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June 30, 2006

Mrs. Susan M. Hudson, Clerk
Vermont Public Service Board
Drawer 20, 112 State Street
Montpelier, VT 05620-2701

Re: Docket No. 6860; EMF Monitoring Plan for Salisbury Elementary School

Dear Mrs. Hudson:

With this letter, Vermont Electric Power Company, Inc. ("VELCO") respectfully submits one original and six copies of its Electromagnetic Fields ("EMF") Monitoring Plan for the Salisbury Elementary School, in accordance with the Board's Order issued on January 3, 2006, in the above-referenced docket.

VELCO is providing copies of this letter and its attachment to the parties on the Docket No. 6860-All Filings Service List, the Salisbury Selectboard, the Salisbury Planning Commission and the Addison County Regional Planning Commission. Copies of these documents are available in electronic format to any party upon request and will be posted at www.velco.com.

Thank you for your assistance with this matter. If you have any questions, please do not hesitate to call me at (802) 748-8324.

Sincerely,

Suzanne M. Monte

smm:lrn/STJ.222635.1

Enclosures

cc: Service List – Docket No. 6860-All Filings
Salisbury Service List
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STJ.220688.1

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Service List - PSB Docket No. 6860 – Affected Municipal Governments and Municipal and Regional Planning Commission for Town of Salisbury

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STJ.222602.1

VELCO's Proposed EMF Monitoring Plan for an ROW Location, for Approval by the Board

The Public Service Board, State of Vermont, in its order of January 3, 2006, ordered in part that:

“we will require VELCO to install a device to measure EMF levels at the edge of the right-of-way adjacent to the Salisbury Elementary School. We are requiring this to ensure that actual EMF levels are within the parameters of predicted EMF levels.”

The EMF monitoring plan that VELCO proposes is described below.

Once the Northwest Vermont Reliability Project (NRP), 345-kV transmission line West Rutland to New Haven is put into operation, VELCO will retain a consultant company (e.g., Gradient Corporation) to monitor the EMF levels at the location specified by the Public Service Board (Board). Due to the fact that magnetic fields at any specific point will be strictly proportional to the power loading on the lines, VELCO plans to monitor EMF in concert with its recording of the operating parameters of the line for specified periods of time so as to identify the constant of proportionality.

Because there is a strict proportionality between line loading and magnetic fields produced by the line at any receptor point, and a strict proportionality between line voltage and electric fields produced by the line at any receptor point, VELCO proposes a monitoring plan aimed at capturing EMF levels at peak or near-peak conditions, as well as examples of EMF levels during low-loading peak conditions. Not only will this plan verify the proportionality predicted by fundamental physics, it will achieve the Board's goal of tracking EMF levels in the vicinity of the Salisbury Elementary School. That is, if the Board desires to know the "average daily field" on the one day per year that the line was most heavily loaded, VELCO could look up when that event occurred in terms of line loading history, and then calculate the average daily field, as well as other EMF parameters of interest.

As described in more detail below, VELCO proposes that monitoring of EMF, once the line is constructed and in operation, over a pre-determined period of time will establish the "real-world" relationship, at the selected receptor point, between EMF and line voltage and current operating parameters. The main uncertainties in the computerized EMF modeling derive from the fact that the exact conductor layout, conductor shape, location of towers, geometric layout of line sag, and variation in nearby terrain are all entered into the model in an idealized fashion that aims to over predict, rather than under predict, the EMF levels. Once the transmission line is in place and operational, all these geometric parameters become fixed, and the empirical relationship between line voltages and currents *versus* ground level EMF at any particular point can be precisely established.

The only reason to monitor for more than a pre-determined period of time would be if the receptor point were affected by EMF from sources other than the line itself -- the EMF impact of these sources, of course, would not be predicted by the 345-kV line loading. However, at the ROW edge, it can be safely assumed that the EMF levels will be dominated by the 345-kV transmission line.

However, because of the existing 115-kV that currently exists, the first step in the monitoring program will be to characterize the magnetic-field-*versus*-line current parameters for the 115-kV line. This will be done in a manner similar to that described below for the 345-kV line, but will take place prior to the time when the 345-kV is put into operation. Essentially this will be the "current condition" of the ROW at the site of the Salisbury Elementary School.

The measurement protocol and instrumentation proposed by VELCO are as follows. First, in consultation with VELCO, the consultant company will identify three 24-hour periods when loads on the 345-kV line

are expected to be (1) low, (2) average, and (3) near peak. The instrumentation described below will be used to monitor EMF levels during these three 24-hour periods, and VELCO will simultaneously record the voltage and current on a 5-minute average basis during the specified 24-hour periods. At the completion of the measurements, the consultant company will correlate the EMF readings with the line voltage and current parameters and determine the proportionality constant. Once this is accomplished, VELCO and the Board will be in a position to evaluate whether the time course of EMF fields at the ROW near the Salisbury School are within the parameters of predicted EMF levels that the Board was presented at the time of the VELCO NRP filing, or whether the EMF levels under real-world conditions are cause for concern by the Board.

Procedures for the Measurement of Magnetic Field Strength

The magnetic field strength will be measured every 1.5 seconds¹ at an elevation of approximately 3 feet above grade.² Magnetic field strength will be measured using an EMDEX II recording meter (manufactured by Enertech Consultants, Campbell, CA). Specifications for this instrument appear in Table 1 below.

TABLE 1	
Specifications for the EMDEX II meter	
Sensors	Three orthogonally oriented magnetic field sensor coils
Sensitivity	Electric fields, 0.0 kV/m - 109 kV/m Magnetic fields, 0.1 mG - 3,000 mG. Reports magnetic field resultant (root mean square) in the broad band mode, the frequency bandwidth being 40 Hz to 800 Hz.
Features	Automatic multi-range measurement capability Easily modified Survey and Normal measurement modes
Amplitude Response	True RMS measurement with a "Crest Factor" of a periodic signal
Power	One 9-volt alkaline battery
Output	Survey mode: display data values on LCD Normal mode: sampled data stored in memory for later retrieval

The EMDEX II reports the resultant field strength³ in mG. This meter satisfies the Institute of Electrical and Electronics Engineers (IEEE) instrumentation standards for measuring magnetic field strength at

¹ Specifically, a 1.5-second running average field strength is computed continuously and reported by the measuring device every 1.5 seconds.

² 1 meter (approximately 3 feet) elevation is specified by the Institute of Electrical and Electronics Engineers (IEEE) as part of its standard procedures for the survey of EMF generated by power lines (IEEE, 1995a, p. 21).

³ The resultant field strength (B_r) is equal to the square root of the sum of the squared field intensity values measured along three orthogonal axes. That is, $B_r = \sqrt{B_x^2 + B_y^2 + B_z^2}$, where B_x , B_y , and B_z are the field intensity measurements along the x , y , and z axes.

power line frequencies (IEEE, 1995a; 1995b). The device records these measurements every 1.5 seconds and allows the user to designate “events” corresponding to measurements at specific locations.

The calibration of the meter is periodically checked by the manufacturer.

Procedures for the Measurement of Electric Field Strength

Electric field will be monitored at an elevation of 3 feet above grade (IEEE, 1995a). Electric field strength will be measured using a Holaday HI-3600-2 meter (manufactured by Holaday Industries, Inc., Eden Prairie, MN). This meter reports field strength in kV/m (or V/m). The meter satisfies IEEE instrumentation standards for measuring electric field strength at power line frequencies. Specifications for this instrument appear in Table 2.

TABLE 2	
SPECIFICATIONS FOR THE HOLADAY HI-3600-02 METER	
Sensors	Concentric plate displacement current electric field sensors <ul style="list-style-type: none"> • 8-inch diameter electrically shielded magnetic field sensing loop • Switch selectable between electric and magnetic fields
Sensitivity	Electric fields, 1 V/m - 199 kV/m Magnetic fields, 10 mA/m - 1999 A/m
Features	Auto-select or manually selected field strength scales Max-hold feature stores and displays highest reading
Amplitude Response	True RMS field strength measurements for accurate measurement of non-sinusoidal waveforms
Polarization Response	Displacement sensor and magnetic field sensor are designed for response to one field polarization component at a time
Power	Two 9-volt alkaline batteries
Output	Liquid crystal display; preamplifier output <i>via</i> phone jack; digital fiber optic signal

The calibration of the meter is periodically checked by the manufacturer.