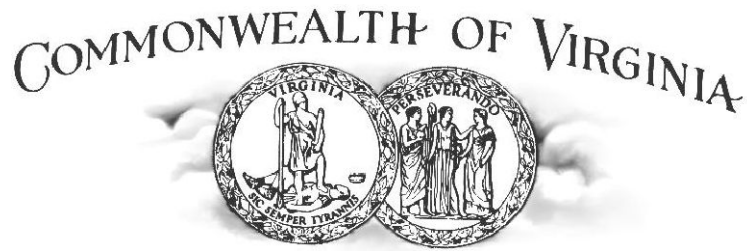


JEHMAL T. HUDSON
COMMISSIONER

SAMUEL T. TOWELL
COMMISSIONER

KELSEY A. BAGOT
COMMISSIONER



BERNARD LOGAN
CLERK OF THE COMMISSION
P.O. BOX 1197
RICHMOND, VIRGINIA 23218-1197

STATE CORPORATION COMMISSION

State Corporation Commission

RECEIVED

1/12/2026

Case No.: PUR-2025-00056

Sponsor: ("Loudoun County")

Exhibit No.: 39

Witness: David P. Estey, P.E.

Bailiff: Kirsten S. Turney

Witness Direct Testimony Summary

Witness: David P. Estey, P.E.

Title: Principal Electric Engineer, RLC Engineering PLLC

Summary:

Mr. Estey's testimony offers an explanation of Extremely Low Frequency Electric Magnetic Fields, including estimates of the magnitude of the magnetic and electrical fields created by Dominion's proposed Golden-Mars overhead transmission route right-of-way. He will also develop estimates of the same for the proposed underground alternatives, and compares the two estimates.

Mr. Estey testifies that the Company's EMF forecasts utilized understated load current figures, rather than the stated maximum summer transfer capability. He also observes that the Company did not consider optimized conductor phasing on a multiple line transmission structure as a means of reducing EMF concentration at the edge of ROW, which would reduce EMF levels even for an overhead configuration and placement.

Mr. Estey's testimony concludes that Dominion's application understates the magnetic field density for Golden-Mars placed overhead by around 350%. If an optimized phase configuration were used on the aerial line, the edge ROW EMF ratings would be greatly reduced. He also concludes that undergrounding Golden-Mars as proposed by the County and other respondents would significantly reduce EMF exposure at comparable loading levels.

**DIRECT TESTIMONY
OF
DAVID P. ESTEY, P.E.**

**ON BEHALF OF
LOUDOUN COUNTY, VIRGINIA
BEFORE THE
STATE CORPORATION COMMISSION OF VIRGINIA
CASE NO. PUR-2025-00056**

Q. PLEASE STATE YOUR NAME, OCCUPATION, AND YOUR WORK ADDRESS.

A. My name is David P. Estey. I am a Principal Electrical Engineer at RLC Engineering, PLLC. My business address is 267 Whitten Road, Hallowell, Maine 04347.

Q. PLEASE DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE?

A. I graduated from the University of New Hampshire in 1974 with BS in electrical engineering. I subsequently earned an MBA degree from Thomas College in 1980. From 1975 to 2007, I was employed at Central Maine Power Company and its engineering affiliate E/PRO. My responsibilities have included distribution system operation and engineering, EMF monitoring and mitigation, Demand Side management program development, utility cost of service and rate making (both state and FERC jurisdictions), substation control design, and electrical support services. Since 2008, I have worked at RLC Engineering as Principal Electrical Engineer responsible for the interconnection, design and commissioning of wind, solar and battery storage renewable energy projects. I am registered as a Professional Engineer in the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Pennsylvania, New York and Florida. My most recent resume is attached to this testimony as **Exhibit DPE-1**.

31 **Q. WHAT IS YOUR PROFESSIONAL EXPERIENCE AS IT RELATES TO POWER**
32 **FREQUENCY ELECTRIC AND MAGNETIC FIELDS (a/k/a ELF EMF)?**
33

34 A. During my employment at Central Maine Power and its affiliate E/PRO, I was tasked with
35 conducting onsite electric and magnetic field measurements at residential and commercial
36 settings to assess relative ELF EMF exposure within and outside of the home, and in and
37 around commercial building environments. I also performed studies estimating the level
38 of electric and magnetic fields produced from existing and proposed transmission line
39 facilities.
40

41 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

42 A. My testimony will offer an explanation of ELF EMF and how the fields are created. I will
43 also endeavor to provide estimates of the magnitude of the magnetic and electrical fields
44 created by the proposed transmission lines across and at the edges of the proposed Golden
45 - Mars transmission route right-of-way (ROW). I will develop estimates of these fields for
46 both the proposed aerial transmission system and the proposed underground system
47 segment.
48

49 **Q. WHAT IS ELF EMF?**

50 A. ELF EMF is short for “Extremely Low Frequency Electric Magnetic Fields” otherwise
51 known as power frequency (50 hz or 60 hz) Electric and Magnetic Fields. Electric and
52 Magnetic Fields exist wherever electricity is generated, transmitted, or distributed in power
53 lines or cables, or used in electrical appliances. The magnitude of Electric Fields from a

transmission line is largely a function of the line voltage and the distance from the line conductor. The unit of electric field measurement is expressed in volts per meter (kV / m). The concentration of Magnetic Field flux density from a transmission line is largely a function of the current flowing in the conductor and the distance from the conductor. The unit for magnetic field flux density is expressed in Tesla (T) or milliGauss (mG) (1 Tesla = 10,000,000 mG or 10mG = 1uT). Magnetic Field Density represents the amount of magnetic flux passing through a unit area perpendicular to the magnetic field.

Q. HAVE YOU REVIEWED THE COMPANY’S APPLICATION FOR PROPOSED TRANSMISSION LINES SUBMITTED IN CASE NO. PUR-2025-00056 (THE “GOLDEN-MARS APPLICATION”)?

A. Yes. I have reviewed the application.

Q. ON BEHALF OF LOUDOUN COUNTY, DID YOU CONDUCT A REVIEW OF THE ELECTRIC AND MAGNETIC FIELDS CREATED BY THE PROPOSED TRANSMISSION LINES ROUTED IN THE VICINITY OF LOUDEN VALLEY ESTATES.

A. Yes, I did.

Q. PLEASE EXPLAIN THE SCOPE OF THE REVIEW AND THE PROCESSES UTILIZED TO UNDERTAKE IT.

A. In the PUR-2005-0056 Application Appendix (Document 250610057 Pages 365-368 of Section IV A), Dominion provided a summary of calculations depicting expected magnetic and electric field concentrations at the edge of the proposed transmission line right-of-way for the typical 500 kV / 230 kV double circuit, monopole, suspension structure (Attachment II.B.3.vi) anticipated to be employed along the Golden - Mars transmission line route. The EMF estimates provided in these documents were conducted for an average load scenario and a peak load scenario using the following values for the three aerial transmission lines associated with the Golden – Mars transmission project placed on a 100 ft ROW:

Transmission Line No.	kV Rating	Voltage (kV)	Load (Ave)	Load (Pk)
Line 5003	500 kV	525 kV	961 amps	1,601 Amps
Line 2412	230 kV	242 kV	357 amps	595 Amps
Line 2413	230 kV	242 kV	462 amps	770 Amps

The values calculated by Dominion from the information summarized above yielded the following field concentrations for the proposed double circuit Monopole suspension structure previously described:

	Left Edge ROW	Right Edge ROW
Electric Field (kV/m)	2.5	2.3
Magnetic Field (mG) Ave Load	64.7	57.3
Magnetic Field (mG) Peak Load	108.2	96.1

Electric and Magnetic Fields were additionally calculated by the applicant for two existing 230 kV lines (Line 2095 and 2218) that will be removed to accommodate the new double circuit monopole line described above:

Transmission Line No.	kV Rating	Voltage (kV)	Load (Ave)	Load (Pk)
Line 2095	230 kV	242 kV	1,034 amps	1,724 Amps
Line 2218	230 kV	242 kV	1,198 amps	1,634 Amps

The EMF values calculated by the Applicant based on the load information above yielded the following electric and magnetic field concentrations for the existing double circuit, 230 kV Monopole structure (Referenced as II.A.5.d) to be removed:

	Left Edge ROW	Right Edge ROW
Electric Field (kV/m)	0.55	0.55
Magnetic Field (mG) Ave Load	72.7	84.0
Magnetic Field (mG) Peak Load	121.3	140.1

It is my intention to verify these EMF estimates and determine whether additional measures may be possible to reduce the concentration of the electric and magnetic fields at the edge of the transmission ROW.

Q. HAVE YOU BEEN ABLE TO VERIFY THE EMF ESTIMATES SUBMITTED BY THE APPLICANT?

A. Based upon the information provided in the application, RLC has been able to perform comparable EMF calculations of the Golden – Mars Transmission Line with the PLS-CADD Version 21.0064 software. To benchmark our calculation, I compared the results of the applicant's calculations for the peak load scenario provided in the application to the RLC results (Exhibit DPE-3) from our calculation as follows:

ROW Left Edge	Applicant	RLC
Electric Field (kV/M)	2.5	2.6
Magnetic Field (mG)	108.2	108.7
ROW Right Edge		
Electric Field (kV/M)	2.3	2.2
Magnetic Field (mG)	96.1	94.2

Q. WHAT WERE THE CONCLUSIONS OF YOUR REVIEW?

A. Two observations came to mind. First, the applicant employed forecasted 2028 load current of 1601 amps for the 500 kV line 5003, and 770 amps for the 230 kV Line 2413 as opposed to the stated maximum summer transfer capability of 4357 MVA (5031 amps) on the 500 kV line 5003 and 1573 MVA (3950 amps) on the 230 kV line 2413. This is inconsistent with the EMF calculations performed for the proposed underground duct bank segment which employed transfer capability loads.

Q. WHAT WAS YOUR SECOND OBSERVATION?

A. My second observation was that the applicant did not appear to consider using optimized conductor phasing on a multiple line transmission structure as a means of reducing the EMF concentration at the edge of ROW. The orientation of the conductors on the structure appears to be configured in a non-optimized manner as Phase ABC ABC top to bottom as opposed to an optimized manner as ABC CBA top to bottom. The ABC CBA configuration allows the fields created from one line to cancel some of the fields created by the second line lowering the EMF concentration at the edge of ROW.

Q. DID YOU PERFORM ANY EMF CALCULATIONS USING AN OPTIMISED PHASE ORIENTATION?

A. Yes, we did. Using a ABC phase (top to bottom) configuration on the 500 kV side (left side) of the structure and a CBA phase (top to bottom) configuration on the 230 kV side (right side) of the structure, and assuming the same 2028 peak load of 1601 Amps for the 500 kV line and 770 amps for the 230 kV line, RLC calculations resulted in the following reduced Magnetic Field flux density at the edge of ROW:

ROW Left Edge	ABC ABC Config	ABC CBA Config
Electric Field (kV/M)	2.6	2.4
Magnetic Field (mG)	108.7	70.8 (-34.8%)
ROW Right Edge		
Electric Field (kV/M)	2.2	0.6
Magnetic Field (mG)	94.2	51.4 (-45.4%)

Q. DID YOU PERFORM SIMILAR EMF CALCULATIONS BASED ON THE LINE TRANSFER LIMITS OF 5031 AMPS ON THE 500 kV CIRCUIT AND 3950 AMPS ON THE 230 kV CIRCUIT?

A. Yes, we did. Two scenarios were performed, the first scenario employed a non-optimized phase configuration using a ABC phase (top to bottom) configuration on the 500 kV side (left side) of the structure and a ABC phase (top to bottom) configuration on the 230 kV side (right side) of the structure assuming a max transfer load of 5031 amps for the 500 kV line and 3950 amps for the 230 kV line(Exhibit DPE-4). A second scenario employed an optimized phase configuration using a ABC phase (top to bottom) configuration on the 500 kV side (left side) of the structure and a CBA phase (top to bottom) configuration on the 230 kV side (right side) of the structure assuming a max transfer load of 5031 amps for the 500 kV line and 3950 amps for the 230 kV line (Exhibit DPE-5). RLC calculations resulted in the following Magnetic Field flux densities at the edge of ROW:

ROW Left Edge	ABC ABC Config	ABC CBA Config
Electric Field (kV/M)	2.6	2.4
Magnetic Field (mG)	382.4	191.0 (-50.0%)
ROW Right Edge		
Electric Field (kV/M)	2.2	0.6
Magnetic Field (mG)	359.7	170.3 (-52.7%)

188 **Q. DID YOU CONDUCT A REVIEW OF THE ELECTRIC AND MAGNETIC FIELDS**
189 **CREATED BY THE PROPOSED UNDERGROUND SEGMENT PROPOSED FOR**
190 **THE GOLDEN – MARS TRANSMISSION LINE**

191 A. Yes, I did.

192

193 **Q. CAN YOU DESCRIBE THE PROPOSED UNDERGROUND PROJECT?**

194 A. The project is detailed by Mr. Conroy in his testimony. I will endeavor to estimate the level
195 of EMF created by the cable duct bank depicted in Exhibit DPE - 6

196

197 **Q. DID THE PROJECT CONDUCT ANY CALCULATIONS OF EMF FOR THE**
198 **PROPOSED GOLDEN -MARS UNDERGROUND SYSTEM?**

199 A. Yes, It appears that Burns-McDonnell submitted a Memorandum dated April 29,2025
200 which offered summaries of the calculations performed on two duct bank configurations,
201 one configuration for an 80.5 foot ROW and a second configuration for a 95.5 foot ROW.
202 The configurations were very similar except the 95.5-foot ROW configuration proposed a
203 24 inch vertical conduit separation for the 500 kV cabling as opposed to an 18 inch vertical
204 conduit separation.

205

206 **Q. WHAT WERE THE RESULTS OF THE BURNS-MCDONNELL EMF**
207 **CALCULATIONS?**

208 A. Due to the level of similarity between the two configurations, I will focus on the
209 configuration developed for the 95.5 ROW. This configuration appears to have used a
210 maximum loading of 4,249 amps for the 230 kV cables and 5,058 amps for the 500 kV

cables. Only a graphical summary of the magnetic field density across the ROW was provided in DPE Exhibit-7; one graph at ground level and one graph at an elevation of 1 meter above ground. There are no estimates for electric fields as cable shielding serves as a barrier, as a result, no or very little electric fields are emitted from the conduit bank. A general summary of the magnetic flux density graphs suggests the following levels across the 80.5 ft ROW:

ROW	Left Edge	Max	Right Edge
At Grade	88 mG	840.1 mG	86 mG
At 1 Meter	54 mG	243.7 mG	52 mG

Q. DID YOU CONDUCT YOUR OWN CALCULATIONS FOR THE DUCT BANK?

A. Yes, we did. Based on the information provided in the Burns-McDonnell April 29,2025 Memorandum and using only a 21-foot spacing between the 230 kV and 500 kV duct banks, we calculated a comparable set of EMF values for a narrower 76.5 ft ROW with the CYMECAP software program.

Q. WHAT WERE THE RESULTS OF YOUR CALCULATIONS?

A. At the comparable projected peak load of 1601 amps on the 500 kV circuit and 770 amps on the 230 kV circuit used for the Aerial transmission line and employing an optimized phase configuration, the Magnetic Field density on the underground system was calculated (Exhibit DPE-8) to be:

	Left Edge	Max	Right Edge
At 1 Meter	5.4 mG	53.6 mG	15.4 mG

At the maximum transfer capacity of 5031 amps on the 500 kV circuit and 3950 amps on the 230 kV circuit, and employing a optimized phase configuration, the Magnetic Field density on the underground system was calculated (Exhibit DPE-9) to be:

	Left Edge	Max	Right Edge
At 1 Meter	25.5 mG	171.7 mG	48.2 mG

Q. BASED ON YOUR ANALYSIS, WHAT ARE YOUR CONCLUSIONS REGARDING THE EMF LEVELS CREATED BY THE AERIAL VS UNDERGROUND TRANSMISSION FACILITIES PROPOSED FOR THE GOLDEN – MARS 500 kV / 230 kV TRANSMISSION FACILITY?

A. My first conclusion is that the project understated the magnetic field density of the aerial 500 kV/230 kV line by using a projected 2028 peak load value of 1601 amps for the 500 kV line and 770 amps for the 230 kV line as opposed to the Maximum Current Rating (MCR) of 5031 amps for the 500 kV line and 3950 amps for the 230 kV line. Use of the MCR instead of the projected 2028 peak load resulted in magnetic flux density estimates in the region of 350 mG plus at the edge of ROW, an increase in excess of 350% over what was stated in the application. If an optimized phase configuration had been employed on the aerial line, the edge of ROW magnetic flux densities would have been less, in the region of 170 – 190 mG.

My second conclusion is that the proposed undergrounding of the Golden – Mars 500 kV / 230 kV line results in significantly less Edge of ROW EMF exposure (25.5 – 48.2 mG) at comparable loading levels.

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Q. ARE THERE ANY STANDARDS THAT LIMIT EMF EMISSIONS FROM TRANSMISSION LINES?

A. There are no specific State of Virginia or Federal standards that establish specific limits on the level of EMF that can be emitted from a transmission line. The State of Virginia relies on information provided by the World Health Organization (WHO) and The US National Institute of Environmental Health Services (NIEHS). The States of Florida and New York limit Magnetic flux density from new 500 kV and 230 kV transmission lines to 200 mG at the edge of ROW. Florida and New York limit Electric Fields from transmission lines to 2 kV/M and 1.6 kV/M, respectively at the edge of ROW. The WHO lists a summary of foreign countries that have suggested limits in the residential sector on magnetic field exposure that range from 30 mG up to 2000 mG.

Q. DO YOU HAVE ANY ADDITIONAL THOUGHTS ON THE HEALTH EFFECTS CREATED BY ELF EMF?

A. The Health Effects associated with ELF EMF are an enigma. Epidemiologists have been studying this issue for decades and have yet to establish a clear causal relationship. Not only are there EMF exposures from power lines but there are also exposures in the home from appliances and other electric devices as well as from electric vehicles. The best way of dealing with the ever-present existence of ELF EMF is understanding the sources of EMF you are exposed to, monitoring the continuing research on the Health Effects of EMF and exercising prudent avoidance.

280 **Q. IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD TO YOUR**
281 **TESTIMONY?**

282 **A. Not at this time.**

283 **Attachments:**

- 284 **1) Exhibit DPE-1 – Resume**
- 285 **2) Exhibit DPE-2 – Detail 500 kV/230 kV DC Engineered Monopole – Suspension**
286 **Structure**
- 287 **3) Exhibit DPE-3 – RLC Benchmark calculation of Aerial 500 kV/230 kV line**
- 288 **4) Exhibit DPE-4 – RLC EMF Calculations at Maximum Transfer Capability – Non**
289 **Optimized Phasing**
- 290 **5) Exhibit DPE-5 - RLC EMF Calculations at Maximum Transfer Capability –**
291 **Optimized Phasing**
- 292 **6) Exhibit DPE-6 - RLC Cable Duct Bank Detail**
- 293 **7) Exhibit DPE 7 – Burns-McDonnell EMF Calculations for 95.5 Ft ROW Configuration**
- 294 **8) Exhibit DPE-8 – RLC EMF Calculation Employing Optimized Phasing at Projected**
295 **2028 Peak Loads**
- 296 **9) Exhibit DPE-9 – RLC EMF Calculation Employing Optimized Phasing at Maximum**
297 **Transfer Capability**
- 298
- 299

PROFESSIONAL EXPERIENCE & ACCOMPLISHMENTS

- Over forty-nine years of experience in the electric utility and power supply industry with five years devoted to customer service activities in the area of Energy Management/Demand Side Management (DSM); eight years devoted to rate and regulatory activities; and thirty-six years devoted to electrical engineering and engineering consulting.
- Medium and high voltage substation design and construction.
- Project economic analysis.
- Proficient with PSLF, SKM and PSS/E power system models.
- Understanding of Power and Control Systems, Demand Side Management (DSM), generator interconnection

PROJECT EXPERIENCE

- Designed balance of plant collector systems and transmission interconnections for proposed wind farms in Ontario, Prince Edward Island, Maine, Massachusetts, New Hampshire, New York, Texas, and Vermont.
- Served as Project Electrical Engineer for TransCanada's development of 10 MW Brockville 1, 9 MW Brockville 2, 7 MW Burritts Rapids, 10 MW William Rutley, 10 MW Mississippi Mills, and 30 MW New Liskeard 1, 3 & 4 photovoltaic projects in Ontario, Canada.
- Designed and managed the construction of the electrical balance of plant facilities associated with the Norway (9 MW) and West Cape (99 MW) wind projects on Prince Edward Island.
- Designed VEC Jay #17 and Lowell substations for source upgrade from 34.5 kV to 46 kV.
- Designed 34.5 kV collector system and interconnection substation for 63 MW Kingdom Community Wind Project
- Developed collector system and interconnection substation design as part of an environment permit application for 34.2 MW Bull Hill Wind Project, 141 MW Oakfield 2 Wind Project in northern Maine, and 63 MW Kingdom Community Wind Project in Vermont.
- Experienced with Type III (DFIG) and Type IV (full inverter) wind turbine generators and inverter based utility scale photovoltaic facilities.
- Performed distribution system impact study on the 15 MW Berkshire Wind Project.
- Performed distribution system impact study on the 1.5 MW Silver Lake, 1.5 MW Pittsfield, 3.5 MW Cottage Street and 2.0 MW Indian Orchard photovoltaic projects.
- Designed, managed construction and commissioned electrical collector system and interconnection for the 90 MW, Big Level Wind, 40 MW Passadumkeag Mountain Wind, 34 MW Saddleback Ridge Wind, 22 MW Canton Wind, 20 MW Spruce Mountain Wind, 4.5 MW Freedom Wind and 4.5 MW Fox Island Wind, and the 10.0 MW Georgia Mountain Wind Projects.

- Designed and commissioned the electrical collection system and interconnection for the 4.99 MW Madison battery Storage facility, the 2 MW Madison IP Battery Storage Facility and the 4.99 Rumford IP Battery Storage Facility.
- Designed balance of plant and collector system for 25 MW Provincetown Battery Storage Facility.
- Testified before the Vermont Public Service Commission relative to the electric utility system impacts of interconnecting the Kingdom Community Wind, Georgia Mountain Wind, Sheffield Wind and the Deerfield Wind Projects.
- Conducted economic due diligence reviews for Central Maine Power Company on several alternative energy projects.
- Designed and commissioned a 1.7 MW Emergency Power System with automatic transfer for wastewater treatment facilities at International Paper's Bucksport mill.
- Conducted an independent review of Bangor Hydro Electric Company's service quality for the State of Maine on behalf of the Public Advocate's Office.
- Designed interconnection and collection systems for the 34.2 MW Saddleback Ridge Wind Project and 20 MW Canton Wind Project.
- Developed preliminary design of 34.5 kV collector system, interconnection substation and associated 115 kV transmission line for the 132 MW Highland Wind Project and the 150 MW Oakfield II Wind Project.
- Performed short circuit, protection coordination, arc flash hazard and harmonic analysis of plant-wide electrical systems at the Passadumkeag Wind Project, Kibby Wind Farm, the Stetson Wind Farm, The Jackson Laboratory, Procter & Gamble's Tambrands Auburn facility and Groveton Paper Board's Groveton facility
- Performed comprehensive EMF surveys and calculations for proposed power plants in Dighton, Massachusetts; Chelsea, Massachusetts; Johnston, Rhode Island; and Tiverton, Rhode Island; Middletown Connecticut; Yarmouth, Massachusetts; Meriden, Connecticut; Norwalk, Connecticut, and testified before both the Connecticut and Massachusetts Facility Siting Council on the issue.
- Performed comprehensive EMF analyses for proposed high voltage transmission projects in Rochester, Southampton, and Smithtown, New York, and submitted testimony before the New York State Public Service Commission on the issue.
- Performed EMF surveys on over 50 residential households, municipal buildings, commercial and industrial facilities.
- Served as owner's representative for the Commissioning of Jamaica Private Power Company's (JPPC) 60 Mw diesel power plant in Kingston, Jamaica.
- Served as owner's engineer on Brookfield's 120 MW Black Springs BESS project in Oran, Texas and 100 MW Lucky Bluffs BESS project in Erath County, Texas

- Performed detailed surge protection analysis for transmission facilities at International Paper Company, AES Londonderry, Public Service of New Hampshire, and Meriden.
- Conducted embedded and marginal cost of service studies and sundry rate design analyses for retail and wholesale rate cases. Developed rate tariffs, rules and regulations, and applications for Maine PUC and FERC submissions.
- Testified before the Maine PUC on matters relating to retail cost of service, pole rental rates, and cost effectiveness of DSM programs.
- Conducted seminars on rate and energy management topics.

MANAGEMENT EXPERIENCE

- Served as Manager of Power System Analysis for TRC Engineers, LLC
- Served as oversight witness for interconnection relay and trip testing for Central Maine Power Company.
- Served as Project Manager of Central Maine Power Company's Generation Management System (GMS), Androscoggin Energy LLC (AELLC), Rumford Power Associates (RPA), and Bucksport Energy, LLC (BELL) Merchant Plant Projects.
- Managed the Central Maine Power Company's power contracts and joint owner's agreements associated with Maine Yankee, Connecticut Yankee, Vermont Yankee, Yankee Rowe and Millstone Unit 3.
- Served as Director of System Engineering for Central Maine Power responsible for relay and control panel designs for line terminal and transformer panels, procurement specifications for large power transformers, uninterruptable power supplies, battery systems and other electrical components.
- Worked with clients to resolve technical questions related to rates and energy management programs.

EDUCATION

M.S., Management

Thomas College, Waterville, MA

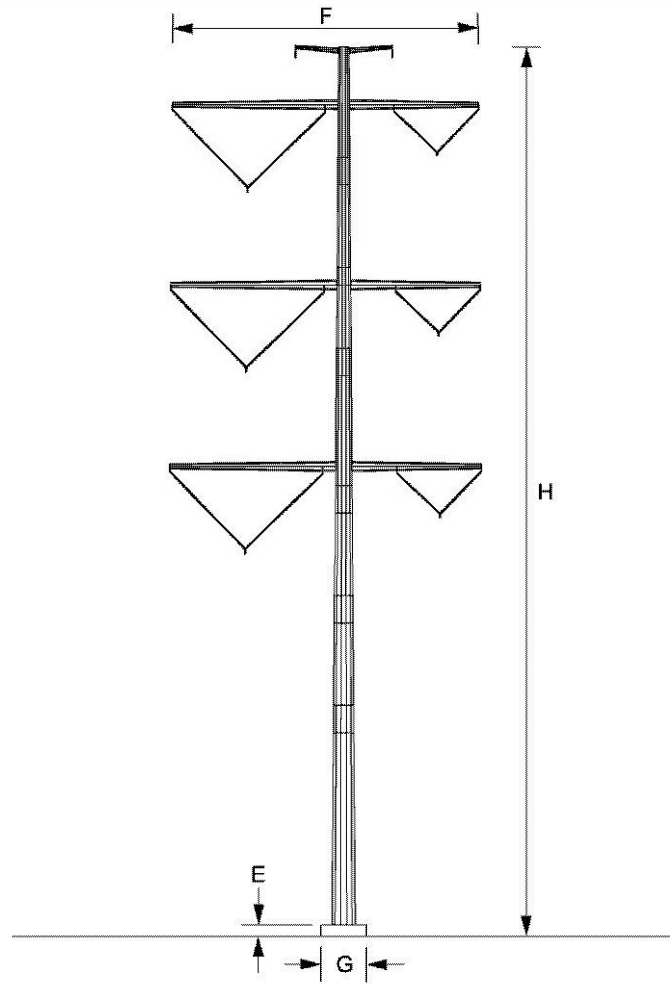
B.S., Electrical Engineering

University of New Hampshire, Durham, NH

PROFESSIONAL AFFILIATIONS / REGISTRATIONS

- Licensed Professional Engineer:
 - Maine (# 3811)
 - New Hampshire (# 10409)
 - Province of Prince Edward Island (# 1140) (inactive)
 - Vermont (# 69338)
 - Massachusetts (# 48860)
 - Connecticut (# 28161)
 - Pennsylvania (# 80291)
 - New York (# 91420)
 - Florida (# 77998)

Exhibit DPE-2



TYPICAL DC 500KV/230KV ENGINEERED MONOPOLE - SUSPENSION

B. RATIONALE FOR STRUCTURE TYPE:	MINIMIZES RIGHT OF WAY ACQUISITION
C. LENGTH OF R/W (STRUCTURE QTY):	8.1 MILES (17) - SEE NOTE 1
D. STRUCTURE MATERIAL:	DULLED GALVANIZED STEEL
RATIONALE FOR STRUCTURE MATERIAL:	DULLED GALVANIZED STEEL USED TO MINIMIZE VISUAL IMPACTS BY REDUCING GLARE & MATCHING NEARBY EXISTING STRUCTURES
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 2
F. AVERAGE WIDTH AT CROSSARM:	56'
G. AVERAGE WIDTH AT BASE:	VARIES - SEE NOTE 3
H. MINIMUM STRUCTURE HEIGHT (SEE NOTE 4):	155'
MAXIMUM STRUCTURE HEIGHT (SEE NOTE 4):	175'
AVERAGE STRUCTURE HEIGHT (SEE NOTE 4):	163'
I. AVERAGE SPAN LENGTH:	593' - SEE NOTE 5
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5'/27.5' (230KV/500KV) AT MAXIMUM OPERATING TEMPERATURE PER 2023 NESC CODE

NOTES: 1. ROW LENGTH & STRUCTURE QUANTITY ARE EXCLUSIVE OF COMPANY SUBSTATION PROPERTIES
 2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'
 3. FOUNDATION DIAMETER SHALL BE BASED ON GEOTECHNICAL FINDINGS DURING FINAL ENGINEERING
 4. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE AND EXCLUDE FOUNDATION REVEAL
 5. THE SPAN LENGTHS ASSOCIATED WITH THIS STRUCTURE TYPE ARE THE AHEAD SPANS

THE INFORMATION CONTAINED ON THIS DRAWING IS
 CONSIDERED PRELIMINARY IN NATURE AND IS SUBJECT
 TO CHANGE BASED ON FINAL DESIGN



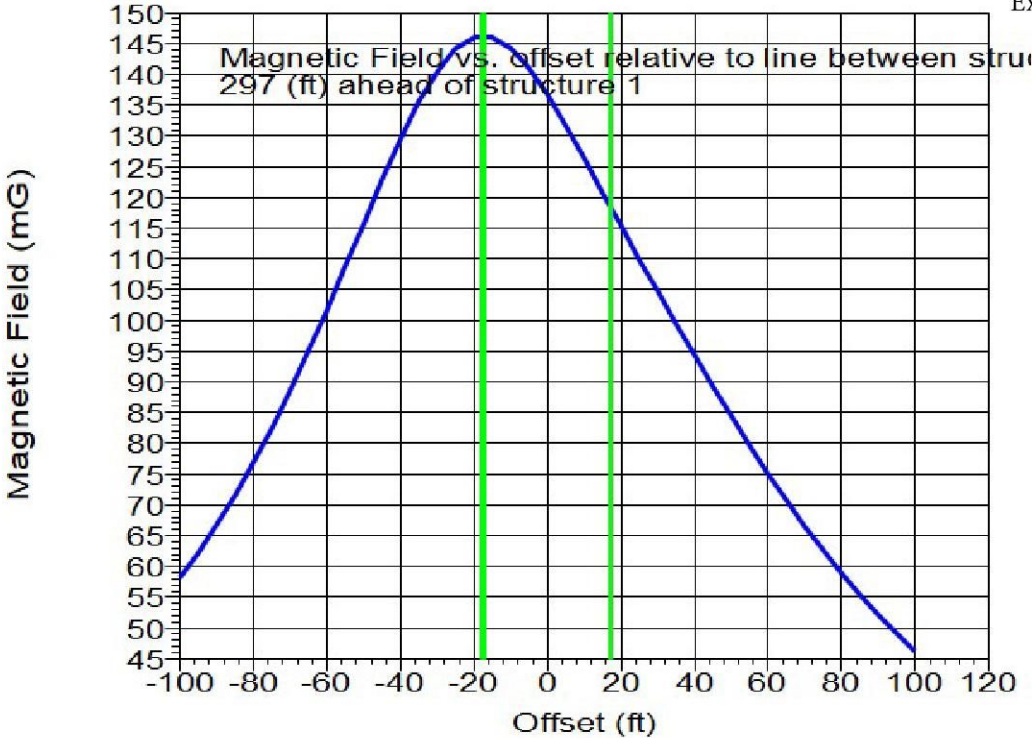
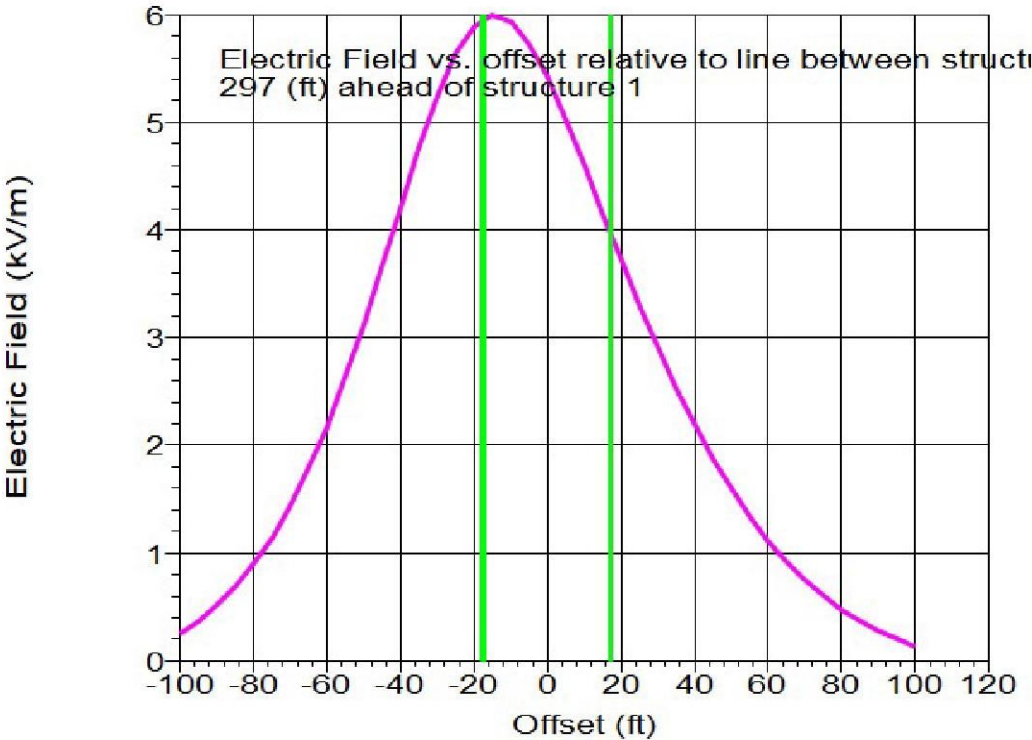
Dominion Energy
 5000 Dominion Blvd.
 Glen Allen, VA 23060

LINES 5003, 2412 & 2413
 TYPICAL 500KV/230KV DC ENGINEERED
 MONOPOLE - SUSPENSION

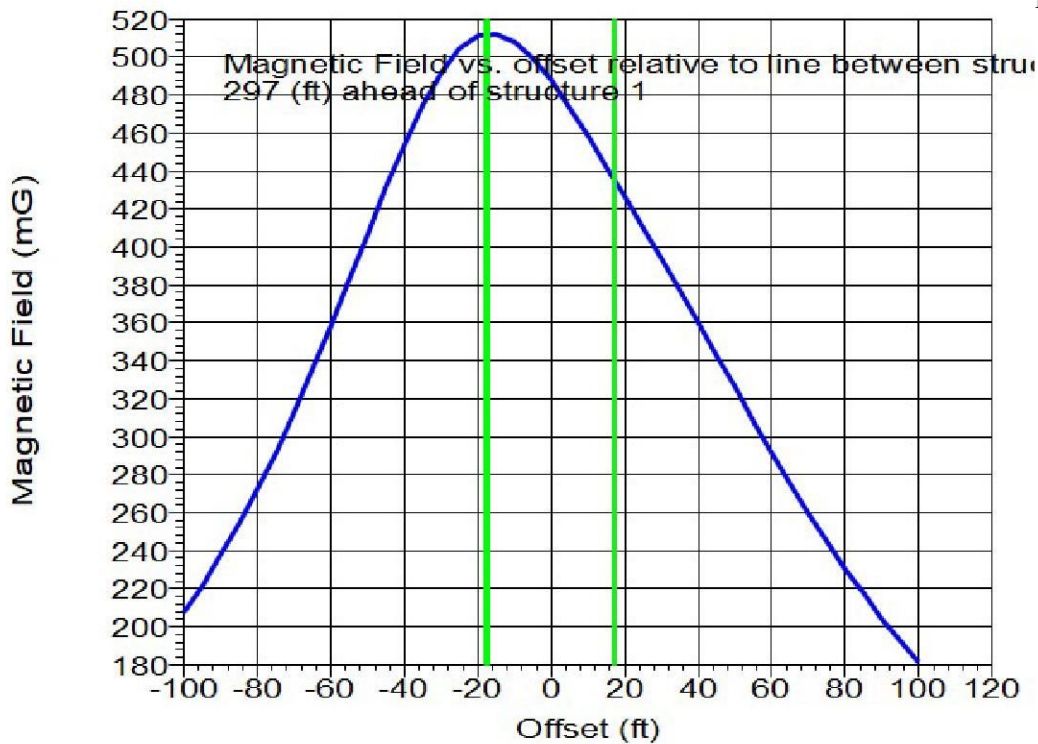
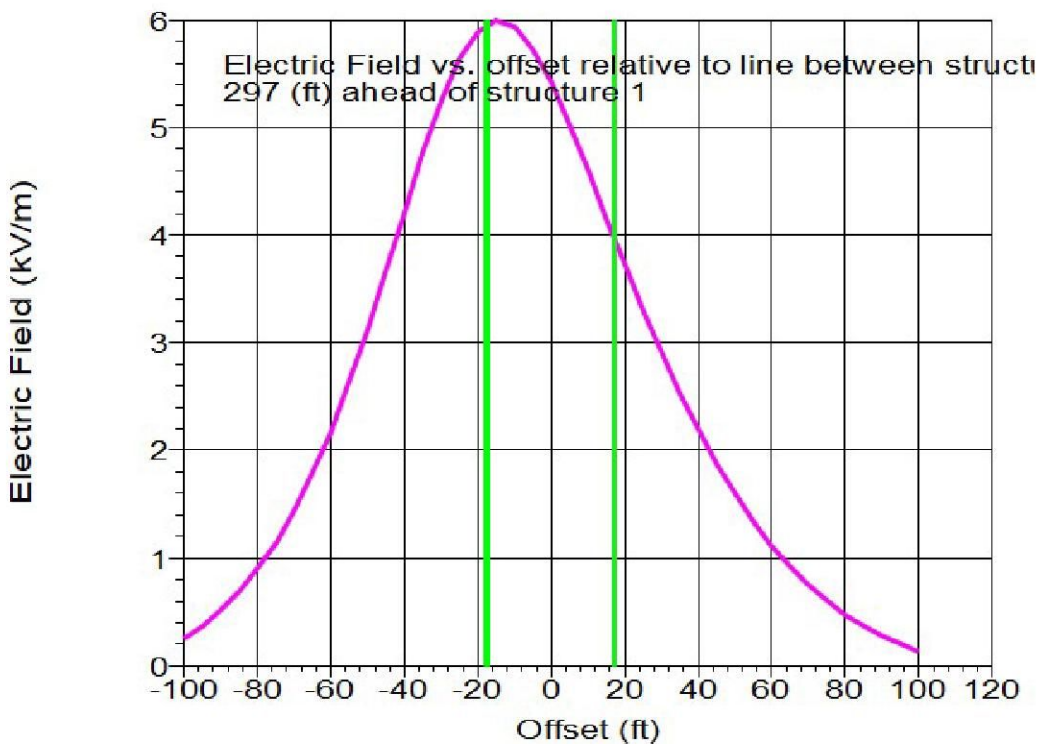
ATTACHMENT NO.

II.B.3.vi

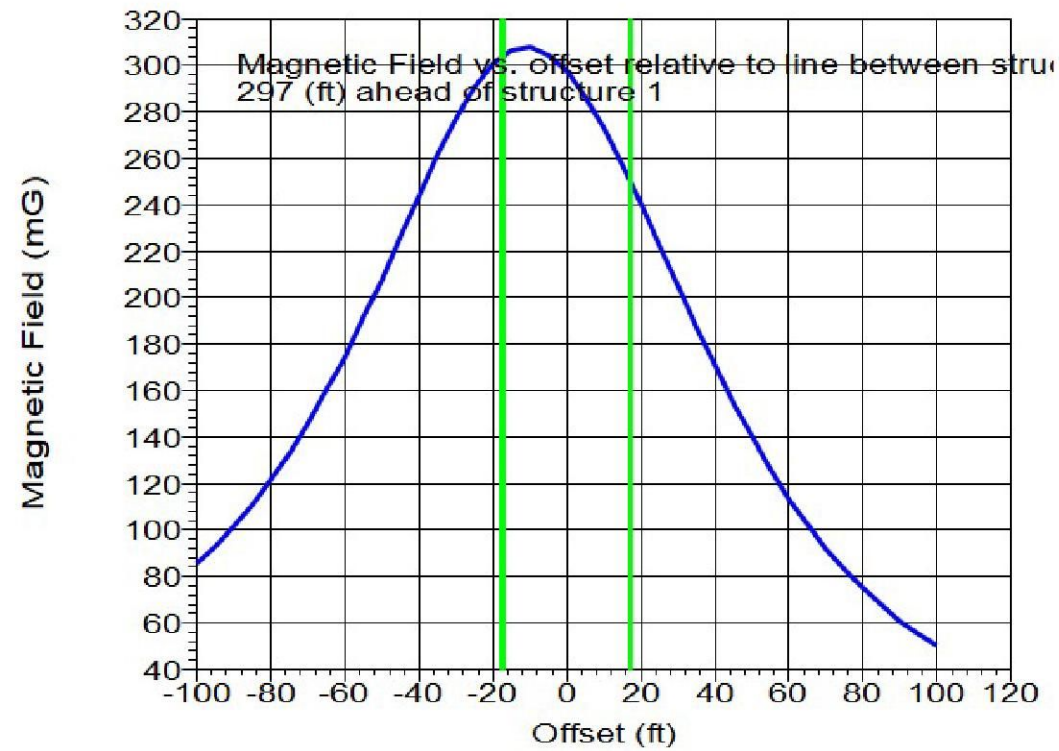
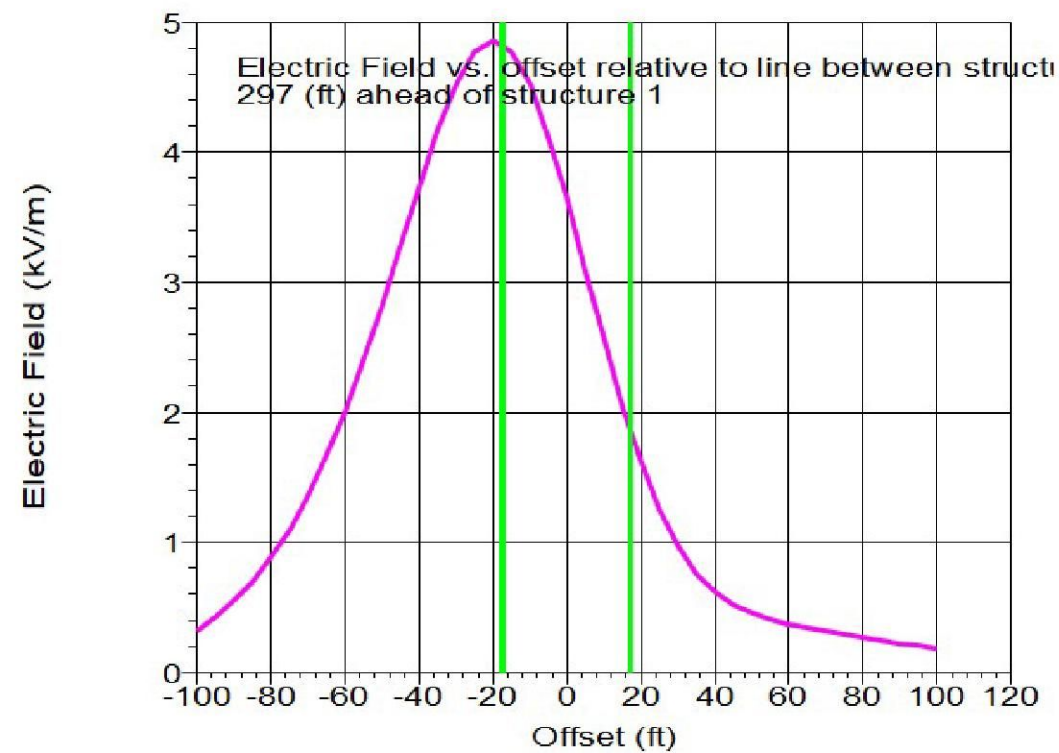
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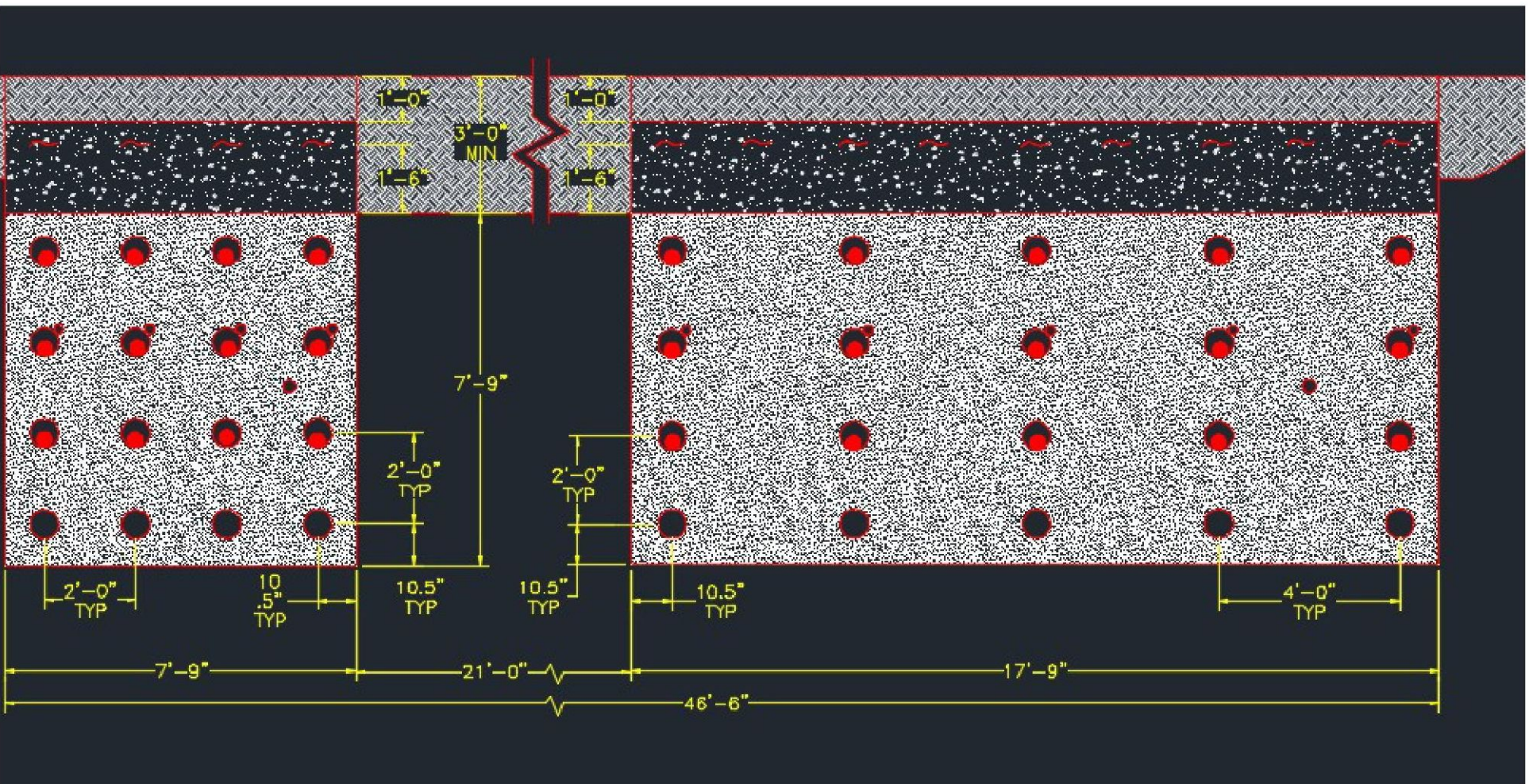
Benchmark RLC EMF Calculations Model Against Results in PUR-2025-0056 Appendix document 250610057 (pages 365-368)

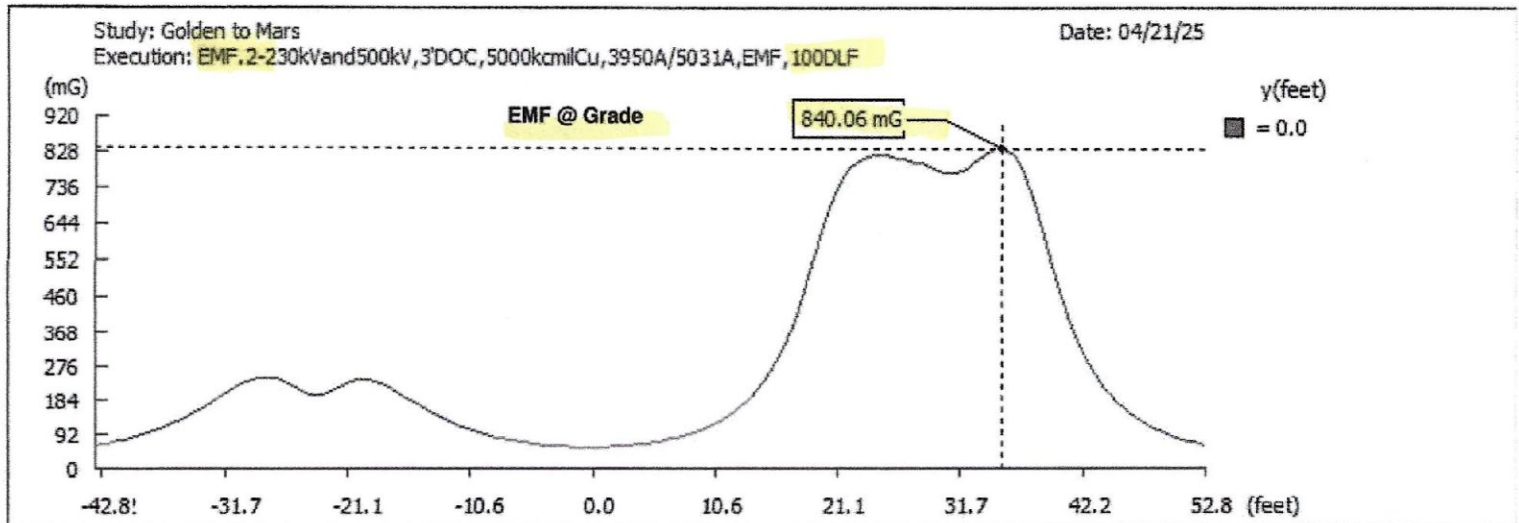
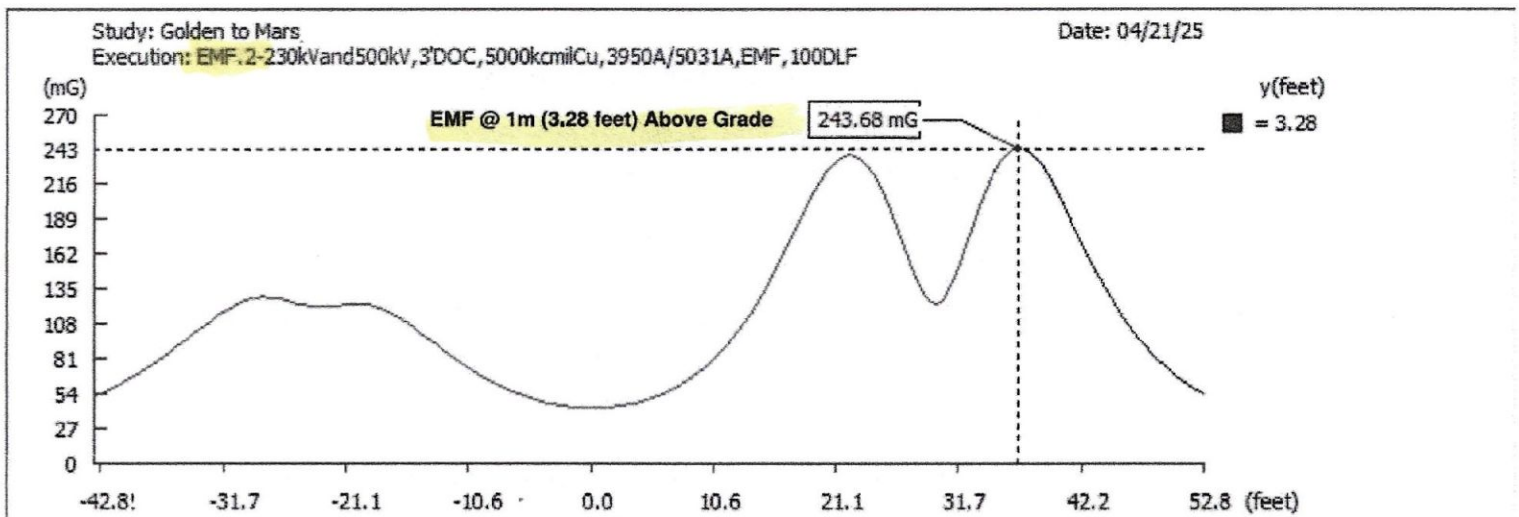
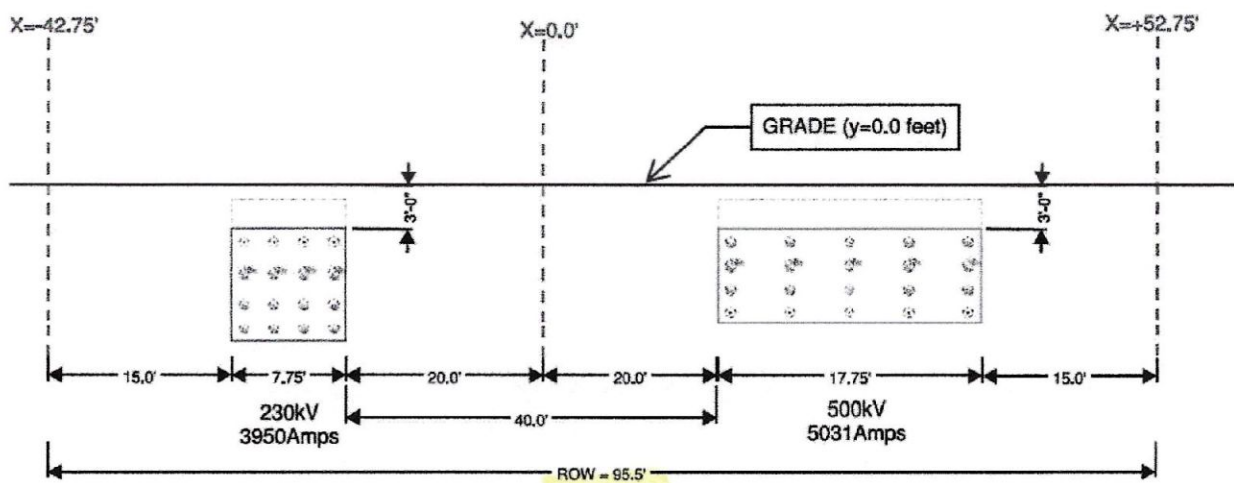


RLC EMF CALCULATIONS FOR DOUBLE CIRCUIT 500 Kv / 230 kv SUSPENSION STRUCTURE NON OPTIMIZED PHASING AT 5031 AMPS ON 500 kv CIRCUIT AND 3950 AMPS ON 230 kv CIRCUIT

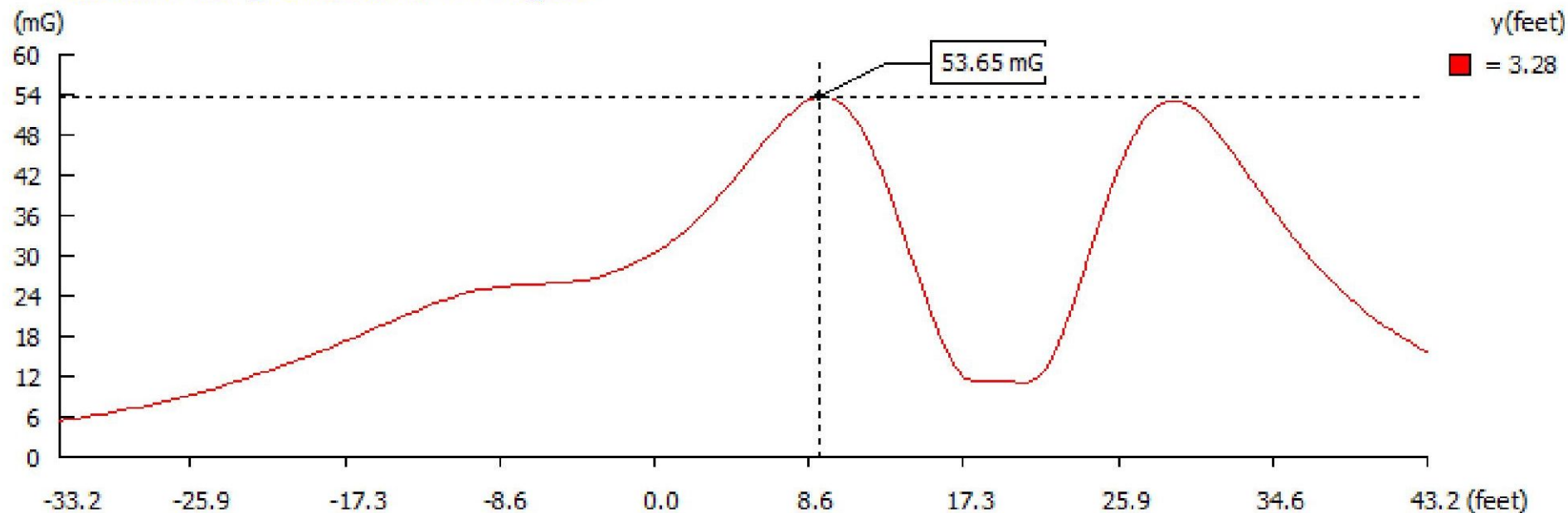


RLC EMF CALCULATIONS FOR DOUBLE CIRCUIT 500 kV / 230 kV SUSPENSION STRUCTURE WITH OPTIMIZED PHASING AT 5031 AMPS ON 500 kV CIRCUIT AND 3950 AMPS ON 230 kV CIRCUIT





BURNS-McDONNELL EMF CALCULATIONS FOR 95.5 FT ROW CONFIGURATION



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-17.375	5.99	192.5	0.0
1	B	-15.375	7.99	192.5	-120.0
1	C	-15.375	5.99	192.5	120.0
1	A	-11.375	9.99	192.5	0.0
1	B	-13.375	7.99	192.5	-120.0
1	C	-11.375	5.99	192.5	120.0
1	A	-15.375	9.99	192.5	0.0
1	B	-11.375	7.99	192.5	-120.0

X Min: -33.2 X Max: 43.2 Step X: 0.5 feet

☐ Add a range of Y values
☒ Add a single Y value

Y Value: 3.28 feet

3.28

Exhibit DPE-8



Save...

Default

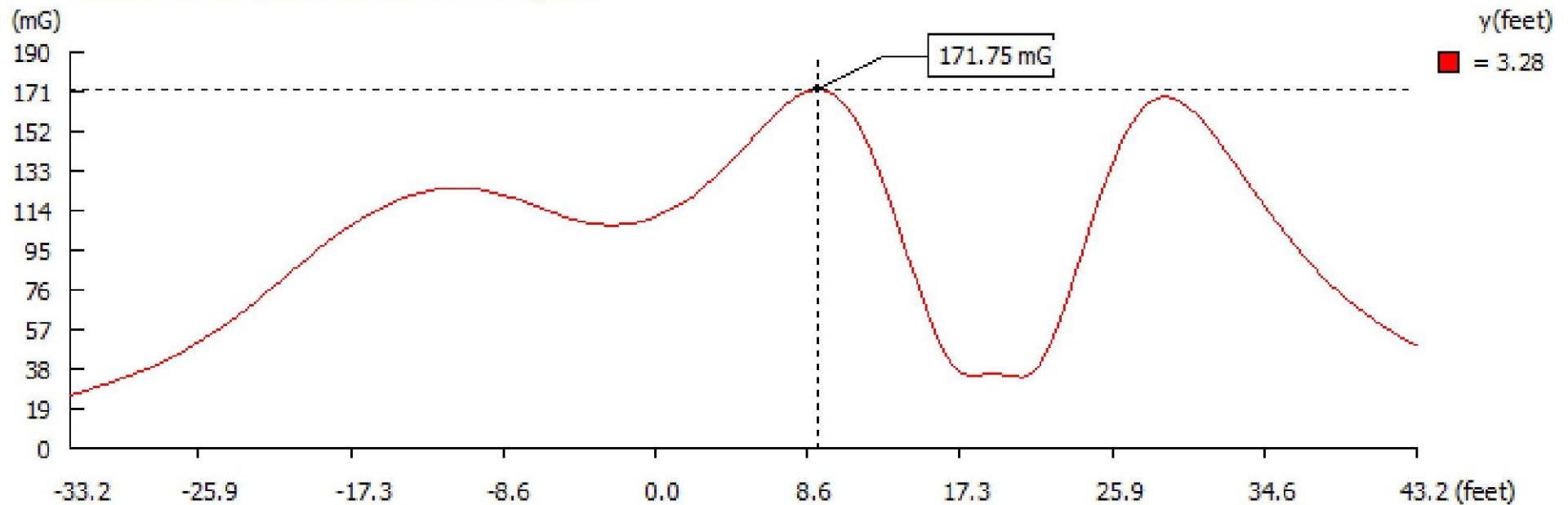
Ok

Cancel

RLC EMF CALCULATION EMPLOYING OPTIMIZED PHASING AT MAXIMUM TRANSFER CAPABILITY

Study: Golden_Mars
Execution: Phasing Permutation for EMF Mitigation

Date: 10/14/2025



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-17.375	5.99	1062.2	0.0
1	B	-15.375	7.99	1062.2	-120.0
1	C	-15.375	5.99	1062.2	120.0
1	A	-11.375	9.99	1062.2	0.0
1	B	-13.375	7.99	1062.2	-120.0
1	C	-11.375	5.99	1062.2	120.0
1	A	-15.375	9.99	1062.2	0.0
1	B	-11.375	7.99	1062.2	-120.0

X Min: -33.2 X Max: 43.2 Step X: 0.5 feet

☐ Add a range of Y values
☒ Add a single Y value

Y Value: 3.28 feet

>
<
<<

3.28

Exhibit DPE-9



Save...

Default

Ok

Cancel

Respectfully submitted,

LOUDOUN COUNTY, VIRGINIA

By Counsel

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I hereby certify that on this 21st day of October 2025, a true and correct copy of the foregoing was sent by email to:

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