroach into the existing right of way. Such encroachments are similarly incompatible with the "buffer zone" requirement, and are usually explicitly forbidden by the terms of CL&P's easements. Moreover, the landowner can not acquire the right to maintain encroachments in the right of way by prescription or adverse possession. Conn. Gen. Stats. 16-237. Accordingly, in these instances, CL&P will comply with the buffer zone requirement by enforcing its easement to require that the encroaching portions of the structures be removed from the right of way.

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3. *The Council must base its buffer zone evaluation on its own determination of the health risks of EMF exposure.*

As noted above, the Act states that the buffer zone shall be one that "protects the public health and safety as determined by the council." P.A. 04-246, §3 (amending § 16-50p(a)(4)(C)). The text of the bill thus recognizes that the legislature has delegated to the Council the responsibility for evaluating the extent, if any, to which the public health and safety requires protection against EMF exposure. Legislative deference to the Council is even more explicit in the legislative history of the Act. The bill that became P.A. 04-246 was reported to the House by Rep. Terry Backer, co chair of the Energy and Technology Committee, whose remarks during the floor debate of the bill represent the most reliable extrinsic source of the intent of the legislature in passing the bill.[2] In responding to a query from another representative, Rep. Backer said emphatically: "What is the extent of the exposure of EMFs and what potential harm

[2] Since the text of the Act does not make unambiguously clear how the specified adjacent uses are to be "take[n] into consideration," in evaluating buffer zones, resort to other indicia of legislative intent is permissible. Public Act 02-154. Statements made on the floor of the legislature by the chair of the legislative committee that reported the bill are particularly valuable indicators of legislative intent; these remarks have the same status as a favorable committee report on which the legislature acts. Bird v. Plunkett, 139 Conn. 491, 504 (1953); *and see* Manchester Sand and Gravel Co. v. Town of South Windsor, 203 Conn. 267, 275, 276 (1987); Computaro v. Stuart Hardwood Corp., 180 Conn. 545, 554-55, n.6 (1980). The House floor debate provides the only such source of legislative intent with respect to the Act; there was no floor debate in the Senate because the bill was place on the consent calendar In contrast to the remarks of the chair of the reporting committee during floor debate, "post-enactment views of those involved with the legislation should not be considered when interpreting the statute." Doe v. Bridgeport Police Dept., 198 F.R.D. 325, 348 n. 16 (D. Conn. 2001); *See,* Salem-Keizer Ass. v. Salem-Keizer school District, 61 P.3d 970 (Ore. App. 2003) (Rule against considering post-enactment statements of legislators to determine legislative intent is universal; such statements are not part of the legislative record on which the body as a whole acted.) Examples of such irrelevant "post enactment statements" that should not be considered are the widely divergent claims as to the legislative intent of the buffer zone requirement submitted in this docket by Rep. DelGobbo (6/18/04); Rep. Adinolfi (7/2/04); Sen. Crisco (7/12/04) and Rep. Klarides (7/15/04).

they can cause? It's going to be left to the Siting Council to define that." *See*, Appendix A hereto.[3]

Thus, the legislators made clear that it is up to the Council to determine whether a health hazard exists, and what precautions are appropriate in the face of uncertainty about risk. While the Council has heard a great deal of testimony that puts different emphases on the degree of scientific uncertainty and its significance, there is a large measure of agreement as to the scientific consensus on the potential health effects of EMF. While Dr. Cole and Dr. Aaronson expressed expert opinions of their own that power line EMF is not a carcinogen, Dr. Cole described the consensus view of the scientific community as a whole as that EMF is a "small and improbable hazard." Cole Tr. 5/13/04, at 153. The Woodbridge Jewish Organization witnesses, on the other hand, emphasize that unlike other once suspected adverse health outcomes of EMF exposure, childhood leukemia has not been ruled out by the research that has been done. However, even they do not "claim...that EMF has been established as a cause of childhood leukemia. The[ir] concern is that there are suggestions in the literature that that might be a possibility." Bell, Tr. 5/13/04 at 244; Rabinowitz, Id.) The Council need not resolve a dispute between contending batteries of experts, one of which asserts that EMF exposure has been shown to be harmful, and the other of which asserts that it has not. There is general agreement that EMF has not been shown to be harmful; the only dispute is as to the likelihood that it might be in the future. Indeed, in this respect, there is little or no relevant difference between the state of the relevant research today and its state at the time the Council made the earlier rulings

[3] A copy of the entire transcript of the floor debate on the Act is attached as Appendix A to the Applicants' "Memorandum Concerning Public Act 04-246," which has been filed together with this Interrogatory Response. Excerpts from the debate that are particularly relevant to the Council's buffer zone determinations are reproduced in Appendix A to this brief.

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described above. The principal difference is that whereas in the late 80's and early 90's, there were a whole host of health effects claimed to be possibly associated with power frequency EMF, today they have all been ruled out, with the possible exceptin childhood leukemia. Any regulatory action by the Council must be taken in that context

4. The Council's buffer zone evaluation should encourage and recognize the use of best management practices to reduce magnetic field exposure.

The Act also makes clear that the Council is to apply its EMF Best Management Practices in exercising its discretion. Thus, the Act:

- recognizes the Council's "best management practices for electric and magnetic fields for transmission lines," and requires that they be kept current with the latest research. (P.A. 04-246, § 9 (amending §16-500(c));
- stipulates that such best management practices "shall require individual, project-specific assessments of electromagnetic fields, taking into consideration design techniques including, but not limited to, compact spacing, optimum phasing of conductors, and applicable and appropriate new field management technologies": and
- requires a finding that the overhead portions of a certified transmission line is "consistent with...the council's best management practices for electric and magnetic fields for electric transmission lines." (P.A. 04-246, § 3 (amending § 16-50p(a)(4)(C)).

Moreover, the legislative history of the Act makes clear the legislature's intent that a primary objective of the buffer zone requirement is to promote the reduction of magnetic fields by the use of EMF best management practices, particularly including split phasing, and not to require specific setback distances or values. In explaining why the bill itself did not "contemplate...or dictate..." specific distances or other values for the buffer zone, Rep. Backer stressed that "no one knows what a safe level is, that has not been determined." (Debate Tr. at 269, Ex. A hereto.) He then pointed out the close connection between best management practices

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and setting buffer zones by noting: "[W]e cannot nor do we know how to engineer the various mitigation practices that might reduce EMF on sites. In other words we don't know how deep to bury it, maybe the soil has something to do with that. We don't know how to change the face [SIC] splitting in a certain area to reduce EMF. That has been left to the Siting Council with specific directions to use the best management practices for EMF." Id.

5. In evaluating the existing right of way as a buffer zone, the Council must take into account the cumulative effect of the proposed new lines on magnetic field exposures.

Two provisions of the Act direct the Council to consider the cumulative effect of new lines with those of existing lines, when evaluating magnetic fields. As noted above, the buffer zone provision itself stipulates that in making buffer zone determinations, the Council shall consider "the level of voltage of the overhead portions and any existing overhead transmission lines on the proposed route." Id., §3; and the Act requires that the Council determine the "probable" EMF impacts of the certified line "alone and cumulatively with other existing facilities." Id., § 3 (amending Conn. Gen. Stats. §16-50p(a)).

In the case of the proposed Middletown to Norwalk line, the cumulative impact of adding a new 345-kV line to existing rights of way on which a 345-kV line and (in some areas) a 115-kV line already exist is clear. As the evidence already submitted and to be submitted will establish, by the aggressive use of field reduction line designs consistent with the Council's EMF Best Management Practices, for most of the route under most conditions, the magnetic field values associated with all the lines in the right of way can be reduced (or at least not substantially increased) as compared with the magnetic fields associated with the existing lines that are likely to exist today, and the magnetic fields that would be likely to exist in the future if the new line

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were not built. This field strength reduction results from designing the new and reconstructed existing lines so as to take maximum advantage of the cancellation effect of fields produced by adjoining conductors. On the other hand, if the overhead portions of the new line were to be constructed within a new right-of-way, a new transmission line source of EMF would be created in a new location; and while that line could be designed using low EMF line design, there would be no reduction of the magnetic fields from the existing lines by the cancellation effect. Thus, construction of new overhead lines on common rights of way together with pre-existing facilities will nearly always be an effective strategy for reducing overall EMF exposures.

6. In determining the appropriate buffer zone to protect public health and safety, the Council should be guided by policy determinations of the leading health authorities of the world, as it has been in the past, and as other prominent transmission siting authorities continue to be.

In determining what regulatory response is appropriate in the face of uncertainty as to whether transmission line EMF might somehow increase the risk of childhood leukemia, the Council is not writing on a blank slate. The record of this proceeding now includes not just a comprehensive collection of the reviews and compilations of the scientific research concerning the potential health effects of EMF exposure, but also a extensive information concerning regulatory responses to that research that have been recommended, and those that have actually been adopted. *See,* e.g., "Supplemental Testimony Of Dr. William H. Bailey Concerning Passive Regulatory Responses With Respect To 60 Hz Electric And Magnetic Fields," d. May 3, 2004, and Exhibits 5 and 9 to "Supplemental Testimony Concerning Buffer Zones" of Dr. Leonard Bell, et al., d. May 11, 2004. The Council should find particularly instructive the regulatory recommendations of two prominent entities that have identified EMF as a possible cause of

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childhood leukemia – the World Health Organization and the (United States) National Institute of Environmental Health Sciences.

a. The World Health Organization

The World Health Organization (WHO) is, of course, the United Nations' specialized agency for health. The International Agency for Research on Cancer ("IARC") is the cancer research arm of WHO (Cole Tr. 5/13/04, at 150; Bell, Tr. 5/13/04, at 226). In June, 2001, an IARC working group reviewed the published scientific evidence concerning extremely low-frequency electric and magnetic fields, and concluded that extremely low frequency magnetic fields should be classified as "possibly carcinogenic to humans" under IARC's system for classifying potential carcinogens based on published scientific evidence.[4] WHO has made recommendations as to the policy responses that are appropriate, given this determination. These recommendations are set forth in a WHO "Backgrounder" on "Electromagnetic Fields and Public Health Cautionary Policies," a copy of which is provided in Exhibit B hereto.[5] The Backgrounder is short and to the point, and deserves to be read in its entirety. In this paper, WHO stresses that, while "cautionary policies regarding EMF exposure have gained popularity among many citizens, who feel that they offer extra protection against scientifically unproven risks...such approaches are very problematic in their application." WHO concluded that the insufficiency of evidence of a hazard from chronic exposure at any given level, and the lack of an understanding of the nature

[4] *See,* WHO Fact Sheet No. 263, copy provided in Ex. B to this Response. This document is in the record as Item. 32 in Appendix to Testimony of Leonard Bell, et al d. 3/16/04, WJO Ex. 1. The Council has taken Administrative Notice of the full IARC Monograph (dated 2002) reporting this conclusion; and the conclusion has been reported and discussed extensively in the application, pre-filed testimony, and cross examination.

[5] The "Backgrounder" was first published in March 2000, before the IARC Review was published. However, in its "Fact Sheet No. 263," in which it discussed the IARC conclusions, WHO reaffirmed its adherence to the policy views expressed in the Backgrounder. Id., at p. 5. A copy of this Fact Sheet is provided as Item 33 in the Appendix to the prefiled testimony of Drs. Bell, et. al, WJO Ex. 1 The WHO website continues today to identify the 'Backgrounder" as embodying WHO's policy recommendations. *See,* http://www.who.int/peh-emf/about/WhatisEMF/en/index5.html - "Precautionary Approaches."

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of the hazard, should one exist, made it impractical and inadvisable to try "to set exposure guidelines." Backgrounder, Ex. B hereto, at 5.

WHO is in favor of a "cautionary" regulatory approach, so long as it is does not make "inappropriate arbitrary adjustments to the limit values to account for the extent of scientific uncertainty." Id., at 6. As an illustration that "it is possible to introduce cautionary policies without undermining science-based standards," the WHO Backgrounder cites the policy of the New Zealand government. (Id., at 6). Along with many other jurisdictions, New Zealand has adopted EMF exposure standards that "follow the 1998 ICNIRP[6] EMF guidelines." Id. These guidelines, which recommend limiting magnetic field exposure of the general public to 833 mG[7] "are based on established health hazards of EMF exposure,[8] and have been widely adopted throughout the world.[9] While the New Zealand agency that adopted these exposure guidelines considered that they provided "adequate protection," it went on to address community concerns through a policy that the WHO Backgrounder characterizes as a form of "prudent avoidance." As described by the responsible New Zealand agency, this policy was one of minimizing "exposure which is unnecessary or incidental to achievement of service objectives or process

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[6] International Commission on Non-ionizing Radiation Protection

[7] Bailey Pre-filed Test. d. 3/16/04, App. Ex. 40, at 6; Supp. Bailey Pre-filed Test. d. 5/3/04, App. Ex. 73, at 14, and Attachment 5 thereto; Bell, Tr. 6/16/04, at 53.

[8] The ICNIRP Guidelines are "designed to avoid all identified hazards, from short and long term exposure, with a large margin of safety incorporated into the limit values." WHO Backgrounder, Ex. B hereto, at 1. However, since "ICNIRP considers the scientific information on potential carcinogenicity of ELF fields insufficient for establishing quantitative limits on exposure," as a practical matter, the standards relate to short-term exposure. WHO Fact Sheet No. 263, in Ex. B hereto, at 4. "The purpose of these guidelines is to prevent exposures to electric fields that could produce contact shocks or magnetic fields that could stimulate tissues by induced electric fields." Supp. Bailey Pre-Filed Test. d. 5/3/04, App. Ex. 73, at 6.

[9] The ICNIRP exposure guidelines have also been recommended by the National Radiological Protection Board of Great Britain and have been adopted by Belgium, the Netherlands, Germany, Sweden, France, Spain, Switzerland, Czech Republic, South Africa, Japan, United Kingdom, and Australia. (Attachment 5 to Bailey Supp. Pre-filed Test. d. 5/03/04, Applicants' Ex. 73, Attachment 5)

requirements, provided that this can be readily achieved at modest expense." (WHO Backgrounder, Ex. B hereto, at 6)

b. The National Institute of Environmental Health Sciences

The National Institute of Environmental Health Sciences is one of the National Institutes of Health. It had oversight responsibility for the EMF-RAPID program, a massive "program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to extremely low frequency electric and magnetic fields." ("NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields," Item 2 in Appendix to Pre-filed Test. Of Bell, et al., WJO Ex. 1, at i). After reviewing the results of this research, the NIEHS concluded that "ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard." Id., at 10. However, at the same time, NIEHS recommended:

> In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted...This is described in greater detail in the section *Recommended Actions.*
> Id.

The referenced recommendations, insofar as pertinent to the construction of electric transmission facilities were:

> The NIEHS suggests that the level and strength of evidence supporting ELF-EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory actions; thus, we do not recommend actions such as stringent standards on electric appliances and a national program to bury all transmission and distribution lines. Instead, the evidence suggests passive measures...NIEHS suggests that the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards...

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Id., at 37, 38.

In his transmittal letter submitting the NIEHS report to Congress, the NIEHS director again stressed that the scientific evidence justified only such "passive regulatory action." Id., Transmittal Letter.

c. The Connecticut Siting Council

Consistent with the policy approach recommended by WHO, the Siting Council has declined to adopt quantitative magnetic field exposure standards in the absence of a scientific basis for establishing them. However, since 1989, the Council's approvals of electric transmission facilities have usually included a provision such as:

> The Certificate Holder shall comply with all future electric and magnetic field standards promulgated by State or federal regulatory agencies Upon establishment of any standards, the facility granted in this Decision and Order shall be brought into compliance with such standards.
> (Docket No. 105, supra, Decision and Order 8/30/89, at 2)

See also, e.g., Docket No. 141, Decision and Order 9/18/91, at 2; Docket No. 152, Decision and Order 4/7/93, at 2, Opinion, at 3; Docket 217, Decision and Order 7/14/03, at 2. In the absence of a scientific basis for setting quantitative standards, the Council has required field reduction in sensitive locations by line designs using best management practices. Thus, for instance, in Docket 141, it approved a configuration that, by the use of compact spacing and cancellation phasing would reduce magnetic fields "by 20 to 44 percent on 80 to 85 percent of the proposed line." Id., Findings of Fact d. 9/18/92, ¶ 134.

d. Vermont Transmission Line Siting

An example closer to home of the policy approach recommended by WHO and NIEHS is provided by the thoughtful and thorough "Position Paper" of the Vermont Department of Health

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("VDH") with respect to "Magnetic Power Frequency Fields and the Velco Northwest Vermont Reliability Project," dated December 15, 2003. (Item 9 in Appendix to Supplemental Testimony Concerning Buffer Zones of Drs. Bell et al, WJO Ex. i) (the "VDH Position Paper.") The Northwest Reliability Project proposes to "bring additional 345 kilovolt ("kV") transmission facilities and other necessary improvements to New England's bulk power grid." (Montalvo Prefiled Test., OCC Ex. 1, at 2). In the VDH Position Paper, the Department of Health reviewed the "current scientific view of human health effects" related to power line EMF (Id., at 8-21, 36); analyzed exposure guidelines from safety organizations and the states (Id., at 21, 22); assessed the electric and magnetic fields that would likely be associated with the project, both with reference to the ICNIRP standard and "prudent avoidance" policies (Id., at 5- 7, 23 – 33 and Appendices A & B); and found that the line, as proposed, would be consistent with such policies. (Id., at 7, 44-48).

To estimate the existing and projected electric and magnetic power frequency along the rights of way for which the new lines were proposed, the VDH used the Bonneville Power Authority program that the Applicants have used in this Docket for calculating projected magnetic fields (Id., at 24). Calculations using both projected average loads and projected maximum continuous loading were performed. (Id., p.5) The VDH found that along some rights of way, the fields at average loading would be decreased by the new construction, and along others they would increase modestly; and that at maximum continuous loading, the fields along all of the rights of way would increase . (Id, at 5, 6). In most cases the resulting fields would be far below not only the ICNIRP standard of 833 mG. (Id., at 6, 45) but also less than the New

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York and Florida standards of 200 mG[10], which "are not health-based but are used by them to maintain the status quo."[11] (Id., at 5, 6, 22, 23). Although, in some instances the maximum projected edge of right-of-way values would be higher than 200 mG, overall, the VDH found that "the magnetic power frequency fields we have calculated for the present and proposed lines maintain the status quo." Id., at 6

After determining that the magnetic fields associated with the project would be well within the only health based standards in existence, the VDH concluded that "modifications to the NRP are not required for health reasons." Moreover, since the project would essentially maintain the status quo with respect to magnetic fields, it was consistent with Vermont's prudent avoidance policies. Id., at 6, 38.

In this case, the proposed project will do better than maintain the status quo. It will achieve a reduction in magnetic field strengths along most of the affected rights of way under most system conditions, compared to the fields that are produced today, or would be produced in the future if the existing lines were to be continued in service without the proposed new construction. Moreover, putting aside such comparisons, the absolute values of the power line fields at the edge of the right of way, and at the adjacent uses of statutory concern, will be significantly lower than those routinely approved in other states. These reductions in magnetic fields can be achieved by an unprecedented use of low EMF line design strategies. These

[10] The Florida standard includes no guideline for 345-kV lines, but prescribes edge of right of way limits of 150 mG for lines of 230 kV and lower and 200mG for 500 kV lines (250 mG for double circuit lines.) VDH Position Paper, at 23, 37.

[11] The Council has recognized these "status quo" regulations. In Docket No. 141, the Council found that, in the absence of any health based state or federal magnetic field strength regulations, "as a guide for th [e approved] transmission line construction, CL&P has determined that the State of New York interim winter standard of 200 mG at the edge of a ROW would not be exceeded by the operation of the proposed line." Id., Findings of Fact ¶ 131, 9/18/91

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general considerations, together with the detailed evidence to be presented to the Council, will establish a record that will fully support a determination by the Council that the buffer provided by the existing right of way along the overhead portions of the proposed line is sufficient to protect the public health and safety.

7. The Council Should Not Endeavor to Set a Generally Applicable Exposure Limit for Statutory Facilities.

The World Health Organization has advised against the adoption of quantitative exposure limits on a cautionary basis:

> Prudent Avoidance and other cautionary policies regarding EMF exposure have gained popularity among many citizens, who feel that they offer extra protection against scientifically unproven risks. However, such approaches are very problematic in their application. The chief difficulty is the lack of clear evidence for hazard from chronic exposure to EMF below recommended guidelines, or any understanding of the nature of a hazard should one exist...
>
> A principle requirement [for precautionary policies] is that such policies be adopted only under the condition that scientific assessments of risk and science-based exposure limits should not be undermined by the adoption of arbitrary cautionary approaches. This would occur, for example, if limit values were lowered to levels that bear no relationship to the established hazards or have inappropriate arbitrary adjustments to the limit values to account for the extent of scientific uncertainty.
> (WHO Backgrounder, Ex. B hereto, at 4, 5.)

Similarly, in explaining its decision not to require "aggressive measures" to reduce transmission line fields, the Vermont Department of Public Service explained:

> [A]dopting aggressive measures would most likely be costly and disruptive, and may ultimately turn out to be ineffective. Aggressive measures taken at this time could be ineffective for two key reasons. First, research could ultimately show that the risks to human health from magnetic fields are nonexistent or very small. Second, knowledge gained on the dose-response of magnetic fields could show that the measures that were taken to limit exposure were inappropriate or ineffective.
> (VDH Position Paper, Item 6 in Appendix to Prefiled Test. of Bell et al, May 11, 2004, at 37, 38).

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In his "Opening Statement," Dr. Ginsberg, suggested the difficulties that beset efforts to establish rational exposure standards other than those based on established health effects, when he pointed out that "uncertainties relate to exactly how to measure a group's exposure level and whether short-term spikes in exposure or the long-term average exposure is most important to health risk." Tr. 3/25/04 at 316 Nevertheless, Dr. Ginsberg suggested that the Council consider a precautionary approach "to make every effort to keep the long-term average exposure of those living near major EMF sources, for example power lines and substations, to be within a reasonably small factor, for example two-fold" of a reference "background range." Tr. 3/25/05 at 317. At the time he presented his testimony, Dr. Ginsberg's understanding of "background" levels was; "Time weight[ed] average, background levels appear to be broadly in the 1 to 5 milligauss range with most homes at or below 3 milligauss," Id; and he further understood that "studies which have shown a link to childhood leukemia suggest that groups exposed to greater than 3 milligauss may be at somewhat elevated risk." Id. The combination of these two factors caused him to suggest the goal of limiting time weighted average exposure to 6 mG. Id.

Even were the Council to embrace such a goal, that would not mean limiting transmission line magnetic fields at adjacent facilities of statutory concern to 6 mG. The time weighted average exposure is based on the individual's exposure for all hours of the day in all locations over time; and thus the transmission line exposure will almost always be averaged with lower exposures. As Dr. Bailey testified, empirical exposure assessment research has found that that the typical (median) time weighted daily exposure of children in a national survey who were under the age of 14 is 0.6 mG. For a child with such average exposure to sources other than transmission line fields, transmission line magnetic field exposures averaging 9 mG at school

would thus not increase the child's time weighted average exposure above 4 mG. Bailey Prefiled Test. d. 3/16/04, Applicant's Ex. 40, at 13. Moreover, the significance of an exposure to transmission line fields to a child's time weighted average will differ according to whether the facility adjacent to the transmission line is a residential area, a school, a day care center, a camp or a playground. For a pre-school age child, exposure at home from adjacent transmission lines will be a significant determinant of time weighted average exposure, if the transmission line field extends through the entire home, or at least the portion of the home usually occupied by the child. But exposure at a playground is likely to make little contribution to a particular child's time weighted average.

In any case, the evidence before the Council, including Dr. Ginsberg's evidence, emphasizes that any attempt to justify such an exposure limit by reference to health effects research will fail. As Dr. Ginsberg has pointed out several times, if magnetic field exposure did increase the risk of childhood leukemia, the increase in the risk would not necessarily be related to time weighted average exposure. (Tr. 3/25/04 at 316; Tr. 6/17/04, at 14) Moreover, the neat co-incidence at 3 mG of "background" levels and an excess risk suggested by Dr. Ginsberg's interpretation of epidemiology studies does not exist. First, as Dr. Ginsberg has pointed out, the 3 mG and 4 mG "cut points" reported in the various studies are necessarily somewhat arbitrary, and in his judgment;

> [W]here the association seems to be occurring is that in the Greenland META analysis they average the exposure seen in the above [4 mG] group, and it was close to six, it was about 5.7 or 5.8 milligauss that was the average level of exposure in those children that had an elevated odds ratio that was close to 2. So rather than just using the cut point, which is the bottom of the window, the average of that window was close to 6."
> (Tr. 5/12/04, at 117).

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On the other hand, background levels in the home are lower than assumed by Dr. Ginsberg in his opening statement. *See,* Exponent EMF Assessment, Application, vol. 6, Applicants' Ex. 1, at 2; "In most of our homes, background AC magnetic field levels average about 1 mG," *citing* Savitz et al, Methodological issues in the Epidemiology of electromagnetic fields and cancer. Epidemiol. Rev. 11:59-78 (1989). Indeed, in Docket No. 141, the Council found that "Background magnetic field levels in homes are around 1 mG." Id., Finding of Fact No. 130 (9/18/91).

Of course, the Council could consider simply adopting a distance standard of say, 300 feet from the edge of the right of way (as some now urge the Council to do) as an ultimate precaution, on the principle that farther away from 300 feet, the transmission line fields will completely dissipate, so that the exposure at that location will be at "background" (whatever it is.) *See,* Ginsberg pre-filed testimony d. 5/6/04, Ginsberg Ex. 5, at 2; Bell, Tr. 6/16/04, at 161. In fact, as the evidence will show, the fields associated with the proposed lines, if aggressive field reduction strategies were employed, would fall off to background within approximately 150 feet – half the distance commonly quoted for a conventionally designed 345-kv line. But, whether the arbitrary distance buffer is 300 feet or 150 feet, the consequences would be grave and much more far reaching than required by the Act. Such an arbitrary policy would almost certainly require the taking of many structures that have been built up along both sides of the right of way. The following section of this memorandum discusses the options open to the Council for increasing the buffer should it find that, in a particular case, the transmission line magnetic field exposure to an adjacent statutory facility will be unacceptable. If these options had to be used on a wholesale basis, as would be the case if a standard of 150' or 300' from the

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right of way were adopted, the required takings would be extensive. Depending on the standard adopted, the required takings, together with the other excess costs imposed by this proceeding, could make the line uneconomic.

Moreover, the effects of adopting an arbitrary distance or field strength limitation to define a buffer zone, rather than making a fact specific determination confined to this Docket, will not be limited to the lines at issue in the Docket. As discussed above, the Council has for years made provision for the potential future event that a transmission line magnetic fields might be found to have adverse health effects, so that health-based standards would be adopted. Anticipating the possibility of such event, the Council has required that facilities it approves be brought into conformity with standards that might be enacted in the future. Were the Council to now adopt a rule of general application, based not on the avoidance of proven risks, but on some kind of precautionary principle, the standard would apply to these now existing facilities as well and likely require their reconstruction or (if that were not possible) withdrawal from service, unless the conditions of the Decisions and Orders were to be modified or eliminated. By way of example, in Docket No. 141, the Council approved the construction on a right of way anticipating that magnetic field values on one side of the right of way would be 22.5 mG at average loads and 168.0 mG at maximum (STE) loading. Id., Finding of Fact ¶ 131. The anticipated magnetic fields associated with the construction approved in Docket No. 141 were similar. Id., ¶¶ 119-121. Just a year ago, in Docket 217, the Council approved overhead construction that was anticipated to result in edge of right of way fields exceeding 34 mG in some locations. Id., Findings of Fact 7/14/03, ¶ 256.

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8. *The Council's Options if It Determines that the Existing Right of Way Will Not, in Any Specific Case, Provide an Adequate Buffer Between the Transmission Lines and an Adjacent Statutory Use, Even With the Use of Low Magnetic Field Line Designs, Are Limited.*

If, in a given instance, the Council concludes that the fields that are likely to emanate from the transmission lines into an adjacent statutory structure or land use are, in light of the probable use of the adjacent facility by children, unacceptable (under whatever criteria the Council applies) then the Council must consider how it can provide for a suitable buffer. It is important to remember that construction of the new 345-kV line underground would not be an option; the structure of the Act is such that the Council will only be reviewing overhead 345-kV construction if it has been determined that underground construction of that portion of the line is not technically feasible. Conn. Gen. Stats. 16-50p(a)(1)(h), as amended by P.A. 04-246, § 7. Moreover, given the densely developed nature of most of Connecticut, it is highly unlikely that a completely different overhead right of way, adjacent to no statutory facilities, could be identified and developed.[12] That being the case, the universe of possibilities for increasing the width of the buffer beyond the existing right of way appears to be:

- widening the right of way on the side away from the adjacent statutory use, if there is available open land;
- providing for a deviation of the right of way, if open land is available, such as the "Durham bypass;"
- making room on the right of way by relocating facilities other than the 345-kV lines, such as an existing 115-kV line;
- widening the right of way notwithstanding that taking of homes or other structures will be required.

[12] In any case, the development of a new right of way when an existing right of way is available would violate the Federal Power Commission "Guidelines for the Protection of Natural Historic Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities," with which the Council is required to comply. Conn. Gen. Stats. § 16-50p(a)(3)(C).

The last course of action could include taking the structure or land where the statutory use is carried on. In such a case, the property owner would receive just compensation for the taking. In effect, the statutory use, or a portion of it, would be relocated rather than the transmission line. Obviously, any such drastic actions would go far beyond any "prudent avoidance" step that has been endorsed by authorities such as WHO, or that has been taken by any other utility or siting authority.

E. CONCLUSION

The Council should determine whether the right of way provides an adequate "buffer zone" on a site specific basis, considering whatever factors it deems relevant, but including at least: the scientific evidence (or lack thereof) that such fields are harmful; the change that the new construction will make in existing transmission line fields; the strength of the magnetic fields from the lines that will extend into any of the listed statutory facilities within or adjacent to the right of way; the nature of the use of that facility by children; and the degree to which the fields have been reduced by the application of EMF Best Management Practices. The Applicants submit that in virtually all cases in this Docket, the existing right of way will be found to provide adequate protection for public health and safety, so as not to require the establishment of a new overhead right of way or the expansion of the existing right of way by the taking of adjacent homes or other structures.

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