

May 13, 2016

By E-Mail & U.S. Mail

Pamela G. Monroe, Administrator
New Hampshire Site Evaluation Committee
21 South Fruit Street, Suite 10
Concord, NH 03301-2429
pamela.monroe@sec.nh.gov

Re: Docket No. 2015-06 – Joint Application of Northern Pass Transmission, LLC and Public Service Company of New Hampshire d/b/a Eversource Energy for a Certificate of Site and Facility

Dear Ms. Monroe:

Enclosed for filing in the above-captioned proceeding is Counsel for the Public's Motion for Leave to Retain Transmission Line Design and Construction Consultants and for an Order Directing the Applicants to Bear the Costs Thereof.

Copies of the enclosure have been forwarded via e-mail to all parties on the enclosed Distribution List.

Thank you.

Sincerely,



Thomas J. Pappas

TJP/slb - 2398415_1

Enclosure

cc: Peter C.L. Roth, Esq.
Elijah J. Emerson, Esq.
Distribution List via e-mail

**THE STATE OF NEW HAMPSHIRE
SITE EVALUATION COMMITTEE**

No. 2015-06

Joint Application of Northern Pass Transmission, LLC and Public Service Company of New
Hampshire d/b/a Eversource Energy for a Certificate of Site and Facility

**COUNSEL FOR THE PUBLIC’S MOTION FOR LEAVE TO RETAIN TRANSMISSION
LINE DESIGN AND CONSTRUCTION CONSULTANTS AND FOR AN ORDER
DIRECTING THE APPLICANTS TO BEAR THE COSTS THEREOF**

Counsel for the Public, by his attorneys, the Office of the Attorney General and Primmer Piper Eggleston and Cramer PC, hereby moves, pursuant to RSA 162-H:10, V, for leave to retain expert consultants and for an order directing Northern Pass Transmission, LLC and Public Service Company of New Hampshire d/b/a Eversource Energy (the “Applicants”) to bear the costs and fees of the consultants and reimburse Counsel for the Public or pay the fees and costs directly to the consultants, as follows: Dewberry in an amount up to \$284,765, Siemens Industry, Inc. (“Siemens”) in an amount up to \$139,480, and Electrical Consulting Engineers, P.C. (“ECE”), in an amount up to \$96,030 (collectively referred to as the “Consultants”). In support hereof, Counsel for the Public respectfully represents as follows:

A. BACKGROUND.

On October 19, 2015, the Applicants submitted a Joint Application for a Certificate of Site and Facility (the “Application”) to the New Hampshire Site Evaluation Committee (the “Committee” or “SEC”) to construct a 192-mile transmission line to run through New Hampshire from the Canadian border in Pittsburg to Deerfield (the “Project”). The Application with its appendices contains more than 27,000 pages including numerous expert reports and studies.

On November 2, 2015, the Chairman of the Committee appointed a Subcommittee (the “Subcommittee”) to consider the Application. The Subcommittee accepted the Application on December 18, 2015. The Applicants provided additional information for the Application on February 26, 2016, pursuant to the revised SEC Rules effective December 16, 2015.

B. LEGAL STANDARD.

Pursuant to RSA 162-H:9, I, Counsel for the Public “... shall represent the public in seeking to protect the quality of the environment and in seeking to assure an adequate supply of energy. The counsel shall be accorded all the rights and privileges, and responsibilities of an attorney representing a party in formal action and shall serve until the decision to issue or deny a certificate is final.” Moreover, RSA 162-H:10, V, authorizes Counsel for the Public to “conduct such reasonable studies and investigations as [it] deems necessary or appropriate to carry out the purposes of this chapter” Counsel for the Public “may employ a consultant or consultants ... in furtherance of the duties imposed by this chapter, the cost of which shall be borne by the applicant in such amount as may be approved by the committee.” *Id.* Counsel for the Public’s broad role includes conducting studies and investigations necessary and appropriate to carry out the purposes of the statute. Order on Pending Motions, *In re Request of SEA-3, Inc. for Exemption*, dated August 10, 2015, at 9. Those issues “go beyond protection of the environment and assuring an adequate supply of energy” and include any matters identified in RSA 162-H:1. *Id.*

C. ARGUMENT.

Counsel for the Public wishes to retain three firms to provide expert analysis and opinion on the design and construction of the Project. Dewberry is a civil engineering firm that will assist in Counsel for the Public’s review of the proposed construction of the Project and its

impacts to the hosting communities and natural resources. Siemens Industry, Inc. will provide electrical engineering services for the overhead portions of the Project as well as the Coos Loop and issues regarding electro-magnetic fields. Electrical Consulting Engineers, P.C. will provide electric engineering services for the underground portions of the Project. The three firms are being presented in the same motion because they will be coordinating with each other in their review of the Project. It is also expected that the Consultants will collaborate with other experts that Counsel for the Public retains (e.g., aesthetics, wildlife) to avoid duplication of effort and to share information. The Consultants' resumes are attached as Exhibit A and the details of services that they will provide are set forth in the attached Exhibit B. The rates Consultants will charge are also set forth in Exhibit B. The total cost of the work is estimated at approximately \$284,765 for Dewberry, \$139,480 for Siemens, and \$96,030 for ECE.

Counsel for the Public has deemed that the retention of Consultants' services to analyze the Applicants' design of the proposed high-voltage transmission line and how the construction of that line will impact the welfare of the population, private property, the location and growth of industry, the overall economic growth of the state, and the public interest, is necessary to carry out the purpose of the siting statute and to evaluate if the Project will assure an adequate supply of energy without unreasonably and adversely affecting the quality of the natural and human environment. As stated in RSA 162-H, the purpose of the siting statute is to find "a balance among those potential significant impacts and benefits" of the Project. RSA 162-H:1. Retention of the Consultants is necessary because it will provide Counsel for the Public and the Committee, and ultimately, the people of the many New Hampshire towns and city through the Project passes, with an unbiased, independent, and thorough analysis of the Project's design and impacts to New Hampshire and its people. This is necessary to enable the Committee to determine

whether the Project and its construction will be in the public interest, how its construction will affect the many communities that the Project passes through, the welfare of those communities, and whether it will have an unreasonable adverse impact on aesthetics, the natural environment, and the orderly development of the region.

The Project is a 192-mile long high-voltage transmission line that contains both overhead and underground components as well as AC and DC designs. It marches through diverse areas of the state, from remote forested lands to lightly-populated tourist destinations to highly-populated urban and suburban residential and commercial neighborhoods. The Project also involves the creation of a new converter station in Franklin and the expansion of an already significant substation in Deerfield. The fifty-three (53) mile segment of undergrounding through the White Mountain National Forest, which is located in a number of vibrant village centers, has been described by the Applicants as unprecedented. There will be large transition structures at each of the three underground segments; structures that the Applicants have not adequately described. The Project also requires the relocation of many miles of existing distribution lines that currently utilize the same corridor. The new lines will occupy the same corridor in new and complex ways that warrant additional scrutiny for purposes of determining feasibility, and ultimately, public safety.

Counsel for the Public and the Committee need the expert insight of the Consultants to understand how the design and construction of the Project will impact the environment, public health and safety in the hosting communities. As an example, Burns & McDonnell Engineering, Inc. (“Burns & McDonnell”) has stated that the pits for trenchless digging will be twenty feet (20’) wide by twenty feet (20’) deep by sixty feet (60’) long. Pre-filed Direct Testimony of Nathan Scott at 4. The Applicants, however, have not described how many of these pits will be

needed and where they will be located. *Id.* at 3-4. The Applicants also have stated that roads could be closed by up to two weeks but have not described the impact on businesses, emergency services or alternative roads. Pre-filed Direct Testimony of John Kayser at 31. The Consultants will be able to evaluate such impacts. In general, undergrounding of the Project has been a matter of extreme importance to the public. Many have publically urged the Applicants to “bury the whole thing” along Interstate Highway 93 or other routes. The Consultants will be able to provide an independent assessment on the technical and economic feasibility of undergrounding additional portions of the Project.

In designing the overhead portion of the Project, Applicants have proposed in many instances to double the heights of the existing lines and introduce new structures up to 160 feet tall in settled areas of the route. Appendix 1, Project Maps at Sheet 173. This need to have taller poles is apparently driven by the size of the right-of-way that Applicants selected in many areas of the Project. Pre-filed Direct Testimony of Derrick Bradstreet at 3. The Consultants will assist in understanding the relationship between right-of-way dimension and geometry and pole heights. For the entire Project corridor, the Applicants describe construction laydown areas of five (5) to fifty (50) acres in size. Kayser at 15-16. They do not provide information on how many of these laydown areas will be needed or where they will be located. Given their size, the laydown areas alone could have an unreasonable adverse impact on aesthetics, the natural environment, public health and safety or the orderly development of the region, and should be scrutinized by the Committee in its evaluation of the overall Project. These are just a few of the examples where expert analysis is required to evaluate the impacts of the Project from a construction impacts and technical perspective.

Because the Project is a merchant transmission facility, the main benefits to New Hampshire are all related to economic activity which the Applicants claim the Project will precipitate and how those benefit or impact New Hampshire. Those benefits need to be contrasted to the impacts that will be imposed on the many New Hampshire communities through which the Project passes during the construction phase. In order to determine whether the Project should be issued a Certificate of Site and Facility, it is Counsel for the Public's and the Committee's responsibility to evaluate how these benefits and impacts fit into the overall "public interest" of the Project. The retention of the Consultants is necessary to achieve that goal.

Counsel for the Public researched, investigated and interviewed other potential experts prior to selecting the Consultants. The Consultants possess the appropriate balance between (a) experience and relevant expertise, and (b) cost-effectiveness. Moreover, Counsel for the Public has worked with Consultants to refine their scope of work to make sure it is focused to achieve prudent advice at a reasonable cost.

Counsel for the Public will forward Consultant's invoices to the Applicants' counsel for payment by the Applicants. Counsel for the Public also will forward to Applicants' counsel a forecast of estimated future costs so that Applicants can budget for them.

WHEREFORE, Counsel for the Public prays that the Committee enter orders authorizing the employment of Dewberry, Siemens Industry, Inc. and Electrical Consulting Engineers, P.C. as consultants pursuant to RSA 162-H:10, V, and directing the Applicants to bear the costs, as incurred monthly, up to a total of \$284,765 for Dewberry, up to a total of \$139,480 for Siemens, and up to a total of \$96,030 for ECE, and granting such other relief as may be just.

The Applicants' Position:

The Applicants assent to the relief sought in the motion, but not to any characterizations in the motion about the case or the Application.

The Following Parties Concur in this Motion:

The City of Concord
The City of New Hampton
The Town of Bridgewater
The Town of Woodstock
The Town of Littleton
The Town of Deerfield
The Ashland Water District
The Town of Bristol
The Town of Easton
The Town of Franconia
The Town of Northumberland
The Town of Sugar Hill
The Town of Whitefield
The Society for the Protection of NH's Forests
The Conservation Law Foundation
The Deerfield Abutter's Group
Susan E. Percy
Mark and Susan Orzeck
Virginia Jeffryes
Jon and Lori Levesque
David Schrier
Rodrigue and Tommy Beland
Eric, Elaine and Joshua Olson
Rodney Moore, et al
Cheryl Jensen, Co-Chair, Bethlehem Conservation Commission
Mary Lee
Taras Kucman
Maureen Quinn
Brad and Daryl Thompson

The Following Parties Object to this Motion:

No party has indicated their objection to the motion.

The Following Parties Take No Position on this Motion:

The City of Berlin

Respectfully submitted,

COUNSEL FOR THE PUBLIC,

By his attorneys,



Dated: May 13, 2016

By: Peter C.L. Roth
Peter C.L. Roth, Senior Assistant Attorney General
Environmental Protection Bureau
33 Capitol Street
Concord, NH 03301-6397
(603) 271-3679

PRIMMER PIPER EGGLESTON & CRAMER PC,



Dated: May 13, 2016

By: Thomas J. Pappas
Thomas J. Pappas, Esq. (N.H. Bar No. 4111)
P.O. Box 3600
Manchester, NH 03105-3600
(603) 626-3300
tpappas@primmer.com


-and-

Elijah D. Emerson, Esq. (N.H. Bar No. 19358)
PRIMMER PIPER EGGLESTON & CRAMER PC
P.O. Box 349
Littleton, NH 03561-0349
(603) 444-4008
eemerson@primmer.com

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing MOTION FOR LEAVE TO RETAIN TRANSMISSION LINE DESIGN AND CONSTRUCTION CONSULTANTS AND FOR AN ORDER DIRECTING THE JOINT APPLICANTS TO BEAR THE COSTS THEREOF has this day been forwarded via e-mail or mail to persons named on the Distribution List of this docket.

Dated: May 13, 2016



Thomas J. Pappas, Esq. (N.H. Bar No. 4111)

Exhibit A 1



David L. Taylor, Jr. RLA

Associate Vice President

EXPERIENCE HIGHLIGHTS:

Practices Total Project Consulting
Client Manager for all of Dewberry's
Exelon/Pepco/BGE commissions
Client Manager and Project Manager
for Dewberry's power commissions in
Maryland and Washington, DC

EDUCATION:

MS, Real Estate, Johns Hopkins
University
BS, Landscape Architecture, West
Virginia University

REGISTRATIONS:

Landscape Architect: MD, PA, OH

YEARS OF EXPERIENCE:

Dewberry: 8
Prior: 14

AFFILIATIONS:

Leadership Baltimore County
Maryland Building Industry
Association

PUBLICATIONS:

" *Land Development Handbook 3rd ed.*;
Chapter 8 "Subdivision Ordinances,
Site Plan Regulations, and Building
Codes" Published by McGraw-Hill; 2008

Mr. Taylor provides multi-discipline team management/leadership enterprise wide with an emphasis on Total Project Consulting. He is responsible for business and operational development for surveying, engineering, landscape architecture and consulting services in the firm's Baltimore office and throughout the Mid-Atlantic.

As a manager he has a hands-on approach and enjoys working directly with clients in all aspects of program development, feasibility, entitlements, zoning, planning, engineering and permitting. In addition to his core team in Baltimore, David coordinates professional resources across many Dewberry offices providing surveying, geospatial, civil engineering, landscape architecture, MEP engineering, structural engineering, planning, zoning and permitting for power/energy, infrastructure, institutional and commercial clients.

RELEVANT EXPERIENCE

Pepco-Buzzard Point/Waterfront Substation Route Study, Washington, D.C.; Project Manager. Project is in SE Washington, DC. Dewberry is exploring potential underground utility corridors for four proposed 138kV transmission line feeders (1,700 Lf± each) between an existing substation and proposed substation. This work is being driven, in part, by the potential relocation of a professional soccer stadium. Dewberry is providing base mapping, route surveying, utility data gathering, Level A utility locating, Phase 1 & 2 Environmental Site Assessments, route layouts and analysis, civil engineering, maintenance of traffic plans, conduit plan and profiles, erosion and sediment control, exhibits, DDOT permit processing and general consulting services.

Pepco-Blue Plains Advanced Waste Water Treatment Plant/Naval Research Laboratory/Joint Base Anacostia-Bolling Route Study, Washington, D.C.; Project Manager. Project area includes Blue Plains Advanced Waste Water Treatment Plant, Naval Research Laboratory (NRL) and Joint Base Anacostia-Bolling. To increase reliability and provide redundant power supply to all three facilities Pepco proposes to construct two 69kV underground

transmission lines (2,000 LF±) between substation 83 and 168 in SW Washington, DC. Dewberry services include field surveying potential route alignments and assembling existing utility data for water, sewer, storm drain, gas, electric, communications and steam lines, base mapping, analyze potential route alignments, prepare plan and profiles, cross sections, 3D utility visualization model, traffic control plans, erosion and sediment control, predictive analysis for construction equipment vibrations, establishing test pit locations, and permit/approvals coordination with CSX Railroad, Blue Plains, NRL, Joint Base, DC Department of Regulatory and Consumer Affairs (DCRA) and DC Department of the Environment (DDOE).

Pepco-Takoma to Georgetown Route Study, Prince George's County, Maryland and Washington, D.C.; Project Manager. Dewberry is exploring potential underground utility corridors for four proposed 69,000 volt transmission line feeders (41,500 LF± each) routing between four existing substations. Dewberry provided base mapping, route alternatives and recommendations, horizontal alignment plans and client and subconsultant coordination relative to property rights and access, substation and intersection surveys.

Pepco-Capitol Crossing Route Realignment, Washington, D.C.; Project Manager. Due to a developer need Dewberry is realigning a 138,000 volt pipe type underground transmission line feeder (450 LF ±) along Massachusetts Ave. Dewberry is responsible for base mapping, route layouts and analysis, civil engineering, pipe-type plans and profiles, exhibits, and client and developer coordination relative to developer design drawings and proposed and existing utilities, and test pitting.

Pepco Champlain Substation MOT, Washington, D.C.; Project Manager. As part of their planned infrastructure upgrades Pepco is replacing older pressurization plants. In support of this effort at the Champlain substation in NE Washington DC Dewberry prepared maintenance of traffic plans (MOT) for temporary parking restrictions, detours, the closing of a neighborhood road and permitting through DDOT. MOT was necessary for the removal, by crane, and replacement of an existing 8,000 gallon pressurization plant within the substation.

Pepco E. Capitol Street 138kV PTL Repair, Washington, DC.; Project Manager. In response to third party contractor damage to an existing pipe-type line, Dewberry provided emergency support services for Pepco in support of their repairing the line. Services included surveying, collecting geotechnical samples for testing and exhibit preparation.

Baltimore Gas & Electric LiDAR Specifications & QA/QC, Baltimore, MD.; Client Manager. Dewberry developed specifications and provided independent QA/QC of LiDAR (Light Detection and Ranging) and Imagery collected as part of BGE's ongoing efforts to evaluate and demonstrate

compliance of their 800 linear miles of above ground electric transmission lines with the North American Electric Reliability Corporation (NERC). Our services included review their existing LiDAR acquisition and product deliverables specifications, develop new specifications, review their third party LiDAR vendor qualifications, participate in third party LiDAR vendor interviews and evaluate and rank the potential vendors, check point surveys, general geospatial consulting, quality assessment of LiDAR tiles, completeness check of LiDAR data, quantitative and qualitative assessment of LiDAR data, classified point cloud review, metadata inspection and review of imagery and planimetric maps.

Baltimore Gas & Electric TLCCP, Multiple Counties, MD.; Client/Project Manager. In support of NERC compliance efforts Dewberry is providing above ground transmission line topographic, tower and conductor surveys along with preparing grading, sediment and erosion control plans, and permit expediting for 20 sites in Baltimore, Harford, Frederick and Anne Arundel County.

Potomac River Station C Substation, Arlington County, VA.; Client/Project Manager. In response to Dominion Virginia Power (DVP) connecting a 230kV interconnection to Pepco's system, they will construct a new high side bus to the existing substation at Potomac River Station C, add additional equipment and reconfigure the four existing 230kV underground transmission feeders leading into Station C. The proposed relocation totals approximately 850 linear feet and connects the feeder to the new high side bus. Dewberry is providing routing plans and profiles, laser scanning of substation equipment, boundary and topographic survey, utility designating, test pits, permitting and as-built services.

Pepco- Buzzard to War Substation Survey – Washington D.C. and Arlington County, Virginia; Project Manager. In response to the retirement of two underground 69,000 volt transmission feeders from Buzzard Point substation within Washington D.C to a termination point in the War substation in Virginia (2 miles LF±) Dewberry located and surveyed 27 manholes so Pepco can remove the cables. Our services included base mapping of manholes, preparing plans showing access points to each manhole, permitting for National Park Service access, subconsultant coordination for utility designation, and client coordination for overall project advancement.

Pepco-Takoma to Burtonsville Permitting, Prince George's County, Maryland; Project Manager. Dewberry provided permitting support for the installation of a 230,000 volt overhead transmission line across 27 road crossings. Our services included base mapping, maintenance of traffic plans, and client coordination relative to permit agencies, contractor and overall project advancement.

Pepco- Substation Decommissioning Surveys, Prince George's County Maryland and Washington, D.C.; Project Manager. Due to the decommissioning of seven (7) substations within Washington, D.C and Maryland Dewberry surveyed each substation to be used as a base for the subsequent razing of each facility. Our services included base mapping and survey and client coordination for overall project advancement.

Mattawoman Energy 230kV Generator Lead Line and Switch Yard, Prince George's County MD; Project Director/Manager. In support of Mattawoman's proposed 839-megawatt combined cycle power plant Dewberry is providing surveying, civil engineering, electrical engineering, geotechnical engineering, structural engineering, routing, land acquisition, easements, forest conservation, exhibits, permitting and consulting services for 2.5 miles of 230kV overhead transmission line on mono-poles and associated switch station which will connect to Pepco's existing Burches Hill Substation. Coordination with SMECO is also required for the relocation of existing overhead distribution lines along the existing CSX railroad.

Pepco Wye Mills Substation, Queenstown, MD.; Client/Project Manager. Pepco constructed a new 138kV underground transmission line within the Wye Mills substation. Dewberry provided survey and mapping, routing plans, profiles, utility designating, test pits, erosion and sediment control, TL drawings, permitting, as-builts, construction stakeout and general consulting services.

Pepco Indian River Substation, Dagsboro, DE.; Client/Project Manager. Pepco constructed a new 138kV underground transmission line within the Indian River substation. Dewberry provided survey and mapping, routing plans, profiles, utility designating, test pits, erosion and sediment control, TL drawings, permitting, as-builts, construction stakeout and general consulting services.

Pepco Easton Substation, Easton, MD.; Client/Project Manager. Pepco constructed a new 138kV underground transmission line within the Easton substation. Dewberry provided survey and mapping, routing plans, profiles, utility designating, test pits, erosion and sediment control, TL drawings, permitting, as-builts, construction stakeout and general consulting services.

Pepco Takom to Sligo Substation 69kV Underground TL, Prince George's County and Montgomery County, MD and Washington, DC.; Pepco is planning to construct four (4) new 69kV transmission lines in two (2) 8-way duct banks approximately 3.5 miles traveling from the existing Takoma Substation #27 in Prince George's County, MD to Sligo Substation #9 in downtown Silver Spring, MD. Dewberry is providing survey/mapping, route planning, plan and profiles, geotechnical engineering, community outreach, traffic control plans, erosion and sediment control, permitting, construction stakeout, as-builts and construction administration/RFI services.



Adam Zysk PE

Senior Site/Civil Engineer

Mr. Zysk has over 31 years of diverse experience on projects located throughout the New England states. These projects have covered the spectrum from interstate highway and interchange designs to site plans for telecom installations. Throughout his career he has completed projects for federal and state agencies, multiple municipalities and private clients. His project responsibilities have included project management, transportation and civil/site design, traffic engineering, construction phasing and traffic management design, drainage, water and wastewater system design and pre-construction and construction inspections. In addition, he has led and/or participated in the public information process in many of the projects he has been involved with through presentations to clients and outside groups and the development of informational materials.

EDUCATION:

BS, Civil Engineering, University of Rhode Island, 1985

REGISTRATIONS:

Professional Engineer - Civil: MA, CT, RI

YEARS OF EXPERIENCE:

Dewberry: 8

Prior: 23

AFFILIATIONS:

American Society of Civil Engineers

Boston Society of Civil Engineers

SELECTED EXPERIENCE

Route 1A (Rantoul Street and Cabot Street) Reconstruction, City of Beverly, MA, Project Manager. Responsible for leading the design process and presenting the proposed design concepts to the local business organization, City officials and the general public as the design progressed. Detailed traffic management plans were required to maintain access to numerous abutters and existing traffic volumes throughout construction. Project right of way requirements included preparing plans and legal descriptions for nearly 200 temporary and 70 permanent easements and 3 takings. This \$20-million reconstruction project included rehabilitation of deteriorated roadway and pedestrian sidewalks, traffic signal upgrades, ADA accessibility, permitting and extensive improvements to the existing storm drainage system. The design requires that traffic be maintained throughout construction with minimal detouring allowed.

Neponset River Bridge Rehabilitation, Boston and Quincy MA. Civil Engineer for the \$54 million rehabilitation of this 23 span viaduct which included complete reconstruction of deteriorated hammerhead pier caps; seismic retrofit with isolation bearings; complete roadway deck reconstruction; widening the sidewalks and adding pedestrian ramps; installation of new lighting and railings; minor realignment and grading of surface streets; modifications to the surface drainage system and optimization of traffic signals. The two-phase project integrated a workable traffic management scheme to maintain daily traffic on this major arterial roadway connecting Quincy and Boston.

Replacement of Needham Street Bridge over Great Ditch Bridge, MassDOT, Dedham, MA, Roadway Project Manager for this Accelerated Bridge Project assignment that includes preliminary through final design and construction phase services for the replacement of the Needham Street over Great Ditch bridge in Dedham. Drainage improvements included the design of two new level spreaders

to mitigate stormwater runoff to adjacent resource areas. Temporary easements were identified as required for construction access and placement of erosion and sedimentation control elements. Detailed construction phasing plans and traffic management details were required for the new bridge.

Section 4 Webster Avenue Evaluation, MWRA, Somerville, MA, Civil Engineer. Responsible for providing assessment of necessary traffic restrictions/management to allow the project to be constructed for replacement and rehabilitation alternatives analysis for a 48" water main on a utility bridge over the MBTA railroad. Details included ADA compliant wheelchair ramps and detailed traffic management plans and details. Final design of the bridge replacement included analysis and impact to local roadway access restrictions, crane access requirements, foundation impact to adjacent structures, etc.

Telecom Sites, New England. Project Engineer for the design of access roads for numerous telecommunication sites in each of the New England states. Project requirements included geometric design and grading, drainage design, and development of erosion and sediment control and other site specific details. At a number of locations, infiltration systems were designed to maintain a zero net increase in site stormwater runoff in accordance with local regulations. Sites located on private property required the delineation of permanent easements for site access and occasionally supplemental temporary easements for construction.

Northern Intermediate High Short Term Improvements, MWRA, Civil/Traffic Engineer for design of 2,500 linear feet of 36" water main connecting the Towns of Stoneham and Reading. Dewberry was responsible for survey, wetland delineation, hazardous materials assessment, subsurface investigation, permitting, design, bidding, resident inspection and construction administration services. Mr. Zysk oversaw the designs for traffic management including detours, construction zone safety plan (CZSP), intersection phasing and incorporating blasting requirements. He was also responsible for presenting the proposed traffic management schemes to the officials and police forces of both municipalities and coordinating their respective requirements to gain acceptance of the work.

Callahan Tunnel Roadway Rehabilitation, MassDOT, Boston, MA. Civil Engineer for design of the \$30 million rehabilitation of the Callahan Tunnel, which carries two lanes of traffic of Route 1A NB under Boston Harbor and serves as a major highway transportation link between downtown Boston to Logan Airport and points north. The project featured concrete reconstruction of the roadway deck, curb reconstruction, and new bituminous concrete pavement. The work involved closing one of the primary access points to Logan Airport. Extensive traffic management plans were required that varied from local detour plans and site access details to regional notification signs and electronic messaging. To assist travelers unfamiliar with Boston, interactive maps were created for posting to the project website.



Brenden Alexander PE

Senior Structural Engineer

Mr. Alexander is a licensed structural engineer and senior project manager with extensive experience in the design of new structures and the modification and retrofit of existing structures including the design of transportation facilities, water/wastewater facilities, healthcare facilities, HVAC support framing, and telecommunication structures. His background also includes bridges, tunnels, parking garages and boat basins. His building design work has consisted of a variety of structures and systems including steel frame, reinforced concrete foundations, vaults and floor systems, and light gauge construction.

EDUCATION:

MS, Structural Engineering, Tufts University

BS, Civil Engineering, Merrimack College

REGISTRATIONS:

Professional Engineer, Structural: MA, CT, ME, NH, FL, TX

National Council of Examiners for Engineering and Surveying

YEARS OF EXPERIENCE:

Dewberry: 12

Total: 12

AFFILIATIONS:

American Society of Civil Engineers

CoreNET Global

SELECTED EXPERIENCE

713 Tremont Control Center Expansion, NSTAR (now Eversource), Wareham, MA. Structural Engineer for the expansion of 713 Tremont Station necessary for the installation of additional high voltage distribution switch gear equipment. The single-story expansion structure includes a brick veneer exterior and roof shape and finish materials consistent with the existing structure.

MassDOT General Engineering Consultant (GEC), Various locations, MA. Structural Engineer. This MassDOT contract was ongoing for over 10 years and included a variety of work order assignments including: the triennial inspection of bridges, highways, drainage systems, buildings, electrical and mechanical systems and toll collection systems; building study, evaluation, design and contract documents; structural and geotechnical engineering, design and contract documents; bridge and highway engineering studies, rehabilitation, design, contract documents, and construction phase services; and construction administration and resident engineering and inspection.

Neponset River Bridge Rehabilitation, MassDOT, Boston and Quincy, MA. Structural Engineer for the \$54 million award-winning rehabilitation of this 23 span viaduct which included complete reconstruction of deteriorated hammerhead pier caps, seismic retrofit with isolation bearings, complete roadway deck reconstruction, widening the sidewalks and adding pedestrian ramps, and installation of new lighting and railings. The two-phase project addressed serious structural deterioration while integrating a workable traffic management scheme to maintain daily traffic on this major roadway connecting Quincy and Boston.

Replacement of Needham Street Bridge over Great Ditch Bridge, MassDOT, Dedham, MA. Structural Engineer for this Accelerated Bridge Project assignment that includes preliminary through final design and construction phase services for the replacement of the Needham Street over Great Ditch bridge in Dedham. Drainage improvements included the design of two new level spreaders to mitigate stormwater runoff to adjacent resource areas. Detailed construction

phasing plans and traffic management details were required due to proposed elevation changes for the new bridge.

I-93 Fast 14 Rapid Bridge Replacement Project, MassDOT, Medford, MA.

Structural Engineer responsible for bridge design for the replacement of four of the 14 deteriorated bridge deck superstructures along a high volume section of I-93. The superstructure replacements used Accelerated Bridge Construction through the use of prefabricated modular units to accomplish complete replacement over the course of 55-hour weekend traffic shutdowns.

Various Telecommunication Installations, New England. Structural Engineer

responsible for design and construction documents for numerous cellular communication sites throughout New England. Services comprise design of telecommunication buildings such as sheds, lean-tos and other non-prefabricated structures for the development of telecommunication sites; field inspections and analysis of existing structures for installation of equipment shelters and antennas; development of site plans in conjunction with Township zoning requirements; evaluation of potential raw land sites; design of equipment building and monopole foundations; new electrical and telephone services; field surveying and engineering support services during construction; testimony for zoning and planning board hearings. Structural design performed in accordance with the Local Building Code and the EIA/TIA 222 Structural Standards for Steel Antenna Towers and Antenna Supporting Structures.

Replacement of Wyoming Bridges No. 43 and 44, RIDOT, Hopkinton and Richmond, RI. Structural Engineer for this \$2-million bridge replacement of two bridges on stone abutments and piers in an environmentally sensitive and historic mill area.

Section 4 Webster Avenue Evaluation, MWRA, Somerville, MA. Structural Engineer responsible for an in-depth bridge inspection and report to assess overall condition rating and structural analysis to evaluate several alternatives to repair or replace the steel truss utility bridge. Final design of the bridge replacement included analysis and impact to local roadway access restrictions, crane access requirements, foundation impact to adjacent structures, etc.

Wachusett Aqueduct Emergency Connection, MWRA, Clinton, MA.

Structural Engineer for final design of two 120-inch butterfly valves to provide the MWRA with the ability to deliver water from one aqueduct to the other during emergency situations. After detailed analysis, Dewberry proposed installing both valves in the existing vault, potentially saving the Authority significant construction costs. Contract documents will include structural, mechanical, security, SCADA and site/civil aspects in addition to the valves design. Structural modifications include reconfiguring the removable slabs of the valve vault roof structure.

Exhibit B 1

NORTHERN PASS TRANSMISSION LINE

INTRODUCTION

We appreciate the opportunity to submit this proposal for Consulting and Technical Analysis to Counsel for the Public in the Attorney General Office of New Hampshire for the Northern Pass Transmission Line Site Evaluation Committee (SEC) Application (Docket No. 2015-06). It is our understanding the application entails 192 miles of 320kV HVDC and 345kV AC overhead and underground transmission line (and related facilities) extending from the international border between (Canada and) Pittsburg, NH to Deerfield, NH, essentially bisecting the state. Review and technical analysis of the application is necessary to determine soundness of design, feasibility of the route(s) presented, assess opportunities to reduce impacts (without redesigning for the applicant), and determine impacts of construction on New Hampshire communities and natural resources.

For committee members who are not familiar with Dewberry we are a leading, market-facing firm with a proven history of providing professional services to a wide variety of public- and private-sector clients. Recognized for combining unsurpassed commitment to client service with deep subject matter expertise, Dewberry is dedicated to solving clients' most complex challenges and transforming their communities. Established in 1956, Dewberry is headquartered in Fairfax, Virginia, with more than 50 locations and 2,000 professionals nationwide. We support large and small projects in the following primary service areas:

- Alternative delivery
- Architecture
- Climate change
- Emergency management
- Environmental
- Geospatial
- Land planning and development
- MEPS
- Resilience
- Security Technology
- Site/civil
- Surveying/mapping
- Sustainability
- Transportation
- Water
- Water resources

In the power utility market we have successfully teamed with clients on more than two thousand miles of linear power infrastructure projects (overhead/underground transmission and substation), providing services such as consulting, surveying, mapping, geospatial, route planning/analysis, site/civil engineering, environmental and cultural review, resilience design, architecture, transportation, utility conflict resolution and permitting. Our capabilities cover rural, urban and metropolitan centers.

Our steady growth and ability to provide the capabilities, capacity, and geographic presence to serve a diverse client base has made us an industry leader, as demonstrated by the latest *Engineering News-Record* rankings.

2015 ENR Rankings

22nd	Top 100 'Pure' Designers	19th	Top 25 in Bridges
41st	Top 500 Design Firms	16th	Top 25 in Water Supply
47th	Top 100 Green Design Firms	43rd	Top 50 in Sewerage and Solid Waste
24th	Top 50 in General Building	19th	Top 25 in Transmission Lines and Aqueducts
4th	Top 10 in Correctional Facilities	36th	Top 50 in Telecommunications
14th	Top 25 in Government Offices	136th	Top 200 Environmental Firms

PROJECT UNDERSTANDING

The Northern Pass Transmission Line Applicant proposes to construct 192 miles of 320kV HVDC and 345kV AC overhead and underground transmission line (and related facilities) extending from the international border between (Canada and) Pittsburg, NH to Deerfield, NH, essentially bisecting the state (see Figure 1).

The application which includes numerous reports, plans, maps and written testimony (140 separate items) are located online at a website maintained by the applicant- <http://www.northernpass.us/state-filing-documents.htm>. These documents, additional documents obtained through data requests, and documents from other consulting firms including, Primmer, Siemens PTI, and Electrical Consulting Engineers, P.C., constitute the full application and the breadth of submitted information Dewberry will consider as part of our consulting and technical review.

The proposed Northern Pass Transmission Line will be within existing public and utility rights-of-way as well as privately acquired right-of-way. The route entails 132 miles of overhead transmission line in four segments and 60 miles of underground transmission line in three separate segments-two smaller segments at the northern end near Clarksville and a longer run across the White Mountain National Forest. Six transition stations are proposed- one at each of the points where overhead and underground conversion occurs along with one converter terminal (in the City of Franklin) and upgrades to the existing Deerfield and Scobie Pond substations.

Certain portions of existing Public Service Company of New Hampshire (PSNH) overhead 115kV and 34.5kV distribution lines along the existing right-of-way will be relocated to accommodate the proposed Northern Pass Transmission Line.

Per our scoping meeting and conference calls, review and technical analysis of the application is necessary.

- To determine soundness of design;
- Feasibility of the route(s) presented;
- Assess opportunities to reduce impacts (without redesigning for the applicant), and;
- Determine impacts of construction on New Hampshire communities and natural resources.

Consulting and technical analysis will be a collaborative effort between Dewberry and firms retained by the Attorney General Office including Primmer, Siemens, Electrical Consulting Engineers, and other specialists as necessary to inform and educate the SEC. Technical design, engineering and plans preparation by Dewberry are not required. Dewberry deliverables will be reports, participation in technical sessions,



Figure 1: Northern Pass Transmission Line

assistance in data requests, written testimony, and testimony at public hearings.

ASSUMPTIONS AND EXCLUSIONS

1. Dewberry will be retained by the New Hampshire Attorney General Office and will represent same.
2. No technical design, engineering or plans preparation will be required.
3. Our work will be limited to review of the Northern Pass Transmission Line application as posted on the Northern Pass website (noted above) as of the date of notice to proceed and the other documents noted above.
4. Dewberry consulting and technical review of the application materials will focus on site/civil-route alignment and constructability impacts, and to a lesser extent operational considerations.
5. Safe right-of-entry to the route and areas contemplated for site development will be made available to Dewberry by the Applicant and/or Attorney General Office as may be necessary to support our field visits and review. This may include vehicular access, ATV access and on foot access by one or more Dewberry personnel.
6. Meetings with Primmer and/or Attorney General Office personnel when necessary will be in Manchester, NH or close proximity.
7. Electrical engineering review (overhead, underground and substation) shall be by others.
8. Visualization, archaeological, cultural, wildlife, wetlands, rare threatened and endangered species review shall be by others.
9. Economic impact/benefit and tourism impact/benefit review shall be by others.
10. Structural engineering review of overhead structures and underground vaults is excluded.
11. Geotechnical engineering review shall be by others.
12. Notice to Proceed (NTP) is anticipated in May or June 2016. While the SEC final schedule has not been determined our proposal assumes all work efforts by Dewberry may be completed by December 2016 or may extend through December 2017.

This proposal is based upon the Draft Outline Scope of Work-Design/Construction received by email on April 5, 2016, and discussions with Primmer and Counsel for the Public, as well as client requirements as of this date. Any modification to these requirements which would require additional work to be performed by Dewberry that is approved will be performed and billed in accordance with our approved hourly rates.

SCOPE OF SERVICES

A. CONSULTING AND TECHNICAL ANALYSIS OF APPLICATION

E001. Consulting and Technical Review of Application

Dewberry's work efforts will cover eight tasks as shown below, generally in the sequence outlined. Our efforts will address the four goals noted below as they relate to site/civil route alignment and constructability impacts, and to a lesser extent operational considerations.

Goals:

- To determine soundness of design;
- Feasibility of the route(s) presented;
- Assess opportunities to reduce impacts (without redesigning for the applicant), and;
- Determine impacts of construction on New Hampshire communities and natural resources (in coordination with review and testimony prepared by others for natural resources).

Task #1: Application Submission Review

Dewberry staff will review the application noted below, as submitted and posted on the Northern Pass website. Emphasis will be on those documents which speak to site/civil route alignment, construction techniques (open trench versus trenchless), access roads for construction, staging and laydown areas, transition station locations, converter station location, and existing substations in Deerfield and Scobie Pond.

The following documents will be reviewed.

- The application pages 1-84.
- The pre-filed testimony of (a) James Muntz; (b) William Quinlin; (c) Sam Johnson; (d) Jerry Fortier; (e) Derrick Bradstreet; (f) Nathan Scott; (g) John Kayser; (h) Lynnn Farrington; (i) Jacob Tinus (j) Lee Carbonneau; and (k) Douglass Bell.
- Appendix 1-10, 31, 32, 34, 39 and 47
- Project Maps.
- Relevant supplemental filing

Deliverables:

- At this stage we will identify items missing from the submission or are unclear which will be necessary to determine if the project will minimize or eliminate impacts to New Hampshire communities and natural resources in a written summary.
- Make recommendations for 6-8 specific sites to be further evaluated by Dewberry and/or the consultant team.

Task #2: Site Visits

After review of application documents Dewberry staff will perform a driving windshield review of the Northern Pass Transmission Line proposed route to the extent practical from Pittsburg, NH to Deerfield, NH. Based on findings from our documents review and driving windshield review we will subsequently visit/walk up to 6-8 specific areas.

Deliverables:

- Site visit #1: driving windshield review – 2 days + 1 day for travel by up to three Dewberry staff.
 - High level written summary of items discovered during the windshield review which will be used as basis for further application review, questions for the applicant and ongoing coordination.
 - Refinement of original recommended specific sites determined under task #1.
- Site visit #2: site specific review – 2 days + 1 day for travel by up to four Dewberry staff.

Task #3: Consultant Team Coordination

Dewberry will oversee and coordinate a limited number of conference calls and WebEx (if appropriate) to assure collaboration and information sharing among Primmer, Siemens, Electrical Consulting Engineers and other specialty consultants during the consulting time period. In addition, subsequent to application review and the driving windshield review noted above Dewberry will coordinate up to four, one day consultant team in-person meetings as noted below. All in-person team meetings will be held at Siemens office in Schenectady, NY.

- 16 hours of conference call and/or WebEx team meetings. Attendance by up to five Dewberry staff.
- Consultant Meeting #1: Subsequent to driving windshield review and prior to Draft report addressing goals submitted to Primmer and Attorney General Office. Attendance by up to three Dewberry staff members and two staff members joining by conference call. 1 day + 1 day travel time.
- Consultant Meeting #2: Prior to final preparation of written testimony. Attendance by up to three Dewberry staff members and two staff members joining by conference call. 1 day + 1 day travel time.

Task #4: Draft Report Addressing Goals

Based on review of the application, driving windshield review, site specific visits and consultant team coordination Dewberry will prepare a Report addressing the goals noted above. Specific areas we will focus on and give consideration on are noted below, although there may be others that are identified as work commences.

- Overhead transmission line structure spacing/location impact considerations
 - Right-of-way width
 - Access road impacts
 - Work space, laydown areas and staging
 - Erosion and sediment control (ESC)
 - Foundation requirements in wetlands (in coordination with review and testimony prepared by others for wetlands).
 - Tree clearing
 - Impacts on communities and natural resources (in coordination with review and testimony prepared by others for natural resources).
 - Other design considerations that may reduce impacts
- Underground transmission line impact considerations
 - Right-of-way width
 - Access roads
 - Work space, laydown areas and staging
 - Erosion and sediment control (ESC)
 - Tree clearing
 - Impacts on adjacent structures
 - Open trench versus trenchless construction areas
 - Manhole spacing/areas
 - Drill pit areas
 - Splicing and pulling areas
 - Underground utility considerations
 - Utility designating/test pits
 - Road repair-full width, mill and overlay, trench repair only
 - Maintenance of traffic
 - Timing and work hours
 - Detours
 - Schools, fire, police, hospital, urgent care
 - Businesses
 - Tourism
 - Impacts on communities and natural resources (in coordination with review and testimony prepared by others for natural resources).
 - Transition station impacts
 - Techniques and considerations for avoiding or minimizing construction impacts in road rights-of-way
 - Other design considerations that may reduce impacts
- Transition station and converter station impact considerations
- Assess feasibility of undergrounding all or substantially all of the Northern Pass Transmission Line within Interstate Highway right-of-way.

Deliverables:

- Draft report addressing goals, which will be used develop written testimony.

Task #5: Prepare Written Testimony

Primmer will prepare all written testimony using the report from above. Dewberry will review and critique the written testimony prepared by Primmer as it relates to the substance of our findings and opinions. We have allocated up the 3.5 days of coordination time by David Taylor and Adam Zysk, and a limited amount of time for support staff if needed. At this time we are unable to define the extent of effort required for this task and have provided an estimated fee for budgeting purposes. If additional time beyond what has been estimated is required, Dewberry reserves the right to seek additional funding approval prior to continuing with the additional services.

Task #6: Respond to Discovery Questions

Dewberry will respond to discovery questions from the applicants and coordinate with Primmer and Attorney General Office. We have allocated up to 40 hours of coordination time by David Taylor and Adam Zysk, and a limited amount of time for support staff if needed. At this time we are unable to define the extent of effort required for this task and have provided an estimated fee for budgeting purposes. If additional time beyond what has been estimated is required, Dewberry reserves the right to seek additional funding approval prior to continuing with the additional services.

Task #7: Site Visits/Consultant Team Coordination

In conjunction with discovery question(s) response and prior to evidentiary hearings Dewberry staff will perform a second driving windshield and/or site specific review of the Northern Pass Transmission Line proposed route to the extent practical from Pittsburg, NH to Deerfield, NH. Additionally, we will revisit/walk relevant site specific areas along the route (estimate 6-8 locations).

Deliverables:

- Site visit #3: windshield and/or site specific review by up to three Dewberry staff – 2 days + 1 day for travel

Task #8: Attend Hearings

Two Dewberry staff will attend hearings as requested by the Counsel for the Public and noted below. Our efforts will also include pre-hearing preparation with Primmer and Attorney General Office.

- Technical hearings: 2 days + 2 day for travel = 2 mobilizations
- Evidentiary hearings: 2 days + 1 day for travel = 1 mobilization
 - Pre-hearing preparation with Primmer and AG – 1 day

Note: If additional per-hearing and/or hearing days beyond what has been allocated above is required (including but not limited to hearing continuances, delays, extensions, prolonged testimony, etc.), Dewberry reserves the right to seek additional funding approval prior to continuing with the additional services.

B. OTHER SERVICES

To98. Reimbursables

Dewberry will invoice reimbursable expenses such as per diem, airfare, hotel, rental car, prints, mileage, FedEx, postage, etc. at cost. While the extent of reimbursables is unknown at this point we have estimated costs based on anticipated site visits, client meetings and hearings.

SUMMARY OF FEES:

ITEM	DESCRIPTION	FEE BASIS	FEE
A. Consulting and Technical Review of Application			
E001	Consulting and Technical Review of Application		
Task #1	Application Submission Review	Hourly Basis; Estimate	\$45,320.00
Task #2	Site Visits	Hourly Basis; Estimate	\$32,920.00
Task #3	Consultant Team Coordination	Hourly Basis; Estimate	\$33,040.00
Task #4	Draft Report Addressing Goals	Hourly Basis; Estimate	\$56,800.00
Task #5	Prepare Written Testimony	Hourly Basis; Estimate	\$17,600.00
Task #6	Respond to Discovery Questions	Hourly Basis; Estimate	\$27,420.00
Task #7	Site Visits/Consultant Team Coordination	Hourly Basis; Estimate	\$18,765.00
Task #8	Attend Hearings	Hourly Basis; Estimate	\$36,400.00
Subtotal A. (Including Estimated Items)			\$268,265.00
B. Other Services			
T098	Reimbursables	Cost; Estimate Only	\$16,500.00
Subtotal B (Including Estimated Items)			\$16,500.00
Total Items A & B (Including Estimated Items)			\$284,765.00

Rates:

Administrative Support:	\$65/hr
Consulting Engineer/Landscape Architect:	\$140 - \$175 - 190/hr
Consulting Senior Engineer/Landscape Architect:	\$260/hr
Principal-in-Charge:	\$300/hr

Dewberry Consultants LLC is an equal opportunity employer and complies with Section 202 of Executive Order 11246, as amended.

In the event the Client accepts this proposal, please execute a copy of this proposal and return it to this office. It is a Dewberry policy that we must receive a copy of the signed contract before any work will begin.

Sincerely,

Dewberry Consultants LLC



Michael R. Snyder, PE
Senior Vice President



David L. Taylor, Jr., RLA
Associate Vice President

Attachments: Standard Attachment B – 4/11
 Resumes

I hereby authorize Dewberry Consultants LLC to proceed in accordance with the afore-described proposal.

Print (Type) Individual, Firm or Corporation Name of Party Legally Responsible for Payment

Signature of Authorized Representative

Date

Print (Type) of Authorized Representative and Title

Exhibit A 2

Mr. Daconti's Bio

CURRICULUM VITAE

NAME: Jose Rafael Daconti

DATE OF BIRTH: October 06, 1954

NATIONALITY: US Citizen (born in Brazil)

EDUCATION:

- Graduate Studies in the USA – funded by the U.S. Congress (Hubert H. Humphrey Fellowship Program – managed by USIA, Institute of International Education and Fulbright Association – Diploma signed by the President of the USA). Mr. Daconti took Graduate Courses and performed technical research in the fields of Electric Power Systems and Electric Power Quality at the Ivy League’s Cornell University (NY) and Electrotek Concepts Inc. (TN), Aug 1996 – July 1997.
- MSEE with Honors (Electric Power Systems), Federal School of Engineering, Itajuba, Brazil, 1986. The Honors Degree Award came as a consequence of the development of a 300-page dissertation and two computational programs for the calculation of electromagnetic compatibility between high voltage transmission lines and gas pipelines.
- One-year Graduate Program “Course of Specialists on Electric Power Systems”, Federal School of Engineering, Itajuba, Brazil, Jan 1981 – Dec 1981.
- BSEE (Electrotechnics), Polytechnic School of Engineering, Recife, Brazil, 1977.
- Technical High School Diploma in Electrotechnics, Federal Technical School of Pernambuco, Recife, Brazil, 1972.

MEMBERSHIP IN STUDENT ASSOCIATIONS:

- Humphrey Fellowship Program Alumni (Cornell University)
- US Department of State Alumni (<https://alumni.state.gov>)
- Fulbright Association Alumni (Eastern New York Chapter)

MEMBERSHIP IN SCIENTIFIC RESEARCH SOCIETY:

- Mr. Daconti is a full member of Sigma Xi, The Scientific Research Society (Rensselaer Polytechnic Institute Chapter, Troy, NY).

USCIS Award: In August 2005, the USCIS awarded Mr. Daconti a Green Card in the Category of Outstanding Researcher.

TECHNICAL CONTRIBUTION TO RELEVANT ENGINEERING PUBLICATIONS

McGraw Hill
“Standard Handbook for Electrical Engineers (Chapter 14 Transmission Systems) – 15th & 16th Editions.

REVIEWER OF PAPERS RELATED TO OVERHEAD TRANSMISSION LINES

Technical Paper Reviewer at the Editorial Board of the IEEE Transactions on Power Delivery (ISSN 0885-8977) since 2002.

CITATION IN RELEVANT TECHNICAL PUBLICATION

Mr. Daconti’s paper “Experience of CHESF Concerning Interferences Between EHV Transmission Lines and Pipelines” published at the CIGRE Session 1986 is cited as a Reference at the CIGRE Technical Brochure “Guide on the Influence of High Voltage AC Power Systems on Metallic Pipelines”, 1995, Paris, FRANCE.

MEMBERSHIP IN TECHNICAL ORGANIZATION

CIGRE Distinguished Member
Former chairman of CIGRE-Brazil Study Committee 36 (Power System Electromagnetic Compatibility)

IEEE Senior Member

Former chairman of IEEE Schenectady PES Chapter

Balloting group member to the following IEEE documents:

- IEEE Std 738-2004 - Standard for Calculating the Current-Temperature of Bare Overhead Conductors
- IEEE Std 1441-2004 - Guide for Inspection of Overhead Transmission Line Construction;
- IEEE Std 957-2004 - Guide for Cleaning Insulators;
- IEEE Std 1260-2004 - Guide on the Prediction, Measurement and Analysis of AM Broadcast Re-radiation by Power Lines;

MSEE ACADEMIC CO-ADVISOR

Mr. Daconti was the Academic Co-Advisor of Mr. Joao V. Eduardo who got a MSEE degree from Federal University of Paraiba, Brazil, in 1993. The dissertation addressed the topic “Electromagnetic Compatibility between Transmission Lines and Pipelines”.

INVITATION TO CHAIR PANEL SESSIONS IN TECHNICAL CONFERENCES

- Chairman of the Panel Session on “Uprating and Upgrading of Overhead Lines, Underground Cables and Transformers” at the IEEE Transmission & Distribution Conference held in Dallas, TX in September 2003.
- Lecturer at the 2004 T&D World Expo and Conference held in Indianapolis, IN in May 2004. This Conference was promoted by Transmission and Distribution World Magazine.

COUNTRIES OF WORKING EXPERIENCE

USA, Brazil, Colombia, Philippines, Jordan, Ghana, Canada

EMPLOYMENT RECORD:

FROM July 2001 TO Present

EMPLOYER: Siemens Power Technologies International – Siemens PTI
Schenectady, NY, USA

**POSITION HELD AND
DESCRIPTION OF DUTIES:**

Senior Staff Consultant

He has worked with PTI Consulting Department where he has been a technical contributor and/or a project manager to a variety of consulting services related to transmission systems and particularly overhead transmission lines. He has worked for clients such as:

- Winergy
- PEPCO
- NEPCO Jordan
- Babcock & Brown
- Public Service of Colorado
- Noble Environmental Power
- BP Alternative Energy of America
- Iberdrola Renewable Energies
- Siemens HVS – Singer Project (PSSE/E-TRAN)
- MidAmerican Energy Company (PSSE)
- Siemens HVS – Black Oak Project (PSSE)
- METC (PSSE & EMTP)
- NYISO (PSSE & ASPEN)
- Hyundai Heavy Industries (EMTP)
- Baltimore Gas and Electric (EMTP)
- Entergy Nuclear (EMTP and TLP)
- International Transmission Company (EMTP)
- Allegheny Power (Expert Witness)
- Alliant Energy (TLP)
- Freeport Electric (EMC)
- Oklahoma Gas and Electric (EMTP)
- Consolidated Edison (PSSE, EMTP & ADEPT)
- Mirant Corporation (MUST and PSSE)

He also worked with Shaw PTI Hardware Department in the development and marketing of its ThermalRate monitoring system. The ThermalRate monitoring system is an innovative idea developed and patented by Shaw PTI and helps utilities to increase the power transfer capability of their high voltage overhead transmission lines in a safe way. In other words, by monitoring the real time thermal ratings of its transmission lines, the utility is able to estimate how much power can be transported throughout each line without sagging the line conductors excessively. So, it could help to avoid Blackouts such as the one occurred in August 2003 when several major power lines in Ohio sagged into trees and provoked short-circuits that leaded a National Blackout.

Additionally, he has worked with Siemens PTI Education Department as Instructor and/or Developer of regular courses on the following topics:

- Overhead Transmission Line Design
- Electromagnetic Compatibility between Transmission Lines and Pipelines
- Transmission Line Theory
- Environmental Concerns of Power Lines
- Lightning and Surge Protection of OH and UG Lines

He is a regular instructor of the long duration and worldwide recognized Power Technology Course, as well as the Distribution System Engineering Course which has been offered for many years to the ConEdison electric utility (New York).

These courses have been approved as Continuing Education Hours for New York State and Florida State licensed Professional Engineers (PE).

These courses have been attended by engineers from North America, Latin America, Europe, Asia and Africa, including electric and gas utilities, government agencies, research centers and private developers such as:

- a) USA
 - New York Power Authority
 - New York State Department of Public Service
 - Consolidated Edison (New York)
 - Key Span Energy (New York)
 - Central Hudson Gas & Electric (New York)
 - Pennsylvania Power & Light (Pennsylvania)
 - Navy Engineering Logistics Office (Virginia)
 - Vermont Public Service Commission (Vermont)
 - MacLean Power Systems (Illinois)
 - Oklahoma Gas & Electric Co. (Oklahoma)
 - Cynergy (Ohio)
 - Kern River Gas Transmission Company (Utah)
 - Salt River Project (Arizona)
 - Tacoma Power (Washington)
 - Lower Colorado River Authority (Texas)
 - City Public Service Board – San Antonio (Texas)
 - Tennessee Valley Authority (Tennessee)
 - EPRI-PEAC (Tennessee)
 - Entergy (Louisiana)
 - Progress Energy (Florida)
 - PAR Electric (Missouri)
 - Southern Natural Gas (Alabama)
 - Hawaiian Electric Company (Hawaii)
- b) CANADA
 - British Columbia Transmission Corporation (CANADA)
 - Manitoba Hydro (CANADA)
 - TransAlta Utilities Corporation (CANADA)
 - AltaLink (CANADA)
- c) CENTRAL AMERICA & CARIBBEAN ISLANDS
 - Virgin Islands Water & Power Authority (VIRGIN ISLANDS)
- d) SOUTH AMERICA
 - Edelca (VENEZUELA)
- e) EUROPE
 - National Grid Company (ENGLAND)

- ESB International (IRELAND)
- NESA (DENMARK)
- f) ASIA
 - Korean Electric Research Institute (KOREA)
 - Korea Electric Power Corporation (KOREA)
- g) OCEANIA
 - Mighty River Power (NEW ZEALAND)
- h) AFRICA
 - Kenya Power & Light (KENYA)
 - Electricity Company of Ghana (GHANA)

FROM July 1998 TO June 2001

EMPLOYER: Electric, Gas, Water & Telecommunication Utilities.

**POSITION HELD AND
DESCRIPTION OF DUTIES:**

Independent Consultant

He worked for CHESF (San Francisco River Hydro Electric Company) and for irrigation, gas and telecommunication companies in Brazil. For CHESF, he worked full-time. Part-time as a team member of the Environmental Department and part-time as a team member of the Transmission Line Design Division. In the Environmental Department, he performed activities related to transmission line environmental costs assessment, environmental permitting, environmental management, environmental education, risk communication to the public concerning EMF exposure and health, including electric and magnetic fields measurement, litigation support and expert public testimony on EMF and health effects applied to lines under litigation. He also worked on environmental risk assessment of high voltage substations. In the Transmission Line Design Division, he performed activities related to transmission lines electrical design, as well as management of transmission line design and construction activities. For ENIIL Irrigation Company, he performed investigations of soil electrical resistivity, and designed and installed a cathodic protection scheme associated to a 105km water pipeline. For PETROBRAS (Brazilian Gas Company), he investigated means to reach the electromagnetic compatibility between several 230 and 69 kV transmission lines and a 200 km gas pipeline. For the ELETRONET Telecommunication Company, he investigated and specified EMC requirements for telecommunication equipment to be installed inside high voltage substations.

FROM January 1978 TO June 1998

EMPLOYER: Companhia Hidro Elétrica do São Francisco – CHESF.
Recife, PE, BRAZIL (<http://www.chesf.gov.br>)

POSITION HELD AND
DESCRIPTION OF DUTIES:

Engineer I - Engineer VI

He worked as a power system engineer in the Department of Transmission System Planning. There, he was mainly involved in electrical analysis, design and investigations concerning 230 kV and 500 kV transmission lines. These activities included: assessment of environmental electromagnetic disturbances; calculation and measurement of electric and magnetic fields; biological effects of electric and magnetic fields; analysis of corona performance of transmission lines including corona losses, audible noise and radio interference; induction on nearby metallic objects and parallel circuits; induction in vehicles and fuel ignition; insulation coordination at transmission towers for power frequency voltage, switching surges, lightning and live-line maintenance; conductor-to-ground clearances; establishment of electrical design criteria; route selection, calculation of right-of-way width and preliminary design of overhead transmission lines; specification and inspection of electrical tests for transmission line components; calculation of electrical parameters and costs of transmission lines; calculation of transposition schemes; selection of conductors, shield wires and insulators; thermal ratings of conductors; and design of transmission line grounding systems, including grounding meshes for urban lines. He also performed studies of electromagnetic compatibility between transmission lines, gas pipelines and railroads and studies of electromagnetic compatibility inside substations. Additionally, he studied means for reduction of voltage sags in transmission systems and helped CHESF to implement its utility power quality program.

FROM May 1976 TO December 1977

EMPLOYER: Companhia Hidro Elétrica do São Francisco – CHESF.
Recife, PE, BRAZIL

POSITION HELD AND
DESCRIPTION OF DUTIES:

Engineer Assistant

He was a full-time team member of CHESF's Transmission Line Design Division where he performed typical technical activities related to 230 kV and 500 kV transmission line design. One of his activities was the development of a software tool in Fortran for conductor sag-tension calculations.

FROM January 1973 TO April 1976

EMPLOYER: Companhia de Eletricidade de Pernambuco – CELPE.
Recife, PE, BRAZIL

POSITION HELD AND
DESCRIPTION OF DUTIES:

Technical Instructor

He worked at the CELPE Electric Utility Training Center where he taught several courses for technicians including Live Line Maintenance of 69 kV and 13.8 kV Distribution Lines.

RELEVANT EXPERIENCE IN OVERHEAD TRANSMISSION LINE ACTIVITIES

KEPCO – Presentation of a Customized Course on OHTL for Maintenance Engineers including topics such as: Overview on Planning, Design and Construction activities; Technical specifications for Procurement and Testing of overhead line material; Overview on Commissioning Tests; Asset Management of overhead line components (Degradation Mode, Failure Mode, Inspection, Condition Assessment, Maintenance Actions); Lightning performance improvement; Conductor vibration; Corrosion of line components; Dynamic thermal rating monitoring systems; Overhead line uprating & upgrading; Overview on live-line maintenance; Vegetation management; Inspection and Maintenance Plans. The course was held in Schenectady, NY in the period Oct 28 – Nov 01, 2013.

Manitoba Hydro – Presentation of a customized version of the Fundamental of Overhead Transmission Line Design Course for 50 engineers in Winnipeg in the period June 10-14, 2013 (Canada)

GRIDCo Ghana (USTDA contract) – Technical Workshop on Overhead Transmission Line Design, Construction, Operation, Maintenance, and Environmental Aspects – Presented for GRIDCo's engineers in Accra, Ghana (Africa).

COES Peru – Service in Progress – Provision of consulting services related to the pioneer design of a 500 kV high altitude (4500 m) overhead transmission line in Peru, South America. Mr. Daconti analyzed aspects of line insulation coordination (tower geometry), electrical and mechanical design criteria, as well as played the role of strategic facilitator for the establishment of the Technical Cooperation Agreement between the COES (Peru) and the Tibet High Altitude Test Station (China).

GRIDCo Ghana (USTDA contract) – Line Route Selection – Route Selection for the 400 km 161 kV Tema – Yendi transmission line, Ghana (Africa).

Abencor – Conductor Inspection Service performed at the Amazon rain forest for the 700 km 500 kV Double Circuit Overhead Transmission Line that connects the Oriximina'-Silves-Lechuga substations. As a result of the performed service, Mr. Daconti has been required to be an Expert Witness before the English High Court of Justice (Queen's Bench Division) in London, UK.

AEP – Recommendations for Connection and Disconnection of Temporary Grounding Sets to Overhead Lines. Mr. Daconti analyzed aspects of insulation coordination for live line maintenance and potential thermal hazards to linemen in charge of installing temporary grounding sets to 345 kV de-energized circuits. The mentioned circuits are electrostatically and electromagnetically induced by various other high voltages lines (including a 765 kV line), located in the same corridor. Recommendations have been issued with respect to minimum safety distances to be respected by the AEP linemen in order to avoid electric shocks and burns.

Algonquin – Conceptual Design of a 345kV Overhead Transmission Line to be built within a 50ft wide Right-of-Way. Mr. Daconti analyzed all electrical aspects and proposed a solution for solving this very complex problem of inserting a line of that magnitude into a typically considered very narrow right-of-way. Aspects of insulation coordination, electric fields, magnetic fields, radio noise and audible noise have been taken into account. The final design is compliant with all NESC requirements.

Central Iowa Power Cooperative – Evaluation of the static thermal rating of a flexible busbar at the Grand Junction substation owned by CIPCO. Mr. Daconti performed all the needed analysis in order to establish the appropriate thermal rating for the mentioned substation busbar.

NextEra – Evaluation of the static thermal ratings of the South Platte-Pawnee and Horse Hollow-Omega overhead transmission lines. Mr. Daconti performed all the needed analysis in order to establish the appropriate thermal ratings for the mentioned lines. Aspects of wind farm output versus line rating have been evaluated for various wind speeds.

November 01, 2013

Sithe Global – Evaluation of Steady-State Thermal Rating for six 132 kV overhead lines in Africa (Bujagali Project).

Red de Energia del Peru – Evaluation of Steady-State and Transient Thermal Rating for the 230 kV Mantanaro-Socabaya Overhead Transmission Line.

METC – Three-Phase Unbalance Study Applied to Untransposed METC's 345 kV Overhead Transmission System. Mr. Daconti was a technical contributor to this project. The service consisted in analyzing the causes of generator trip-off at Covert power plant when the Ludington pumping station was under operation at maximum load, and providing recommendations to reduce the voltage and current unbalance at the mentioned transmission system. Mr. Daconti was also the Project Manager of this consulting service.

Allegheny Power – Mr. Daconti testified as an Expert Witness before the Public Service Commission of Maryland on behalf of Allegheny Power. The subject of his testimony was a technical-economical comparison between overhead lines and underground cables applied to the Urbana Loop 230 kV Transmission Project. Aspects of Construction, Maintenance, Repair, Power System Planning and Operation were addressed. Mr. Daconti was also the Project Manager to this consulting service.

Alliant Energy – Analysis and Recommendations for Improving Overhead Lines Lightning Performance and Quality of Supply to Alliant's Industrial Customers: Mr. Daconti analyzed the lightning performance of Alliant's 69 kV power network located in Cedar Rapids, IA, and investigated methods for its improvement. Additional investigations for improvement of industrial equipment voltage sag ride-through capability were performed and recommendations were provided. Mr. Daconti also assisted Alliant Energy to plan a voltage sag monitoring campaign. Mr. Daconti was also the Project Manager to this consulting service.

Freeport Electric – Analysis of Pipeline Induced Voltages due to the 69 kV Underground Line between Freeport's Power Plant #2 and LIPA's Bellmore Substation: Mr. Daconti analyzed the electromagnetic compatibility between these underground installations which are located in Long Island, NY. Simulations were performed for electric line operation under steady-state and short-circuit conditions. Regarding the investigation of potential risks to people and installations, the pipeline-to-ground induced voltage profile was calculated and compared to typically acceptable safety limits. Recommendations against unacceptable disturbances were provided. Mr. Daconti was also the Project Manager to this consulting service.

CHESF – Environmental Department: Mr. Daconti worked as a part-time team member and performed the following activities: overhead line route selection technical assistance for several 500 kV and 230 kV lines built by CHESF in this period; assessment of overhead lines environmental costs; management of the permitting requirements regarding the 500 kV P.Dutra-Fortaleza transmission line; preparation of the environmental management plan to be applied to the 230 kV Banabuiu-Fortaleza line; preparation of an environmental education bulletin about risk communication to the public concerning EMF exposure; measurement of electric and magnetic fields produced by 230 kV transmission lines; litigation support and expert public testimony applied to the 230 kV Fortaleza-Pici. He also worked on the preparation of environmental risk assessment reports for the Fortaleza, Milagres, Banabuiu and Mossoro 500 kV and 230 kV Substations. These reports were approved by IBAMA (the Brazilian Institute for the Environment which in Brazil has an importance comparable to EPA – Environmental Protection Agency in the United States). Additionally, he was a member of the Organizing Committee of the CIGRE/CHESF Seminar on Environmental Issues Related to Transmission and Distribution Systems.

CHESF – Transmission Line Design Division: Mr. Daconti worked as a part-time team member and performed the following activities associated with the 230 kV Fortaleza-Pici transmission line: design of grounding meshes for urban towers; design of a shielding system to reduce the electric field levels underneath the transmission line in the vicinity of a train station; analysis of the capacitive, inductive and resistive coupling between the transmission line, some metallic fences and the Metrofor railroad. Additionally, he analyzed the electromagnetic compatibility between the 230 kV Messias-Maceio transmission line and the GASALP gas pipeline. Besides that, he provided training for engineers on the use

of software tools for calculation of transmission line electrical parameters, electric field, magnetic field, radio noise, audible noise, corona losses, ground potential rise in the vicinity of towers and short-circuit currents along transmission lines. He also developed a database application in Microsoft Access for management of transmission line design and construction activities.

ELETRONET Telecommunication Company – Analysis of Electromagnetic Compatibility between Telecommunication Equipment and High Voltage Substations Environment: Initially, Mr. Daconti analyzed the results of EMC immunity tests applied to Lucent Wave Star equipment, associated with OPGW communication systems. These pieces of equipment were supposed to be installed by ELETRONET in 230 kV and 500 kV substations. Then, he investigated what would be the typical levels of electromagnetic disturbances produced inside those substations and specified the EMC requirements for telecommunication equipment to be installed inside those installations.

PETROBRAS Gas Company – EMC between Transmission Lines and Gas Pipeline: Mr. Daconti analyzed the electromagnetic compatibility between the 200 km long Pilar-Cabo Gas Pipeline and several 230 kV and 69 kV overhead transmission lines owned by CHESF, CELPE and CEAL electric utilities. This analysis required field investigation and calculation of multiple short-circuits on the transmission lines and their effects through inductive and resistive couplings with the mentioned gas pipeline. The results were compared to safety criteria and safety measures were recommended.

ENIIL Irrigation Company – Cathodic Protection System for Underground Pipeline: Mr. Daconti performed electrical measurements of soil resistivity, designed the cathodic protection system, specified the material to be purchased and managed the field work associated with the installation of the mentioned system along a 105 km long water pipeline between the cities of Oroco and Ouricuri.

CHESF – Mr. Daconti prepared a spreadsheet based Transmission Line Costs Database in order to support the selection of the most economical transmission line alternatives for CHESF's Power System Planning Studies.

He also coordinated the CHESF's Research Project on "Environmental Impact of Electric and Magnetic Fields from High Voltage Installations".

Additionally, he was invited to taught a course on Electromagnetic Compatibility inside Substations for ISA (Colombian electric transmission utility).

CHESF – Mr. Daconti worked together with TESPO Engineering in the analysis of electromagnetic compatibility involving the ORSUB gas pipeline owned by PETROBRAS and several 230 kV transmission lines owned by CHESF and COELBA electric utilities. The mentioned gas pipeline is located between the city of Salvador and the Southern region of Bahia State.

Additionally, as a Member of the ABRICEM's (Brazilian Society on Electromagnetic Compatibility) Working Group on Biological Effects of Low Frequency Electric and Magnetic Fields he was invited to present a lecture in the Workshop "Biological Effects of 60 Hz Electric and Magnetic Fields" in Rio de Janeiro.

CHESF – Mr. Daconti worked in the team responsible for the preliminary design of the 500 kV P.Afonso-R.Largo transmission line.

He also was invited to taught a course on Electromagnetic Compatibility between Transmission Lines and Pipelines for ISA (Colombian electric transmission utility).

CHESF – Mr. Daconti used the EMTP software to calculate electrical parameters of transmission lines and made a comprehensive review of the CHESF's Transmission Line Electrical Parameters Database.

He also, assisted PETROBRAS with the investigation and solution of problems of electromagnetic incompatibility between the 450 km long Northeast Gas Pipeline and high voltage lines.

Additionally, he performed EMTP simulations to investigate the expected overvoltages on the 230 kV Barreiras-Sacos transmission line.

CHESF – Mr. Daconti performed EMTP studies for the 500 kV P.Afonso-Messias transmission line. The studies included the calculation of induced voltages in parallel circuits, electrical stresses on grounding switches and secondary arc extinction. He also provided technical assistance to Eletropaulo electric utility with respect to electromagnetic interference problems from 138 kV H.Borden - B.Santista transmission line.

CHESF – Mr. Daconti analyzed the electromagnetic compatibility between the 230 kV Teresina-Piripiri transmission line and a railroad (pre-metro) to be installed in the neighborhood of the line's right-of-way. Issues of clearances for insulation coordination between the railroad wagons and the transmission line were investigated. Induction effects due to capacitive, inductive and resistive coupling were investigated as well. Safety measures were recommended. For performing this analysis a specific software was developed in Fortran.

CHESF – Mr. Daconti analyzed problems of electromagnetic compatibility related to a gas pipeline entering the CHESF's 230 kV Camacari facility (comprised by a substation and a gas fired power plant). To avoid the transfer of dangerous voltages to remote sections of the pipeline, several safety actions were recommended. Additional actions were taken to avoid hazards to people and equipment located inside that facility premises.

He also analyzed the electromagnetic compatibility between the Dow Chemical propane pipeline located in the Mataripe region and the 230 kV Jacaracanga-Dow transmission line. Modifications in the transmission line grounding system were recommended to provide safety for people and pipeline.

CHESF – Mr. Daconti designed grounding meshes for CHESF's 69 kV urban transmission lines in Camacari geographical region. For it, he calculated the short-circuit currents along the transmission lines and the ground potential rise produced by the grounding systems. A comparison was made with internationally accepted step and touch voltages criteria.

He also made recommendations for the design of a temporary grounding system to be used during the construction of CHESF's transmission lines. According to later information received from CHESF's Transmission Line Construction Department (Mr. Matheus), this system saved the life of some construction workers during a line construction field accident.

CHESF – Mr. Daconti analyzed the feasibility of increasing conductor-to-ground clearances of CHESF's 230 kV transmission lines located in geographical regions where sugar cane burns frequently happen. The reduction of the air gaps insulation strength was analyzed based on a bibliographical review. Additionally, he analyzed the corona performance of ACSR conductors with greased steel core. Some of these conductors purchased by CHESF experienced problems of grease melting with consequent increase on corona disturbance effects.

CHESF – Mr. Daconti participated in the analysis for definition of several CHESF's 230 kV and 500 kV transmission lines top tower geometry. These studies revised the electrical clearances of the mentioned towers in order to assure a good insulation coordination performance regarding power frequency voltages, switching surges, lightning and live-line maintenance. Additionally, he inspected tests regarding the distribution of electric potential on suspension insulator strings at CEPEL (Brazilian Electric Power Research Center).

CHESF – Mr. Daconti developed a software tool in Fortran for the calculation of electrical parameters of metallic pipelines. The software is able to calculate electrical parameters of bare or coated pipelines, located above ground or underground. This software was used in the analysis of crossings between overhead lines and pipelines.

He also worked as a Member of the Committee responsible for the elaboration of the Brazilian Standard on Transmission Line Design (NBR 5422) being a technical contributor to the Line Clearances Section. Additionally, he performed studies for sectionalizing and grounding of metallic fences located nearby 230 kV transmission lines in the Lama Preta neighborhood.

CHESF – Mr. Daconti and Themag Engineering analyzed the electromagnetic compatibility between an Acid Pipeline owned by Caraiba Metais and two CHESF's transmission lines corridors constituted by the following overhead lines:

230 kV Camacari-C.Metais

230 kV Camacari-G.Mangabeira

230 kV Camacari-Jacaracanga

230 kV Camacari-Cotegipe

230 kV Camacari-Matatu

Safety measures were recommended to protect people against electric shocks and pipeline installation against damages.

Additionally, he improved a software tool written in Fortran for the calculation of short-circuit current distribution between transmission line shield wires and grounding systems.

CHESF – Mr. Daconti analyzed the electrostatic and electromagnetic unbalances and proposed transposition schemes for the following transmission lines:

230 kV Candeias-Jacaracanga

230 kV Angelim-S.Caetano

230 kV Fortaleza-Tauape

230 kV Mirueira-Goianinha

500 kV Camacari-Candeias

He also calculated short-circuit currents and specified shield wires characteristics for the following transmission lines:

230 kV Imperatriz-P.Franco

230 kV P.Franco-Carolina

230 kV Milagres-Coremas

230 kV P.Afonso-Itabaiana

The specification of the mentioned shield wires took into account the variation of the short-circuit current along the transmission line length.

Mr. Daconti prepared a set of reports on: selection of transmission line conductors and shield wires, definition of transmission line transposition schemes, and calculation of transmission line environmental effects for establishment of right-of-way width. These reports have been presented to a World Bank technical mission that approved a loan for the construction of several transmission lines.

Additionally, he participated in the preliminary design of the 500 kV P.Dutra-S.Luiz transmission line. Conductor, shield wire and insulator were selected, as well as transposition scheme, right-of-way width, tower clearances and conductor-to-ground clearances were defined. Also, electrical parameters were calculated. This line crosses regions of aggressive atmosphere near the ocean.

CHESF – Mr. Daconti analyzed problems of high altitude Corona Effect for the 500 kV P.Afonso-Angelim transmission line. Problems of visual Corona were detected along the transmission line section located over the Sao Pedro mountain range. Pollution problems were investigated and a solution was proposed.

He also inspected RIV and Corona Tests applied to 500 kV line conductor and hardware performed at Sao Paulo University's High Voltage Laboratory.

CHESF – Mr. Daconti was a team member of the one-year long H-2000 power system expansion planning project. The mentioned project was conducted by CHESF, ENEL/CESI and Themag Engineering and aimed to plan the CHESF's power system expansion for the decade 1990-2000. Most of the activities performed by him were related to preliminary transmission line design such as: route selection, definition of design criteria; specification of line materials; technical-economical selection of conductors; power losses in shield wires; calculation of thermal limits of conductors and shield wires; insulation coordination for power frequency voltage, switching surges, lightning and live-line maintenance;

CHESF – Mr. Daconti developed a software tool in Fortran for calculation of corona losses, electric and magnetic fields, audible noise, radio noise and television interference produced by overhead

transmission lines at ground level. The mentioned software was extensively used by CHESF in studies for definition of Right-Of-Way width and environmental disturbances caused by transmission lines. He also performed studies to check the possibility of reducing Right-Of-Way width of some 230 kV and 500 kV transmission lines of CHESF's power system. Additionally, he analyzed the induction in vehicles and the possibility of fuel ignition underneath the 230 kV overhead transmission lines which cross CHESF's Headquarters parking lot.

CHESF — Mr. Daconti developed a software tool in Fortran for calculation of overhead transmission line sags and tensions. This software was used by CHESF to prepare conductor catenary templates and stringing tables.

TECHNICAL PUBLICATIONS IN CONFERENCES AND JOURNALS WITH NATIONAL AND INTERNATIONAL CIRCULATION:

1. "Experience of CHESF concerning interference between EHV transmission lines and pipelines", CIGRE Session 1986, Paris/France, (co-author: D.O.C. Brasil).
2. "Calculation of metallic pipeline electrical parameters", 2nd Latin American Regional Meeting of CIGRE, 1987, Puerto Iguazu/ARGENTINA. **Author**.
3. "Environmental disturbances due to high voltage electrical installations", IX SNPTEE, 1987, Belo Horizonte/BRAZIL, (co-authors: C.P.R. Gabaglia, C. Fernandes, D.O.C. Brasil). Paper in Portuguese. See paper #09 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1987/sga9.htm
4. "Special grounding mats for 69 kV urban distribution network in Salvador city", APEE magazine, September 1988, Recife/BRAZIL. **First Author**. Paper in Portuguese.
5. "Effects of high voltage transmission lines on the environment", Eletricidade Moderna magazine, August 1989, Sao Paulo/BRAZIL, (co-authors: C.P.R. Gabaglia, C. Fernandes, D.O.C. Brasil). Paper in Portuguese.
6. "Interference from 230 and 500 kV transmission lines on metallic pipelines – Experience of CHESF", X SNPTEE, 1989, Curitiba/BRAZIL, **First Author** (co-authors: F.D. Ferro, J. Varela, M.O.B.C. Melo, O. Regis). Paper in Portuguese. See paper #07 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1989/gsp10.htm
7. "Induced effects on metallic installations near AC high voltage transmission lines", 3rd Latin American Regional Meeting of CIGRE, 1989, Foz do Iguacu/BRAZIL (co-authors: R. Sanz, O.G. Vera, J.L. Pineiro, D.O.C. Brasil, A.M. Franca, S.T. Sobral, J.R. Medeiros). Paper in Portuguese.
8. "Electromagnetic interference on the gas pipeline entering the 230 kV Camacari substation", CIER Conference, 1989, Caracas/VENEZUELA, **First Author** (co-authors: F.D. Ferro, M.O.B.C. Melo). Paper in Portuguese.
9. "Induced effects caused by overhead transmission lines on metallic structures", CIGRE Session 1990, Paris/France, (co-authors: R. Sanz, O.G. Vera, J.L. Pineiro, D.O.C. Brasil, A.M. Franca, J.R. Medeiros, S.T. Sobral).
10. "Effects on other installations of the injection of short-circuit currents into the ground", 4th International Symposium on Short-Circuit Currents in Power Systems, 1990, Liege/BELGIUM, **First Author** (co-authors: D.O.C. Brasil, D.M. Correia).
11. "Disturbances caused by the proximity between the 230 kV Teresina-Piripiri transmission line and a railroad near Teresina city", XI SNPTEE, 1991, Rio de Janeiro/BRAZIL, **First Author** (co-authors: M.O.B.C. Melo, O.L.S. Paiva, M.A.A.C. Lima, D.M. Correia). Paper in Portuguese. See paper #19 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1991/gsi11.htm
12. "Experience of CHESF about mitigation of electromagnetic interference – Aspects concerned with grounding mats and short-circuit currents", CIER Conference, 1991, Santiago/CHILE. **First Author. Awarded Brazilian Paper**. Paper in Portuguese.
13. "Disturbances caused by inductive and resistive couplings with low voltage networks", XI SENDI, 1992, Blumenau/BRAZIL, (co-authors: D.M. Correia, D.O.C. Brasil). Paper in Portuguese.
14. "Electromagnetic compatibility between electric power systems and other installations", International Symposium on Electromagnetic Compatibility - ISEMC, 1994, Sao Paulo/BRAZIL, **First Author**

(co-authors: D.O.C. Brasil, D.M. Correia). This paper was also presented at the 1995 International Colloquium of CIGRE Study Committee 36 (Power System Electromagnetic Compatibility).

15. "Induction from transmission lines and substations on other installations – practical cases", 6th Latin American Regional Meeting of CIGRE, 1995, Foz do Iguacu/BRAZIL, (co-authors: D.O.C. Brasil, D.M. Correia). Paper in Portuguese.
16. "Overview about modern Custom Power equipment", II SBQEE, 1997, Sao Lourenco/BRAZIL, **First Author** (co-authors: A.J.P. Ramos, H.S. Bronzeado). Paper in Portuguese.
17. "Guide on EMC in Power Plants and Substations", CIGRE SC 36 Technical Brochure, 1997, Paris/France, (co-authors: members of WG 36.04). **Peer-reviewed publication.**
18. "Voltage sag mitigation by means of Thyristor Controlled Series Capacitors", ICHQP, 1998, Athens/GREECE, (co-author: A.R.M. Tenorio).
19. "Environmental costs of transmission lines", 8th Latin American Regional Meeting of CIGRE, 1999, Ciudad del Este/Paraguay, (co-authors: R.C. Furtado, F.G. Soares, E. Almeida, J.M.B. Bezerra). Paper in Portuguese.
20. "Inclusion of environmental costs in transmission system budgets", XV SNPTEE, 1999, Foz do Iguassu/BRAZIL, (co-authors: R.C. Furtado, F.G. Soares, E. Almeida, J.M.B. Bezerra). Paper in Portuguese. <http://www.itaipu.gov.br/xvsnptee/xvsnptee/grupoxi/gia06.pdf>
21. "Electromagnetic compatibility in power plants and substations", 8th Latin American Regional Meeting of CIGRE, 1999, Ciudad del Este/Paraguay, **First Author** (co-author: J. Saad). Paper in Portuguese.
22. "The incorporation of environmental costs into the planning of a power system interconnection in Brazil", CIGRE Session 2000, Paris/France, (co-authors: R.C. Furtado, F.G. Soares, J.M.B. Bezerra).
23. "Analysis of EMC problems related to capacitive voltage transformers inside the 500 kV Xingo substation", XVI SNPTEE, 2001, Campinas/BRAZIL, (co-authors: F.R. Alves, H.M. Moraes). Paper in Portuguese. http://www.xviiisnptee.com.br/acervo_tecnico/memoria/xvi/10_Grupo_X_Gsc/GSC-021.pdf
24. "Environmental risk management of high voltage substations", XVI SNPTEE, 2001, Campinas/BRAZIL, **First Author** (co-authors: R.C. Furtado, J.D. Braga, F.E.C. Farias, R.R. Almeida, P.T. Silva). Paper in Portuguese. http://www.xviiisnptee.com.br/acervo_tecnico/memoria/xvi/11_Grupo_XI_Gia/gia-024.pdf
25. "Increasing power transfer capability of existing transmission lines", IEEE T&D Conference, 2003, Dallas, USA, **First Author** (co-author: Daniel C. Lawry).
26. "Overhead line thermal rating calculation based on the conductor replica method", IEEE T&D Conference, 2003, Dallas, USA, (co-author: Daniel C. Lawry).
27. "The ThermalRate System: A Solution for Thermal Upgrading of Overhead Transmission Lines", Shaw PTI Electronic Newsletter, April 2004, USA, **First Author** (co-author: Daniel C. Lawry). <http://www.shawgrp.com/PTI/company/eNewsletter/The%20ThermalRate%20System.pdf>

28. “Dynamic Thermal Rate Monitoring: An Effective Means for Increasing Power Transfer Capability of Existing Transmission Systems”, IX SEPOPE, 2004, Rio de Janeiro, BRAZIL, **First Author** (co-author: Daniel C. Lawry).
See <http://www.furnas.com.br/ixsepope/english/artigos/sessao19/tema10/SP-153.pdf>
29. “Uprating and Upgrading of Overhead Lines”, T&D World Expo, 2004, Indiana, USA, **Author**.
See Page 6 Technical Lecture T105 at http://images.tdworldexpo.com/files/1104/t&d04_AB.pdf
30. “Conductor Replica Methodology: An Effective Solution for Strengthening Electric Power Transmission Infrastructure by Increasing Overhead Line Thermal Rating”, EPRI Increased Power Flow Conference, 2004, Boston, USA, **First Author** (co-authors: Daniel Lawry, Bernie Fitzgerald, Shadrack Orero).
31. “Management of Electrical Risks in Transmission Line – Pipeline Shared Rights-of-Way”, 8th International Symposium on Environmental Concerns in Rights-of-Way Management, 2004, Saratoga, USA, **Author**. The proceedings of this Symposium will be published by Elsevier.
See Session 5 “Pipeline: Procedures & Practices” at <http://www.esf.edu/row8/Wednesday%20AM.htm>
32. “An Effective Technology for Increasing the Thermal Rating of Transmission Lines”, 15th Conference on the Electric Power Supply Industry – CEPsi, 2004, Shanghai, CHINA, **First Author** (co-author: Daniel Lawry).
See Paper ID #732 at http://www.cepsi2004.com/regonline/paperorallist_e.asp
33. “Standard Handbook for Electrical Engineers – 15th Edition – Section 14 – Transmission Systems”, 2006, New York, USA, **Author & Revision Coordinator**.
34. “Application of Surge Arresters to Protect Overhead Lines Against Lightning”, Power Quality & Reliability Conference, 2006, California, USA, **Author**.
See: http://home.powerquality.com/conference/TVSS_Surge_Suppression_Conditioning_1/
35. “Standard Handbook for Electrical Engineers – 16th Edition – Section 14 – Transmission Systems”, 2012, New York, USA, **Author & Revision Coordinator**
36. “Jose Daconti: The Voice of Overhead Transmission” – Transmission & Distribution World Magazine, Oct 2013, Electronic Newsletter.
See: <http://tdworld.com/etrain/jose-daconti-voice-overhead-transmission>

Exhibit B 2

**Siemens PTI Proposal Number P125-16-
Rev.1**

***Expert Witness Services for the New
Hampshire's Site Evaluation
Committee on the Northern Pass
Transmission Project Application
(Docket No. 2015-06)***

Prepared for

**New Hampshire Attorney General's
Office**

Submitted by:
Jose Daconti
Senior Staff Consultant

Rev. [1]
May 6, 2016

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Acceptance

Siemens Industry, Inc., Siemens Power Technologies International (Siemens PTI), services will be performed pursuant to its Terms and Conditions of Consulting Assignments in Appendix B at the end of this document and the Order from the New Hampshire Site Evaluation Committee (Docket No. 2015-06).

We appreciate the opportunity to work with New Hampshire Attorney General's Office on this assignment. If this proposal is acceptable to you, please return a signed copy of this Acceptance page to the address below and we will proceed with the work. Should you have any questions, please do not hesitate to contact us.

P125-16 Rev.1

**Siemens Industry, Inc.
Siemens Power Technologies International**

Accepted: _____
(Signature)

(Printed Name) (Date) _____

(Title)

New Hampshire Attorney General's Office

Accepted: _____
(Signature)

(Printed Name) (Date) _____

(Title)

Please forward signed Acceptance to:

Consulting Contract Administrator
Siemens Industry, Inc.
Siemens Power Technologies International
400 State Street
Schenectady, NY 12305
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Introduction

Siemens PTI is pleased in offering this Proposal to the New Hampshire Attorney General's Office (Counsel for the Public).

The Attorney General's Office (Counsel for the Public) is interested in hiring Siemens PTI to perform the duties of Expert Witness in the Northern Pass Transmission Project Application (Docket No. 2015-06) before the New Hampshire's Site Evaluation Committee (SEC).

The Northern Pass Transmission Project Applicant is proposing to build a 192-mile long transmission line that will be comprised of 132 miles of overhead and 60 miles of underground sections. The Project will consist of interconnected segments of 320 kV HVDC and 345 kV HVAC. It extends from Canada and goes from Pittsburgh, NH to Deerfield, NH.

Siemens PTI activities will be related to the technical assessment of all of the overhead line sections (HVDC and HVAC). No assessment of underground facilities, substations and transition stations will be performed by Siemens PTI.

Initially, Siemens PTI will assess the Project with respect to its technical soundness.

Then, Siemens PTI will support docket activities.

Finally, Siemens PTI will address specific issues requested by the NH SEC.

The Expert Witness consulting service will be provided by Mr. Jose R. Daconti, Senior Staff Consultant of our company. His overhead line focused bio is included in Section 4 of this Proposal.

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Work Scope

Siemens PTI proposes to perform the requested Work Scope via the execution of the following tasks:

Task #1 – Determination if the Project is Technically Sound

Siemens PTI will review relevant design items for both the HVAC and HVDC overhead line sections, as follows:

- Route selection
- Design criteria, applicable standards and codes
- ROW width
- Selection of line structure, conductor, shield-wire, insulators, hardware, accessories and grounding system
- Specifications for materials procurement
- Structure design
- Foundation design (normal soil and wetlands)
- Line thermal rating
- Line insulation coordination for typical voltage stresses (steady-state, switching, lightning)
- Line insulation coordination for live line maintenance
- Clearances Analysis: conductor blow-out, conductor-to-ground, conductor-to-other-facilities
- Ruling span selection & sag-tension tables
- Structure spotting, long crossings and airport approaching
- Vibration analysis (Aeolian, Galloping)
- Electro-magnetic environmental disturbances along the line route (electric field, magnetic field, audible noise, radio noise) – Calculations, Measurements, Exposure Limits and Regulations
- Electromagnetic compatibility with neighbor objects and facilities (vehicles, fences, pipelines, railroads, lower voltage electrical circuits)
- Reliability indices (lightning performance and pollution related outages)
- Voltage unbalance and short-circuit currents

Task #2 – Support to Docket Activities

Siemens PTI will thoroughly review all received filing materials (e.g.: relevant testimony, reports, design plans/maps, permit applications) related to the HVAC and HVDC overhead sections of the Northern Pass Project.

Missing information will be identified, discovery questions will be formulated and discovery requests will be responded.

Also, Siemens PTI will assist the Counsel for the Public with the drafting of pre-filed testimonies.

Technical hearings will be attended. Two-one-day stay (totaling 4-day T&L) trips to New Hampshire have been budgeted.

Evidentiary hearings will be attended also. A two-day-stay (totaling 3-day T&L) trip to New Hampshire has been budgeted.

Siemens PTI will draft a technical report.

The Siemens PTI representative will meet with other consultants of the SEC team. Four 2-hour meetings / conference calls have been budgeted.

Up to Three one-day-stay (totaling 6-day T&L) trips have been budgeted for the purpose of site visits.

Also, sixteen hours of Webex Meetings have been budgeted.

Task #3 – Specific Issues to be Addressed

Assistance in evaluating alternative designs and configurations proposed to SEC.

Evaluation of Network Overloads related to the COOS Loop – Siemens PTI will analyze the impact of the Northern Pass Transmission Project in terms of creating or increasing overloads on the COOS Loop.

Investigation of Design Alternatives for Environmental Impact Mitigation – Evaluation of the suitability of pole height, ROW width, shared ROWs, overcrowded ROWs and compliance to regulatory and industry codes. Evaluation of applicable visual impact mitigation techniques.

Assist in evaluation of the Environmental Impact from the Construction and Maintenance of the Overhead Line Sections – The mentioned impact on communities and natural resources will be evaluated by means of a review of construction specifications, environmental management plans, EPC timeframes and asset management (maintenance) plans.

Service Price and Schedule

The service is being offered on a Per Diem (Time and Material) basis according to the standard Terms & Conditions (Appendix B) of this document.

Counsel for the Public will be invoiced monthly for the corresponding expenses as the service progresses. Counsel for the Public will submit invoices to the Applicants for their payment.

The Table shown on the next page summarizes the activities to be performed and the estimated price to execute them. The estimated price has been determined based upon our best judgment of the needed time to perform the tasks. If the NH SEC assignments exceed our estimates (e.g.: longer time for attending technical hearings) Siemens reserves the right to seek reimbursement for incurred additional time on a Per Diem basis.

The service is estimated to be started in May or June 2016 and to be concluded in December 2016. Siemens understands that this schedule may be extended through June or December 2017. Mr. Daconti has some pre-existing commitments, some of which may not be re-scheduled, but he will make every reasonable effort to accommodate the schedule requirements of the NH SEC.

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Service Price and Schedule

Task #	Task Description	Sub-Task #	Sub-Task Description			Sub-Total 1 (US\$)	T&L days	T&L costs @ US\$200/day	Total (US\$)
		1.1	HVAC Overhead Transmission Line Design Review	32		9,280			9,280
		1.2	HVDC Overhead Transmission Line Design Review	32		9,280			9,280
2	Support to Docket Activities	2.1	Thorough review of filing materials			9,280			9,280
		2.2	Determination of missing information & Formulation of discovery questions	32		9,280			9,280
		2.3	Response to discovery requests			9,280			9,280
		2.4	Assistance in drafting introductory pre-filing testimony	32		9,280			9,280
		2.5	Attendance to technical hearings			4,640	4	800	5,440
		2.6	Attendance to evidentiary hearings			4,640	3	600	5,240
		2.7	Draft of the overhead line report			23,200			23,200
		2.8	Meetings / conference calls with other consultants of the SEC team			2,320			2,320
		2.9	Webex Meetings			4,640			4,640
		2.10	Perform site visits			6,960	6	1,200	8,160
3	Specific Issues to be Addressed	3.1	Assistance in Evaluating Alternative Designs and Configurations Proposed to SEC	24		4,640			6,960
		3.2	Evaluation of network overloads related to the COOS Loop			13,920			13,920
		3.3	Assistance in the Evaluation of Environmental Impacts Caused by the Overhead Line (HVDC and HVAC sections)	24		4,640			6,960
		3.4	Evaluation of the Environmental Impact of the Construction and Maintenance Activities of the Overhead Line Sections	24		4,640			6,960

TOTAL

139,480

Section

4

Mr. Daconti's Bio

CURRICULUM VITAE

NAME: Jose Rafael Daconti

DATE OF BIRTH: October 06, 1954

NATIONALITY: US Citizen (born in Brazil)

EDUCATION:

- Graduate Studies in the USA – funded by the U.S. Congress (Hubert H. Humphrey Fellowship Program – managed by USIA, Institute of International Education and Fulbright Association – Diploma signed by the President of the USA). Mr. Daconti took Graduate Courses and performed technical research in the fields of Electric Power Systems and Electric Power Quality at the Ivy League's Cornell University (NY) and Electrotek Concepts Inc. (TN), Aug 1996 – July 1997.
- MSEE with Honors (Electric Power Systems), Federal School of Engineering, Itajuba, Brazil, 1986. The Honors Degree Award came as a consequence of the development of a 300-page dissertation and two computational programs for the calculation of electromagnetic compatibility between high voltage transmission lines and gas pipelines.
- One-year Graduate Program "Course of Specialists on Electric Power Systems", Federal School of Engineering, Itajuba, Brazil, Jan 1981 – Dec 1981.
- BSEE (Electrotechnics), Polytechnic School of Engineering, Recife, Brazil, 1977.
- Technical High School Diploma in Electrotechnics, Federal Technical School of Pernambuco, Recife, Brazil, 1972.

MEMBERSHIP IN

STUDENT ASSOCIATIONS:

- Humphrey Fellowship Program Alumni (Cornell University)
- US Department of State Alumni (<https://alumni.state.gov>)
- Fulbright Association Alumni (Eastern New York Chapter)

MEMBERSHIP IN

**SCIENTIFIC RESEARCH
SOCIETY:**

- Mr. Daconti is a full member of Sigma Xi, The Scientific Research Society (Rensselaer Polytechnic Institute Chapter, Troy, NY).

USCIS Award:

In August 2005, the USCIS awarded Mr. Daconti a Green Card in the Category of Outstanding Researcher.

TECHNICAL CONTRIBUTION TO RELEVANT ENGINEERING PUBLICATIONS

McGraw Hill

“Standard Handbook for Electrical Engineers (Chapter 14 Transmission Systems) – 15th & 16th Editions.

REVIEWER OF PAPERS RELATED TO OVERHEAD TRANSMISSION LINES

Technical Paper Reviewer at the Editorial Board of the IEEE Transactions on Power Delivery (ISSN 0885-8977) since 2002.

CITATION IN RELEVANT TECHNICAL PUBLICATION

Mr. Daconti's paper “Experience of CHESF Concerning Interferences Between EHV Transmission Lines and Pipelines” published at the CIGRE Session 1986 is cited as a Reference at the CIGRE Technical Brochure “Guide on the Influence of High Voltage AC Power Systems on Metallic Pipelines”, 1995, Paris, FRANCE.

MEMBERSHIP IN TECHNICAL ORGANIZATION

CIGRE Distinguished Member

Former chairman of CIGRE-Brazil Study Committee 36 (Power System Electromagnetic Compatibility)

IEEE Senior Member

Former chairman of IEEE Schenectady PES Chapter

Balloting group member to the following IEEE documents:

- IEEE Std 738-2004 - Standard for Calculating the Current-Temperature of Bare Overhead Conductors
- IEEE Std 1441-2004 - Guide for Inspection of Overhead Transmission Line Construction;
- IEEE Std 957-2004 - Guide for Cleaning Insulators;
- IEEE Std 1260-2004 - Guide on the Prediction, Measurement and Analysis of AM Broadcast Re-radiation by Power Lines;

MSEE ACADEMIC CO-ADVISOR

Mr. Daconti was the Academic Co-Advisor of Mr. Joao V. Eduardo who got a MSEE degree from Federal University of Paraiba, Brazil, in 1993. The dissertation addressed the topic “Electromagnetic Compatibility between Transmission Lines and Pipelines”.

INVITATION TO CHAIR PANEL SESSIONS IN TECHNICAL CONFERENCES

- Chairman of the Panel Session on “Upgrading and Upgrading of Overhead Lines, Underground Cables and Transformers” at the IEEE Transmission & Distribution Conference held in Dallas, TX in September 2003.
- Lecturer at the 2004 T&D World Expo and Conference held in Indianapolis, IN in May 2004. This Conference was promoted by Transmission and Distribution World Magazine.

COUNTRIES OF WORKING EXPERIENCE

USA, Brazil, Colombia, Philippines, Jordan, Ghana, Canada

EMPLOYMENT RECORD:

FROM July 2001 TO Present

EMPLOYER:

Siemens Power Technologies International – Siemens PTI
Schenectady, NY, USA

**POSITION HELD AND
DESCRIPTION OF DUTIES:**

Senior Staff Consultant

He has worked with PTI Consulting Department where he has been a technical contributor and/or a project manager to a variety of consulting services related to transmission systems and particularly overhead transmission lines. He has worked for clients such as:

- Winergy
- PEPCO
- NEPCO Jordan
- Babcock & Brown
- Public Service of Colorado
- Noble Environmental Power
- BP Alternative Energy of America
- Iberdrola Renewable Energies
- Siemens HVS – Singer Project (PSSE/E-TRAN)
- MidAmerican Energy Company (PSSE)
- Siemens HVS – Black Oak Project (PSSE)
- METC (PSSE & EMTP)
- NYISO (PSSE & ASPEN)
- Hyundai Heavy Industries (EMTP)
- Baltimore Gas and Electric (EMTP)
- Entergy Nuclear (EMTP and TLP)
- International Transmission Company (EMTP)
- Allegheny Power (Expert Witness)
- Alliant Energy (TLP)
- Freeport Electric (EMC)
- Oklahoma Gas and Electric (EMTP)
- Consolidated Edison (PSSE, EMTP & ADEPT)
- Mirant Corporation (MUST and PSSE)

He also worked with Shaw PTI Hardware Department in the development and marketing of its ThermalRate monitoring system. The ThermalRate monitoring system is an innovative idea developed and patented by Shaw PTI and helps utilities to increase the power transfer capability of their high voltage overhead transmission lines in a safe way. In other words, by monitoring the real time thermal ratings of its transmission lines, the utility is able to estimate how much power can be transported throughout each line without sagging the line conductors excessively. So, it could help to avoid Blackouts such as the one occurred in August 2003 when several major power lines in Ohio sagged into trees and provoked short-circuits that leaded a National Blackout.

Additionally, he has worked with Siemens PTI Education Department as Instructor and/or Developer of regular courses on the following topics:

- Overhead Transmission Line Design
- Electromagnetic Compatibility between Transmission Lines and Pipelines
- Transmission Line Theory
- Environmental Concerns of Power Lines
- Lightning and Surge Protection of OH and UG Lines

He is a regular instructor of the long duration and worldwide recognized Power Technology Course, as well as the Distribution System Engineering Course which has been offered for many years to the ConEdison electric utility (New York).

These courses have been approved as Continuing Education Hours for New York State and Florida State licensed Professional Engineers (PE).

These courses have been attended by engineers from North America, Latin America, Europe, Asia and Africa, including electric and gas utilities, government agencies, research centers and private developers such as:

- a) USA
 - New York Power Authority
 - New York State Department of Public Service
 - Consolidated Edison (New York)
 - Key Span Energy (New York)
 - Central Hudson Gas & Electric (New York)
 - Pennsylvania Power & Light (Pennsylvania)
 - Navy Engineering Logistics Office (Virginia)
 - Vermont Public Service Commission (Vermont)
 - MacLean Power Systems (Illinois)
 - Oklahoma Gas & Electric Co. (Oklahoma)
 - Cynergy (Ohio)
 - Kern River Gas Transmission Company (Utah)
 - Salt River Project (Arizona)
 - Tacoma Power (Washington)
 - Lower Colorado River Authority (Texas)
 - City Public Service Board – San Antonio (Texas)
 - Tennessee Valley Authority (Tennessee)
 - EPRI-PEAC (Tennessee)
 - Entergy (Louisiana)
 - Progress Energy (Florida)
 - PAR Electric (Missouri)
 - Southern Natural Gas (Alabama)
 - Hawaiian Electric Company (Hawaii)
- b) CANADA
 - British Columbia Transmission Corporation (CANADA)
 - Manitoba Hydro (CANADA)
 - TransAlta Utilities Corporation (CANADA)
 - AltaLink (CANADA)
- c) CENTRAL AMERICA & CARIBBEAN ISLANDS
 - Virgin Islands Water & Power Authority (VIRGIN ISLANDS)
- d) SOUTH AMERICA
 - Edelca (VENEZUELA)
- e) EUROPE
 - National Grid Company (ENGLAND)

- ESB International (IRELAND)
- NESA (DENMARK)
- f) ASIA
 - Korean Electric Research Institute (KOREA)
 - Korea Electric Power Corporation (KOREA)
- g) OCEANIA
 - Mighty River Power (NEW ZEALAND)
- h) AFRICA
 - Kenya Power & Light (KENYA)
 - Electricity Company of Ghana (GHANA)

FROM July 1998 TO June 2001

EMPLOYER: Electric, Gas, Water & Telecommunication Utilities.

**POSITION HELD AND
DESCRIPTION OF DUTIES:**

Independent Consultant

He worked for CHESF (San Francisco River Hydro Electric Company) and for irrigation, gas and telecommunication companies in Brazil. For CHESF, he worked full-time. Part-time as a team member of the Environmental Department and part-time as a team member of the Transmission Line Design Division. In the Environmental Department, he performed activities related to transmission line environmental costs assessment, environmental permitting, environmental management, environmental education, risk communication to the public concerning EMF exposure and health, including electric and magnetic fields measurement, litigation support and expert public testimony on EMF and health effects applied to lines under litigation. He also worked on environmental risk assessment of high voltage substations. In the Transmission Line Design Division, he performed activities related to transmission lines electrical design, as well as management of transmission line design and construction activities. For ENIIL Irrigation Company, he performed investigations of soil electrical resistivity, and designed and installed a cathodic protection scheme associated to a 105km water pipeline. For PETROBRAS (Brazilian Gas Company), he investigated means to reach the electromagnetic compatibility between several 230 and 69 kV transmission lines and a 200 km gas pipeline. For the ELETRONET Telecommunication Company, he investigated and specified EMC requirements for telecommunication equipment to be installed inside high voltage substations.

FROM January 1978 TO June 1998

EMPLOYER: Companhia Hidro Elétrica do São Francisco – CHESF.
Recife, PE, BRAZIL (<http://www.chesf.gov.br>)

POSITION HELD AND
DESCRIPTION OF DUTIES:

Engineer I - Engineer VI

He worked as a power system engineer in the Department of Transmission System Planning. There, he was mainly involved in electrical analysis, design and investigations concerning 230 kV and 500 kV transmission lines. These activities included: assessment of environmental electromagnetic disturbances; calculation and measurement of electric and magnetic fields; biological effects of electric and magnetic fields; analysis of corona performance of transmission lines including corona losses, audible noise and radio interference; induction on nearby metallic objects and parallel circuits; induction in vehicles and fuel ignition; insulation coordination at transmission towers for power frequency voltage, switching surges, lightning and live-line maintenance; conductor-to-ground clearances; establishment of electrical design criteria; route selection, calculation of right-of-way width and preliminary design of overhead transmission lines; specification and inspection of electrical tests for transmission line components; calculation of electrical parameters and costs of transmission lines; calculation of transposition schemes; selection of conductors, shield wires and insulators; thermal ratings of conductors; and design of transmission line grounding systems, including grounding meshes for urban lines. He also performed studies of electromagnetic compatibility between transmission lines, gas pipelines and railroads and studies of electromagnetic compatibility inside substations. Additionally, he studied means for reduction of voltage sags in transmission systems and helped CHESF to implement its utility power quality program.

FROM May 1976 TO December 1977

EMPLOYER: Companhia Hidro Elétrica do São Francisco – CHESF.
Recife, PE, BRAZIL

POSITION HELD AND
DESCRIPTION OF DUTIES:

Engineer Assistant

He was a full-time team member of CHESF's Transmission Line Design Division where he performed typical technical activities related to 230 kV and 500 kV transmission line design. One of his activities was the development of a software tool in Fortran for conductor sag-tension calculations.

FROM January 1973 TO April 1976

EMPLOYER: Companhia de Eletricidade de Pernambuco – CELPE.
Recife, PE, BRAZIL

POSITION HELD AND

DESCRIPTION OF DUTIES:

Technical Instructor

He worked at the CELPE Electric Utility Training Center where he taught several courses for technicians including Live Line Maintenance of 69 kV and 13.8 kV Distribution Lines.

RELEVANT EXPERIENCE IN OVERHEAD TRANSMISSION LINE ACTIVITIES

KEPCO – Presentation of a Customized Course on OHTL for Maintenance Engineers including topics such as: Overview on Planning, Design and Construction activities; Technical specifications for Procurement and Testing of overhead line material; Overview on Commissioning Tests; Asset Management of overhead line components (Degradation Mode, Failure Mode, Inspection, Condition Assessment, Maintenance Actions); Lightning performance improvement; Conductor vibration; Corrosion of line components; Dynamic thermal rating monitoring systems; Overhead line uprating & upgrading; Overview on live-line maintenance; Vegetation management; Inspection and Maintenance Plans. The course was held in Schenectady, NY in the period Oct 28 – Nov 01, 2013.

Manitoba Hydro – Presentation of a customized version of the Fundamental of Overhead Transmission Line Design Course for 50 engineers in Winnipeg in the period June 10-14, 2013 (Canada)

GRIDCo Ghana (USTDA contract) – Technical Workshop on Overhead Transmission Line Design, Construction, Operation, Maintenance, and Environmental Aspects – Presented for GRIDCo's engineers in Accra, Ghana (Africa).

COES Peru – Service in Progress – Provision of consulting services related to the pioneer design of a 500 kV high altitude (4500 m) overhead transmission line in Peru, South America. Mr. Daconti analyzed aspects of line insulation coordination (tower geometry), electrical and mechanical design criteria, as well as played the role of strategic facilitator for the establishment of the Technical Cooperation Agreement between the COES (Peru) and the Tibet High Altitude Test Station (China).

GRIDCo Ghana (USTDA contract) – Line Route Selection – Route Selection for the 400 km 161 kV Tema – Yendi transmission line, Ghana (Africa).

Abencor – Conductor Inspection Service performed at the Amazon rain forest for the 700 km 500 kV Double Circuit Overhead Transmission Line that connects the Oriximina'-Silves-Lechuga substations. As a result of the performed service, Mr. Daconti has been required to be an Expert Witness before the English High Court of Justice (Queen's Bench Division) in London, UK.

AEP – Recommendations for Connection and Disconnection of Temporary Grounding Sets to Overhead Lines. Mr. Daconti analyzed aspects of insulation coordination for live line maintenance and potential thermal hazards to linemen in charge of installing temporary grounding sets to 345 kV de-energized circuits. The mentioned circuits are electrostatically and electromagnetically induced by various other high voltages lines (including a 765 kV line), located in the same corridor. Recommendations have been issued with respect to minimum safety distances to be respected by the AEP linemen in order to avoid electric shocks and burns.

Algonquin – Conceptual Design of a 345kV Overhead Transmission Line to be built within a 50ft wide Right-of-Way. Mr. Daconti analyzed all electrical aspects and proposed a solution for solving this very complex problem of inserting a line of that magnitude into a typically considered very narrow right-of-way. Aspects of insulation coordination, electric fields, magnetic fields, radio noise and audible noise have been taken into account. The final design is compliant with all NESC requirements.

Central Iowa Power Cooperative – Evaluation of the static thermal rating of a flexible busbar at the Grand Junction substation owned by CIPCO. Mr. Daconti performed all the needed analysis in order to establish the appropriate thermal rating for the mentioned substation busbar.

NextEra – Evaluation of the static thermal ratings of the South Platte-Pawnee and Horse Hollow-Omega overhead transmission lines. Mr. Daconti performed all the needed analysis in order to establish the appropriate thermal ratings for the mentioned lines. Aspects of wind farm output versus line rating have been evaluated for various wind speeds.

November 01, 2013

Sithe Global – Evaluation of Steady-State Thermal Rating for six 132 kV overhead lines in Africa (Bujagali Project).

Red de Energia del Peru – Evaluation of Steady-State and Transient Thermal Rating for the 230 kV Mantanaro-Socabaya Overhead Transmission Line.

METC – Three-Phase Unbalance Study Applied to Untransposed METC's 345 kV Overhead Transmission System. Mr. Daconti was a technical contributor to this project. The service consisted in analyzing the causes of generator trip-off at Covert power plant when the Ludington pumping station was under operation at maximum load, and providing recommendations to reduce the voltage and current unbalance at the mentioned transmission system. Mr. Daconti was also the Project Manager of this consulting service.

Allegheny Power – Mr. Daconti testified as an Expert Witness before the Public Service Commission of Maryland on behalf of Allegheny Power. The subject of his testimony was a technical-economical comparison between overhead lines and underground cables applied to the Urbana Loop 230 kV Transmission Project. Aspects of Construction, Maintenance, Repair, Power System Planning and Operation were addressed. Mr. Daconti was also the Project Manager to this consulting service.

Alliant Energy – Analysis and Recommendations for Improving Overhead Lines Lightning Performance and Quality of Supply to Alliant's Industrial Customers: Mr. Daconti analyzed the lightning performance of Alliant's 69 kV power network located in Cedar Rapids, IA, and investigated methods for its improvement. Additional investigations for improvement of industrial equipment voltage sag ride-through capability were performed and recommendations were provided. Mr. Daconti also assisted Alliant Energy to plan a voltage sag monitoring campaign. Mr. Daconti was also the Project Manager to this consulting service.

Freeport Electric – Analysis of Pipeline Induced Voltages due to the 69 kV Underground Line between Freeport's Power Plant #2 and LIPA's Bellmore Substation: Mr. Daconti analyzed the electromagnetic compatibility between these underground installations which are located in Long Island, NY. Simulations were performed for electric line operation under steady-state and short-circuit conditions. Regarding the investigation of potential risks to people and installations, the pipeline-to-ground induced voltage profile was calculated and compared to typically acceptable safety limits. Recommendations against unacceptable disturbances were provided. Mr. Daconti was also the Project Manager to this consulting service.

CHESF – Environmental Department: Mr. Daconti worked as a part-time team member and performed the following activities: overhead line route selection technical assistance for several 500 kV and 230 kV lines built by CHESF in this period; assessment of overhead lines environmental costs; management of the permitting requirements regarding the 500 kV P.Dutra-Fortaleza transmission line; preparation of the environmental management plan to be applied to the 230 kV Banabuiu-Fortaleza line; preparation of an environmental education bulletin about risk communication to the public concerning EMF exposure; measurement of electric and magnetic fields produced by 230 kV transmission lines; litigation support and expert public testimony applied to the 230 kV Fortaleza-Pici. He also worked on the preparation of environmental risk assessment reports for the Fortaleza, Milagres, Banabuiu and Mossoro 500 kV and 230 kV Substations. These reports were approved by IBAMA (the Brazilian Institute for the Environment which in Brazil has an importance comparable to EPA – Environmental Protection Agency in the United States). Additionally, he was a member of the Organizing Committee of the CIGRE/CHESF Seminar on Environmental Issues Related to Transmission and Distribution Systems.

CHESF – Transmission Line Design Division: Mr. Daconti worked as a part-time team member and performed the following activities associated with the 230 kV Fortaleza-Pici transmission line: design of grounding meshes for urban towers; design of a shielding system to reduce the electric field levels underneath the transmission line in the vicinity of a train station; analysis of the capacitive, inductive and resistive coupling between the transmission line, some metallic fences and the Metrofor railroad. Additionally, he analyzed the electromagnetic compatibility between the 230 kV Messias-Maceio transmission line and the GASALP gas pipeline. Besides that, he provided training for engineers on the use

of software tools for calculation of transmission line electrical parameters, electric field, magnetic field, radio noise, audible noise, corona losses, ground potential rise in the vicinity of towers and short-circuit currents along transmission lines. He also developed a database application in Microsoft Access for management of transmission line design and construction activities.

ELETRONET Telecommunication Company – Analysis of Electromagnetic Compatibility between Telecommunication Equipment and High Voltage Substations Environment: Initially, Mr. Daconti analyzed the results of EMC immunity tests applied to Lucent Wave Star equipment, associated with OPGW communication systems. These pieces of equipment were supposed to be installed by ELETRONET in 230 kV and 500 kV substations. Then, he investigated what would be the typical levels of electromagnetic disturbances produced inside those substations and specified the EMC requirements for telecommunication equipment to be installed inside those installations.

PETROBRAS Gas Company – EMC between Transmission Lines and Gas Pipeline: Mr. Daconti analyzed the electromagnetic compatibility between the 200 km long Pilar-Cabo Gas Pipeline and several 230 kV and 69 kV overhead transmission lines owned by CHESF, CELPE and CEAL electric utilities. This analysis required field investigation and calculation of multiple short-circuits on the transmission lines and their effects through inductive and resistive couplings with the mentioned gas pipeline. The results were compared to safety criteria and safety measures were recommended.

ENIIL Irrigation Company – Cathodic Protection System for Underground Pipeline: Mr. Daconti performed electrical measurements of soil resistivity, designed the cathodic protection system, specified the material to be purchased and managed the field work associated with the installation of the mentioned system along a 105 km long water pipeline between the cities of Oroco and Ouricuri.

CHESF – Mr. Daconti prepared a spreadsheet based Transmission Line Costs Database in order to support the selection of the most economical transmission line alternatives for CHESF's Power System Planning Studies.

He also coordinated the CHESF's Research Project on "Environmental Impact of Electric and Magnetic Fields from High Voltage Installations".

Additionally, he was invited to taught a course on Electromagnetic Compatibility inside Substations for ISA (Colombian electric transmission utility).

CHESF – Mr. Daconti worked together with TESPO Engineering in the analysis of electromagnetic compatibility involving the ORSUB gas pipeline owned by PETROBRAS and several 230 kV transmission lines owned by CHESF and COELBA electric utilities. The mentioned gas pipeline is located between the city of Salvador and the Southern region of Bahia State.

Additionally, as a Member of the ABRICEM's (Brazilian Society on Electromagnetic Compatibility) Working Group on Biological Effects of Low Frequency Electric and Magnetic Fields he was invited to present a lecture in the Workshop "Biological Effects of 60 Hz Electric and Magnetic Fields" in Rio de Janeiro.

CHESF – Mr. Daconti worked in the team responsible for the preliminary design of the 500 kV P.Afonso-R.Largo transmission line.

He also was invited to taught a course on Electromagnetic Compatibility between Transmission Lines and Pipelines for ISA (Colombian electric transmission utility).

CHESF – Mr. Daconti used the EMTP software to calculate electrical parameters of transmission lines and made a comprehensive review of the CHESF's Transmission Line Electrical Parameters Database.

He also, assisted PETROBRAS with the investigation and solution of problems of electromagnetic incompatibility between the 450 km long Northeast Gas Pipeline and high voltage lines.

Additionally, he performed EMTP simulations to investigate the expected overvoltages on the 230 kV Barreiras-Sacos transmission line.

CHESF – Mr. Daconti performed EMTP studies for the 500 kV P.Afonso-Messias transmission line. The studies included the calculation of induced voltages in parallel circuits, electrical stresses on grounding switches and secondary arc extinction. He also provided technical assistance to Eletropaulo electric utility with respect to electromagnetic interference problems from 138 kV H.Borden - B.Santista transmission line.

CHESF – Mr. Daconti analyzed the electromagnetic compatibility between the 230 kV Teresina-Piripiri transmission line and a railroad (pre-metro) to be installed in the neighborhood of the line's right-of-way. Issues of clearances for insulation coordination between the railroad wagons and the transmission line were investigated. Induction effects due to capacitive, inductive and resistive coupling were investigated as well. Safety measures were recommended. For performing this analysis a specific software was developed in Fortran.

CHESF – Mr. Daconti analyzed problems of electromagnetic compatibility related to a gas pipeline entering the CHESF's 230 kV Camacari facility (comprised by a substation and a gas fired power plant). To avoid the transfer of dangerous voltages to remote sections of the pipeline, several safety actions were recommended. Additional actions were taken to avoid hazards to people and equipment located inside that facility premises.

He also analyzed the electromagnetic compatibility between the Dow Chemical propane pipeline located in the Mataripe region and the 230 kV Jacaracanga-Dow transmission line. Modifications in the transmission line grounding system were recommended to provide safety for people and pipeline.

CHESF – Mr. Daconti designed grounding meshes for CHESF's 69 kV urban transmission lines in Camacari geographical region. For it, he calculated the short-circuit currents along the transmission lines and the ground potential rise produced by the grounding systems. A comparison was made with internationally accepted step and touch voltages criteria.

He also made recommendations for the design of a temporary grounding system to be used during the construction of CHESF's transmission lines. According to later information received from CHESF's Transmission Line Construction Department (Mr. Matheus), this system saved the life of some construction workers during a line construction field accident.

CHESF – Mr. Daconti analyzed the feasibility of increasing conductor-to-ground clearances of CHESF's 230 kV transmission lines located in geographical regions where sugar cane burns frequently happen. The reduction of the air gaps insulation strength was analyzed based on a bibliographical review. Additionally, he analyzed the corona performance of ACSR conductors with greased steel core. Some of these conductors purchased by CHESF experienced problems of grease melting with consequent increase on corona disturbance effects.

CHESF – Mr. Daconti participated in the analysis for definition of several CHESF's 230 kV and 500 kV transmission lines top tower geometry. These studies revised the electrical clearances of the mentioned towers in order to assure a good insulation coordination performance regarding power frequency voltages, switching surges, lightning and live-line maintenance. Additionally, he inspected tests regarding the distribution of electric potential on suspension insulator strings at CEPEL (Brazilian Electric Power Research Center).

CHESF – Mr. Daconti developed a software tool in Fortran for the calculation of electrical parameters of metallic pipelines. The software is able to calculate electrical parameters of bare or coated pipelines, located above ground or underground. This software was used in the analysis of crossings between overhead lines and pipelines.

He also worked as a Member of the Committee responsible for the elaboration of the Brazilian Standard on Transmission Line Design (NBR 5422) being a technical contributor to the Line Clearances Section. Additionally, he performed studies for sectionalizing and grounding of metallic fences located nearby 230 kV transmission lines in the Lama Preta neighborhood.

CHESF – Mr. Daconti and Themag Engineering analyzed the electromagnetic compatibility between an Acid Pipeline owned by Caraiba Metais and two CHESF's transmission lines corridors constituted by the following overhead lines:

230 kV Camacari-C.Metais

230 kV Camacari-G.Mangabeira

230 kV Camacari-Jacaracanga

230 kV Camacari-Cotegipe

230 kV Camacari-Matatu

Safety measures were recommended to protect people against electric shocks and pipeline installation against damages.

Additionally, he improved a software tool written in Fortran for the calculation of short-circuit current distribution between transmission line shield wires and grounding systems.

CHESF – Mr. Daconti analyzed the electrostatic and electromagnetic unbalances and proposed transposition schemes for the following transmission lines:

230 kV Candeias-Jacaracanga

230 kV Angelim-S.Cactano

230 kV Fortaleza-Tauape

230 kV Mirueira-Goianinha

500 kV Camacari-Candeias

He also calculated short-circuit currents and specified shield wires characteristics for the following transmission lines:

230 kV Imperatriz-P.Franco

230 kV P.Franco-Carolina

230 kV Milagres-Coremas

230 kV P.Afonso-Itabaiana

The specification of the mentioned shield wires took into account the variation of the short-circuit current along the transmission line length.

Mr. Daconti prepared a set of reports on: selection of transmission line conductors and shield wires, definition of transmission line transposition schemes, and calculation of transmission line environmental effects for establishment of right-of-way width. These reports have been presented to a World Bank technical mission that approved a loan for the construction of several transmission lines.

Additionally, he participated in the preliminary design of the 500 kV P.Dutra-S.Luiz transmission line. Conductor, shield wire and insulator were selected, as well as transposition scheme, right-of-way width, tower clearances and conductor-to-ground clearances were defined. Also, electrical parameters were calculated. This line crosses regions of aggressive atmosphere near the ocean.

CHESF – Mr. Daconti analyzed problems of high altitude Corona Effect for the 500 kV P.Afonso-Angelim transmission line. Problems of visual Corona were detected along the transmission line section located over the Sao Pedro mountain range. Pollution problems were investigated and a solution was proposed.

He also inspected RIV and Corona Tests applied to 500 kV line conductor and hardware performed at Sao Paulo University's High Voltage Laboratory.

CHESF – Mr. Daconti was a team member of the one-year long H-2000 power system expansion planning project. The mentioned project was conducted by CHESF, ENEL/CESI and Themag Engineering and aimed to plan the CHESF's power system expansion for the decade 1990-2000. Most of the activities performed by him were related to preliminary transmission line design such as: route selection, definition of design criteria; specification of line materials; technical-economical selection of conductors; power losses in shield wires; calculation of thermal limits of conductors and shield wires; insulation coordination for power frequency voltage, switching surges, lightning and live-line maintenance;

CHESF – Mr. Daconti developed a software tool in Fortran for calculation of corona losses, electric and magnetic fields, audible noise, radio noise and television interference produced by overhead

transmission lines at ground level. The mentioned software was extensively used by CHESF in studies for definition of Right-Of-Way width and environmental disturbances caused by transmission lines. He also performed studies to check the possibility of reducing Right-Of-Way width of some 230 kV and 500 kV transmission lines of CHESF's power system. Additionally, he analyzed the induction in vehicles and the possibility of fuel ignition underneath the 230 kV overhead transmission lines which cross CHESF's Headquarters parking lot.

CHESF – Mr. Daconti developed a software tool in Fortran for calculation of overhead transmission line sags and tensions. This software was used by CHESF to prepare conductor catenary templates and stringing tables.

TECHNICAL PUBLICATIONS IN CONFERENCES AND JOURNALS WITH NATIONAL AND INTERNATIONAL CIRCULATION:

1. "Experience of CHESF concerning interference between EHV transmission lines and pipelines", CIGRE Session 1986, Paris/France, (co-author: D.O.C. Brasil).
2. "Calculation of metallic pipeline electrical parameters", 2nd Latin American Regional Meeting of CIGRE, 1987, Puerto Iguazu/ARGENTINA. **Author**.
3. "Environmental disturbances due to high voltage electrical installations", IX SNPTEE, 1987, Belo Horizonte/BRAZIL, (co-authors: C.P.R. Gabaglia, C. Fernandes, D.O.C. Brasil). Paper in Portuguese. See paper #09 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1987/sga9.htm
4. "Special grounding mats for 69 kV urban distribution network in Salvador city", APEE magazine, September 1988, Recife/BRAZIL. **First Author**. Paper in Portuguese.
5. "Effects of high voltage transmission lines on the environment", Eletricidade Moderna magazine, August 1989, Sao Paulo/BRAZIL, (co-authors: C.P.R. Gabaglia, C. Fernandes, D.O.C. Brasil). Paper in Portuguese.
6. "Interference from 230 and 500 kV transmission lines on metallic pipelines – Experience of CHESF", X SNPTEE, 1989, Curitiba/BRAZIL, **First Author** (co-authors: F.D. Ferro, J. Varela, M.O.B.C. Melo, O. Regis). Paper in Portuguese. See paper #07 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1989/gsp10.htm
7. "Induced effects on metallic installations near AC high voltage transmission lines", 3rd Latin American Regional Meeting of CIGRE, 1989, Foz do Iguacu/BRAZIL (co-authors: R. Sanz, O.G. Vera, J.L. Pineiro, D.O.C. Brasil, A.M. Franca, S.T. Sobral, J.R. Medeiros). Paper in Portuguese.
8. "Electromagnetic interference on the gas pipeline entering the 230 kV Camacari substation", CIER Conference, 1989, Caracas/VENEZUELA, **First Author** (co-authors: F.D. Ferro, M.O.B.C. Melo). Paper in Portuguese.
9. "Induced effects caused by overhead transmission lines on metallic structures", CIGRE Session 1990, Paris/France, (co-authors: R. Sanz, O.G. Vera, J.L. Pineiro, D.O.C. Brasil, A.M. Franca, J.R. Medeiros, S.T. Sobral).
10. "Effects on other installations of the injection of short-circuit currents into the ground", 4th International Symposium on Short-Circuit Currents in Power Systems, 1990, Liege/BELGIUM, **First Author** (co-authors: D.O.C. Brasil, D.M. Correia).
11. "Disturbances caused by the proximity between the 230 kV Teresina-Piripiri transmission line and a railroad near Teresina city", XI SNPTEE, 1991, Rio de Janeiro/BRAZIL, **First Author** (co-authors: M.O.B.C. Melo, O.L.S. Paiva, M.A.A.C. Lima, D.M. Correia). Paper in Portuguese. See paper #19 at http://www.xviiisnp tee.com.br/acervo_tecnico/memoria/1991/gsi11.htm
12. "Experience of CHESF about mitigation of electromagnetic interference – Aspects concerned with grounding mats and short-circuit currents", CIER Conference, 1991, Santiago/CHILE. **First Author. Awarded Brazilian Paper**. Paper in Portuguese.
13. "Disturbances caused by inductive and resistive couplings with low voltage networks", XI SENDI, 1992, Blumenau/BRASIL, (co-authors: D.M. Correia, D.O.C. Brasil). Paper in Portuguese.
14. "Electromagnetic compatibility between electric power systems and other installations", International Symposium on Electromagnetic Compatibility - ISEMC, 1994, Sao Paulo/BRAZIL, **First Author**

- (co-authors: D.O.C. Brasil, D.M. Correia). This paper was also presented at the 1995 International Colloquium of CIGRE Study Committee 36 (Power System Electromagnetic Compatibility).
15. "Induction from transmission lines and substations on other installations – practical cases", 6th Latin American Regional Meeting of CIGRE, 1995, Foz do iguacu/BRAZIL, (co-authors: D.O.C. Brasil, D.M. Correia). Paper in Portuguese.
 16. "Overview about modern Custom Power equipment", II SBQEE, 1997, Sao Lourenco/BRAZIL, **First Author** (co-authors: A.J.P. Ramos, H.S. Bronzeado). Paper in Portuguese.
 17. "Guide on EMC in Power Plants and Substations", CIGRE SC 36 Technical Brochure, 1997, Paris/France, (co-authors: members of WG 36.04). **Peer-reviewed publication.**
 18. "Voltage sag mitigation by means of Thyristor Controlled Series Capacitors", ICHQP, 1998, Athens/GREECE, (co-author: A.R.M. Tenorio).
 19. "Environmental costs of transmission lines", 8th Latin American Regional Meeting of CIGRE, 1999, Ciudad del Este/Paraguay, (co-authors: R.C. Furtado, F.G. Soares, E. Almeida, J.M.B. Bezerra). Paper in Portuguese.
 20. "Inclusion of environmental costs in transmission system budgets", XV SNPTEE, 1999, Foz do Iguassu/BRAZIL, (co-authors: R.C. Furtado, F.G. Soares, E. Almeida, J.M.B. Bezerra). Paper in Portuguese. <http://www.itaipu.gov.br/xvsnptee/xvsnptee/grupoxi/gia06.pdf>
 21. "Electromagnetic compatibility in power plants and substations", 8th Latin American Regional Meeting of CIGRE, 1999, Ciudad del Este/Paraguay, **First Author** (co-author: J. Saad). Paper in Portuguese.
 22. "The incorporation of environmental costs into the planning of a power system interconnection in Brazil", CIGRE Session 2000, Paris/France, (co-authors: R.C. Furtado, F.G. Soares, J.M.B. Bezerra).
 23. "Analysis of EMC problems related to capacitive voltage transformers inside the 500 kV Xingo substation", XVI SNPTEE, 2001, Campinas/BRAZIL, (co-authors: F.R. Alves, H.M. Moraes). Paper in Portuguese. http://www.xviiisnptee.com.br/acervo_tecnico/memoria/xvi/10_Grupo_X_Gsc/GSC-021.pdf
 24. "Environmental risk management of high voltage substations", XVI SNPTEE, 2001, Campinas/BRAZIL, **First Author** (co-authors: R.C. Furtado, J.D. Braga, F.E.C. Farias, R.R. Almeida, P.T. Silva). Paper in Portuguese. http://www.xviiisnptee.com.br/acervo_tecnico/memoria/xvi/11_Grupo_XI_Gia/gia-024.pdf
 25. "Increasing power transfer capability of existing transmission lines", IEEE T&D Conference, 2003, Dallas, USA, **First Author** (co-author: Daniel C. Lawry).
 26. "Overhead line thermal rating calculation based on the conductor replica method", IEEE T&D Conference, 2003, Dallas, USA, (co-author: Daniel C. Lawry).
 27. "The ThermalRate System: A Solution for Thermal Upgrading of Overhead Transmission Lines", Shaw PTI Electronic Newsletter, April 2004, USA, **First Author** (co-author: Daniel C. Lawry). <http://www.shawgrp.com/PTI/company/eNewsletter/The%20ThermalRate%20System.pdf>

28. “Dynamic Thermal Rate Monitoring: An Effective Means for Increasing Power Transfer Capability of Existing Transmission Systems”, IX SEPOPE, 2004, Rio de Janeiro, BRAZIL, **First Author** (co-author: Daniel C. Lawry).
See <http://www.furnas.com.br/ixsepoppe/english/artigos/sessao19/tema10/SP-153.pdf>
29. “Uprating and Upgrading of Overhead Lines”, T&D World Expo, 2004, Indiana, USA, **Author**.
See Page 6 Technical Lecture T105 at http://images.tdworldexpo.com/files/1104/t&d04_AB.pdf
30. “Conductor Replica Methodology: An Effective Solution for Strengthening Electric Power Transmission Infrastructure by Increasing Overhead Line Thermal Rating”, EPRI Increased Power Flow Conference, 2004, Boston, USA, **First Author** (co-authors: Daniel Lawry, Bernie Fitzgerald, Shadrack Orero).
31. “Management of Electrical Risks in Transmission Line – Pipeline Shared Rights-of-Way”, 8th International Symposium on Environmental Concerns in Rights-of-Way Management, 2004, Saratoga, USA, **Author**. The proceedings of this Symposium will be published by Elsevier.
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32. “An Effective Technology for Increasing the Thermal Rating of Transmission Lines”, 15th Conference on the Electric Power Supply Industry – CEPsi, 2004, Shanghai, CHINA, **First Author** (co-author: Daniel Lawry).
See Paper ID #732 at http://www.cepsi2004.com/regonline/paperorallist_e.asp
33. “Standard Handbook for Electrical Engineers – 15th Edition – Section 14 – Transmission Systems”, 2006, New York, USA, **Author & Revision Coordinator**.
34. “Application of Surge Arresters to Protect Overhead Lines Against Lightning”, Power Quality & Reliability Conference, 2006, California, USA, **Author**.
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35. “Standard Handbook for Electrical Engineers – 16th Edition – Section 14 – Transmission Systems”, 2012, New York, USA, **Author & Revision Coordinator**
36. “Jose Daconti: The Voice of Overhead Transmission” – Transmisssion & Distribution World Magazine, Oct 2013, Electronic Newsletter.
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Appendix



Corporate Overview

Siemens Power Technologies International (Siemens PTI) is a world leader in power systems analysis. Siemens PTI has a legacy of world renowned engineering experience and innovative software and technology to assist our clients who are regularly facing fast evolving and highly complex issues. Our comprehensive offerings including Consulting, Software Solutions, and Education, work together to address a wide range of power system engineering needs.

Founded in 1969 in Schenectady, NY, Siemens PTI has evolved into a world-class resource for the electric power industry. We also have regional Consulting offices in Houston, Texas; Minnetonka, Minnesota; Mountain View, California; Littleton, Colorado; and British Columbia, Canada. We work in synergy with Siemens PTI Network Consulting in Erlangen, Germany, as well as with offices in many different countries.

Siemens PTI (<http://www.siemens.com/power-technologies>) is part of Siemens Industry (www.siemens.com/industry). Financial data as well as other information regarding the Siemens Corporation may be found at www.siemens.com/annualreport.

A.1 Consulting

Siemens PTI's Consulting team in the US includes over 30 dedicated consulting engineers who are accomplished in a wide range of skills. Our consultants typically complete over one hundred projects each year for our customers across the globe. Some of these are short-term, highly-focused studies that require only a few days of effort; others are more comprehensive assignments involving thousands of consulting hours that span several months. Over Siemens PTI's four-decade history, our consultants have provided technical and strategic consulting services to clients in over 70 countries.

Siemens PTI offers solutions to power-related problems with our unique combination of global experience, analytical skill, industry leading software tools, and network of industry relationships established over decades of high-quality consulting services. We offer engineering services that can supplement our customers' existing technical staff and support them in unique projects that require specialized expertise. Our areas of expertise include a full range of transmission planning, distribution planning, smart grid consulting, production cost modeling, and NERC audit compliance services.

A.2 Software Solutions

Comprehensive network planning and analysis, which can be time-consuming processes, are essential for utility companies, as well as industrial network operators, generators and engineering consulting firms. To facilitate the planning and design of supply networks, Siemens PTI offers a suite of powerful software tools that support network planning and operations engineers in their development of highly accurate and efficient power system analyses.

The Power System Simulation (PSS®) Product Suite provides a complete set of integrated, conventional and specialized tools for the simulation and analysis of transmission, distribution and industrial power networks, as well as gas, water, heating and cooling infrastructures. Easily integrated into any existing IT environment, these powerful and user-friendly tools feature an intuitive graphical user interface, customizable visualization options, automation capabilities and efficient data management.

The PSS® Product Suite includes:

- PSS®E, transmission power system planning
- MOD®, project modeling and data management for PSS®E
- PSS®MUST, transmission transfer capability calculation
- PSS®ODMS, CIM-based model management and analysis for operations and planning
- PSS®SINCAL, utility and industry network planning
- PSS®NETOMAC, dynamic system analysis
- SIGUARD® DSA, dynamic security assessment

Our software solutions are backed by the vast knowledge and experience of our consulting engineers, and the long and successful practical use of these analytical tools by power system consultants and network operators in more than 135 countries. We continue to support and improve the capabilities of our PSS® Product Suite in response to current industry needs.

A.3 Siemens Power Academy

Siemens Power Academy offers comprehensive education and training programs covering all aspects of transmission and distribution theory, and applications of new technology including Smart Grid Automation; the Siemens Power Academy is the only authorized training provider in the world for instruction and training in the use of Siemens PTI's world-renowned PSS®E software.

From basic concepts to complex dynamics and modeling techniques, Siemens Power Academy programs and short courses help customers on-board new employees, supplement engineer in training (EIT) programs, and build a development investment strategy to grow technical talent and power system engineering teams.

Approximately 1,000 engineers from around the world participate each year in the more than 60 Siemens Power Academy courses offered in North America. Our network of instructional experts, supported by consulting engineers and industry experts, ensure that course content meets today's challenges, and that our instructional methods for transferring technical knowledge are of the highest standards. With more than forty years of experience training our customers, we have a solid reputation for delivering meaningful training.

1) Scope – Siemens Industry, Inc., Siemens Power Technologies International (Siemens PTI) will perform the services set forth in the Contract, Letter, or Proposal of which these Terms and Conditions (“Terms”) are a part and together make up the “Agreement” with the client(s) executing the Contract, Letter, or Proposal (“Client”). The provisions of these Terms shall control in the case of conflict with any provisions of any Contract, Letter, Proposal, or any other contract document.

- Expenses:** Report production and printing, reproduction, telephone, and computer services will be billed to Client at Siemens PTI's costs for such materials or services. Expenses of consultants while on assignment or any other charge incurred or expenditure made on Client's behalf will be charged at cost.

- 4) Taxes** – Any and all payments to Siemens PTI under the Agreement shall be made free and clear of and without deduction for any and all present and future taxes, levies, imposts, deductions, charges, or withholdings.

- 5) Insurance** – Siemens PTI will maintain comprehensive general and automobile liability insurance with a combined bodily injury and property damage limit of \$500,000 and worker's compensation insurance as required by law.

- 6) Independent Contractor** – It is understood and agreed that Siemens PTI shall for all purposes be an independent contractor, shall not hold itself out as representing or acting in any manner for Client, and shall have no authority to bind Client to any contracts or in any other manner.
- 7) Termination** – This Agreement shall be subject to the right of either party to terminate at any time upon not less than ten (10) days' prior written notice to the other party. Upon termination, Client shall pay the full amount due for services rendered and costs and expenses incurred and not paid for up to that time, and the costs of returning consultant personnel to home base and other reasonable costs and expenses incurred in effecting termination (including cancellation charges) and returning documents.
- 8) Responsibility Statement** – Siemens PTI's services will consist of reviewing and advising Client concerning the subject project and/or facilities for which Siemens PTI has no engineering, design, construction, operation, or maintenance responsibility. Siemens PTI's review of any information prepared by Client or others, including, but not limited to, design, schedule, interface, environmental, permitting, performance, market, or economic information, shall in no way serve to transfer to Siemens PTI responsibility or liability for the accuracy, correctness, or timeliness of such information. Such information shall be timely submitted to Siemens PTI and Siemens PTI's advice will be based on and limited by the accuracy, scope, and timeliness of information furnished to Siemens PTI. Time and scope limitations inherent in Siemens PTI's performance preclude definitive verification of factors that may later be shown to have been important to the project. Siemens PTI's review, therefore, may not uncover all of the significant risks and variables. The parties acknowledge that the actual project economic viability and technical performance depend on many factors not within the control of Siemens PTI, such as proper design, equipment, construction, operation, maintenance, etc. Therefore, Siemens PTI specifically does not guarantee, warranty, or otherwise underwrite the project, its economic viability, or its technical performance. Any engineering, design, construction, operation, or maintenance deficiencies shall remain the complete responsibility of the party or parties providing the engineering, design, construction, operation, and maintenance services for the project. It is understood that Siemens PTI shall have no right of authority to stop any work, nor shall Siemens PTI have any responsibility for the means, methods, techniques, or safety programs of the engineer, constructor, and/or operator.

Siemens PTI agrees that the services provided for herein will be performed in accordance with recognized professional consulting standards for the same or similar services. If, during the performance of these services or within one year following completion of the assignment, such services shall prove to be faulty or defective by reason of a failure to meet such standards, Siemens PTI agrees that, upon prompt written notification from Client of any such fault or defect prior to the expiration of the one-year period following the completion of the services, such faulty or defective portion of the services shall be redone to meet such standards at no cost to Client up to a maximum amount equivalent to the cost of fees paid for the services rendered under this assignment.

Notwithstanding any other provision to the contrary in this Agreement, Siemens PTI's total aggregate liability for damages under this Agreement shall be limited to 100% of the amount of the fees for services received by Siemens PTI under this Agreement. In no event shall Siemens PTI, its parent corporation, or their affiliates, agents, employees, or

others providing materials or performing services in connection with this Agreement be liable for any indirect, incidental, consequential or special loss or damage, including, but not limited to, lost profits, business interruption losses, customer claims, or replacement losses, whether attributable to breach of contract, warranty, express or implied, tort, including negligence, strict liability, or otherwise. EXCEPT FOR THE LIABILITIES ASSUMED HEREIN, CLIENT DOES RELEASE SIEMENS PTI, ITS PARENT CORPORATION AND THEIR AFFILIATES, AGENTS, EMPLOYEES, OR OTHERS PROVIDING MATERIALS OR PERFORMING SERVICES IN CONNECTION WITH THIS AGREEMENT.

- 9) Confidential Information** – Neither party shall disclose to any third party any Confidential Information of the other, and such Confidential Information shall be identified or marked as confidential at the time of disclosure, for a period of two (2) years from completion of this Agreement. As used herein, Confidential Information includes, but is not limited to, any information that relates to any party's research, development, trade secrets, proprietary products, or business affairs, but does not include information that (i) is at the time of its disclosure publicly known or becomes publicly known through no breach of the terms of this Agreement; (ii) was already known by the receiving party at the time of disclosure; (iii) is lawfully received from a third party not bound under a confidentiality agreement with either party; or (iv) is disclosed under legal compulsion.
- 10) Work Product** – Siemens PTI's services are provided for Client's sole benefit and not for the benefit of or use by any other party. No third party shall be entitled to rely upon Siemens PTI's work product. It is understood and agreed that Siemens PTI's use of its proprietary computer software, methodology, procedures, or other proprietary information in connection with an assignment shall not give Client or anyone else any rights with respect to such proprietary computer software, methodology, procedures, or other proprietary information, and Client agrees to keep confidential and not disclose such proprietary information to any third parties. Subject to the confidentiality obligations hereunder, Siemens PTI may retain and further use the technical content of its work hereunder.

The following legal notice shall be affixed to any report or other document furnished by Siemens PTI hereunder and to any report or other document resulting from this Agreement that shall be distributed outside Client's organization.

"LEGAL NOTICE"

This document was prepared by Siemens Industry, Inc., Siemens Power Technologies International (Siemens PTI), solely for the benefit of New Hampshire Attorney General's Office (Counsel for the Public). Neither Siemens PTI, New Hampshire Attorney General's Office, nor their parent corporations or affiliates, nor any person acting in their behalf (a) makes any warranty, expressed or implied, with respect to the use of any information or methods disclosed in this document; or (b) assumes any liability with respect to the use of any information or methods disclosed in this document.

Any recipient of this document, by their acceptance or use of this document, releases Siemens PTI, New Hampshire Attorney General's Office, their agents, counsel, parent corporations and affiliates from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability."

- 11) Excused Performance** – Siemens PTI shall not be deemed in default of any provision hereof or be liable for any delay, failure in performance, or interruption of service resulting directly or indirectly from a force majeure event, including but not limited to acts of God, civil or military authority, civil disturbance, war, terrorist attacks, strikes or other labor disputes, fires, other catastrophes, or other force, event or condition beyond its reasonable control, whether or not such event may be deemed foreseeable.
- 12) Notices** – All notices and communications given under or pursuant to the Agreement shall be in writing and sent by certified mail, telecopied or delivered to Siemens Industry, Inc., Siemens Power Technologies International at 400 State Street, Schenectady, NY, 12305, Attention: Division Counsel, and if to Client at the address or telecopy number shown on the Contract, Letter, or Proposal or such other address or telecopy number as Client may designate by written notice to Siemens PTI. All such notices and communications shall be effective: (a) if mailed, when received, as evidenced by a Return Receipt; (b) if telecopied, when sent, as evidenced by receipt of a confirmation from the correct telecopier number; and (c) if delivered personally or by courier, when actually received as evidenced by a receipt.
- 13) Complete Agreement** – It is understood and agreed that this Agreement embodies the complete understanding of the parties and that any and all provisions, negotiations, and representations not included herein are hereby abrogated and these Terms cannot be changed, modified, or varied except by written instrument signed by both parties. In the event Client shall issue a purchase order, memorandum, or other instrument covering the services herein provided, it is hereby specifically agreed and understood that such purchase order, memorandum, or instrument is for Client's internal purposes only, and any and all terms and conditions contained therein, whether printed or written, shall be of no force or effect. No waiver by either party of a breach hereof or a default hereunder shall be deemed a waiver by such party of a subsequent breach or default of like or similar nature.
- 14) Governing Law** – This Agreement shall be construed and otherwise governed pursuant to the laws of the State of New Hampshire, excluding any conflict of laws principle, and the parties agree to the jurisdiction of the courts of the State of New Hampshire.

- 15) Dispute Resolution** – The parties shall make a diligent, good faith attempt to resolve by negotiation all disputes arising out of or in connection with this Agreement. If such negotiation is unsuccessful within a period of forty-five (45) days, the parties shall make a diligent, good faith attempt to settle the dispute by mediation.

Each party shall be responsible for its own costs and expenses, including legal fees, incurred in the course of any legal proceedings.

- 16) Export Reservation Clause** – Client acknowledges that Siemens Industry, Inc. is required to comply with applicable export laws and regulations relating to the sale, exportation, transfer, assignment, disposal and usage of the provided Consulting Services under the Contract, including any export license requirements. Client agrees that such Consulting Services shall not at any time directly or indirectly be used, exported, sold, transferred, assigned or otherwise disposed of in a manner which will result in non-compliance with such applicable export laws and regulations. It shall be a condition of the continuing performance by Siemens Industry, Inc. of its obligations hereunder that compliance with such export laws and regulations be maintained at all times. CLIENT AGREES TO INDEMNIFY AND HOLD SIEMENS INDUSTRY, INC. HARMLESS FROM ANY AND ALL COSTS, LIABILITIES, PENALTIES, SANCTIONS AND FINES RELATED TO NON-COMPLIANCE WITH APPLICABLE EXPORT LAWS AND REGULATIONS.

Revised 12/08

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Appendix
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Siemens Industry, Inc.
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Exhibit A 3



EARLE C. (RUSTY) BASCOM, III – PRINCIPAL ENGINEER

Rusty Bascom holds B.S. (1989) and M.E. (1990) degrees in Electric Power Engineering from Rensselaer Polytechnic Institute, an A.S. in Engineering Science (1987) from Hudson Valley Community College, and an M.B.A. (1993) from the State University of New York.

While completing studies for his Master of Engineering degree, Mr. Bascom worked in the Software Products Department of Power Technologies, Inc. to develop time over-current and distance relay software for PSS/E. He joined PTI's Underground Cable Systems group in 1990 as an Analytical Engineer where he spent nine years gaining experience in the T&D Technology and System Planning & Operations departments while focusing on underground and submarine cable applications and technologies. Mr. Bascom was with Power Delivery Consultants from 1999 to 2010 where he continued specializing in underground cable systems, providing support to utility and research projects, and coordinating all of PDC's short courses and educational accreditation with IACET and the Florida Board of Professional Engineers.

Mr. Bascom co-founded Electrical Consulting Engineers in 2010. As company President and Principal Engineer, he specializes in cable system studies that include the following areas:

- *Feasibility studies, budgetary costing, design, specification preparation, bid review, and procurement support of new underground transmission circuits up to 500kV, including consideration of hybrid overhead-underground lines and horizontal directional drilled (HDD) projects*
- *Quality Assurance services during factory acceptance testing, field installation and commissioning*
- *Analytical studies including ampacity audits, magnetic field analysis/mitigation, pulling tension, and circulation and forced cooling evaluations (pipe-type cables)*
- *Research projects involving underground cables*
- *Studies of operational issues, condition assessment and failure investigation of cable systems*
- *Expert witness for utility outreach, public forums and hearings relating to underground cable systems*

Mr. Bascom has developed analytical methods used for the analysis and design of power equipment, some of which were incorporated in tools such as cable ampacity software for General Electric, pulling-tension software for Con Edison of New York, and circuit breaker coordination, costing and fault study software for a joint venture by Alcan and Square D. He has also developed some of ECE's in-house analytical tools to calculate ampacity, pulling tension, magnetic fields, induced voltage and hydraulic forced cooling.

Mr. Bascom has been principal investigator for several research studies for the Electric Power Research Institute including as a reviewer of the 1992 edition and author of the ampacity chapter in the 2006 edition of EPRI's *Underground Transmission Systems Reference Book*, and principal author of two editions of an underground cable fault location reference manual. He provided engineering development for EPRI software including the EPRIGEMS® Cable Ampacity Tutorial, Alternative Cable Evaluation (ACE) program, Power Transformer Analysis (PTLOAD) system, and the insulated cable models in the Dynamic Thermal Circuit Rating (DTCR) system. He has been Principal Investigator for development of UTWorkstation since 1991.

Mr. Bascom has instructed short courses for CPD International (Australia), Amabhubesi (South Africa), the University of Pennsylvania, Power Delivery Consultants, Siemens and Pterra Consulting involving AC and DC power cable systems, uprating, analytical techniques, and hybrid (underground and overhead) line design. He is a Senior Member of the IEEE, its Power & Energy Society and Standards Association, and a voting member of the IEEE Insulated Conductors Committee (ICC); he was selected as Vice Chair/Treasurer Elect in 2014 and remains active in several ICC working groups by contributing to the development of IEEE guides and standards including as past chair of ICC C8W to develop a cable standard for AC cable systems above 161kV and as past co-chair of ICC WG 7-41, Transmission Cable Operations Report. He is a member of CIGRÉ, its Joint Task Force CIGRÉ-ICC, TAG (Tutorial Advisory Group) and the U.S. representative for Working Groups B1.35, B1.50 and B1.56, and a past member of the National Association of Corrosion Engineers (NACE). Mr. Bascom authored the cable systems chapter in the 14th, 15th and 16th editions of the McGraw-Hill *Standard Handbook for Electrical Engineers*. Mr. Bascom is a registered Professional Engineer in New York, Florida, Texas, Maryland, Delaware, Arizona and the District of Columbia, is a member of the NCEES International Registry, and he is the author of 60 technical papers and publications. He holds 1 patent.

January 2016



DR. W. GRAHAM LAWSON – PRINCIPAL CONSULTANT

Graham Lawson received a B.Sc. in Physics with honors from Edinburgh University, and a Ph.D. in Electrical Engineering from the University of Southampton. He held several research and management positions with the Pirelli group, including Vice President and Chief Engineer of Pirelli Cables (now Prysmian Cables), North America. Dr. Lawson has provided engineering consulting services since 1992 focused on major submarine cable projects (both AC and HVDC). He was Manager of the Underground Cable Systems unit in the Transmission & Distribution department with Power Technologies, Inc. from 1992 to 1997. He founded Energy Cable Consultants, Inc. in 1997 through which he continued providing consulting services until 2015 when he relocated to the United Kingdom.

While at Pirelli, his activities included:

- Analysis of behavior of high-voltage dc cables and their accessories
- Life evaluation of self-contained fluid-filled cables. This pioneering study is the basis for much of the work presently conducted in this country on aging of paper-insulated cables.
- Evaluation of evaporative cooling of cable systems and the use of heat pipes for localized cooling
- Numerous ampacity analyses of SF6 bus and conventional cable systems
- In charge of the development of 345-kV laminated paper-polypropylene cable and 230-kV high-pressure gas-filled cable.
- Responsible for research projects to improve medium-voltage extruded-dielectric cables
- Holding the position of Chief Engineer for the telecommunication division of Pirelli Cables, PLC, performing extensive work in optical systems development and manufacture.

As a consultant, Dr. Lawson conducted several technical and analytical studies for U.S. utilities, including innovative ampacity analyses and submarine cable applications. Among his most recent U.S. activities Dr. Lawson has provided consulting services for the Neptune RTS Project, the 500 kVDC, 660 MW submarine cable link between New Jersey and Long Island, NY and the 3-core 138 kV, 300 MVA Connecticut to Long Island submarine cable link which replaced the 1969 SCFF submarine cable circuits.

Dr. Lawson has also been responsible for several major studies of submarine cable design and application, including the following projects:

- In charge of cable system analysis for the 400-mile, 500-kV dc submarine cable link between Sarawak and Peninsular Malaysia (the Bakun project). This work included all of the technical, economic, and environmental issues associated with the cable system, evaluating major submarine cable manufacturing facilities worldwide, preparing tender documents, and bid review.
- Reviewed proposals for the 275-kV, 1000 MVA 10 mile submarine cable circuit between Penang Island and Peninsular Malaysia. This work included cable design assessment, ampacity studies, and reliability optimization.
- Assessed technical feasibility of the proposed Iceland / UK submarine cable project for Scottish Hydro-Electric PLC. Work included detailed ampacity studies and reliability analyses.
- Performed technical audit and valuation of the Cook Strait 350-kV dc submarine cable between the North and South Islands of New Zealand.
- In charge of technical and economic assessment of the Leyte - Mindanao 350-kV submarine cable interconnection in the Philippines

Dr. Lawson has authored twenty articles and technical papers. He wrote the "Basic Design Considerations" chapter of the 1992 EPRI *Underground Transmission Systems Reference Book*. He is a Fellow of the IEE, a Senior member of the IEEE and a member of its Insulated Conductors Committee, and a Chartered Engineer in the United Kingdom .

January 2014

Exhibit B 3



ELECTRICAL CONSULTING ENGINEERS, P.C.

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r.bascom@ec-engineers.com

8 May, 2016

Mr. Peter C.L. Roth
Senior Assistant Attorney General
Counsel for the Public, Office of the Attorney General
33 Capitol Street
Concord, NH 03301

RE: Northern Pass Transmission Project - Expert Witness Support

Dear Peter;

During the last few weeks, we have been discussing expert witness support and a technical review of the Northern Pass Transmission project in support of Counsel for the Public's review of the project application. The proposed project would include construction of overhead and underground power transmission lines along an approximately 192 mile route that the developer has included in their application documents.

Electrical Consulting Engineers, P.C. (ECE) is an engineering service provider with offices based in the State of New York. ECE specializes in providing services focused on underground and submarine transmission and distribution systems including generalized approaches for construction and installation of these systems. However, we do not have expertise in the areas of overhead line or substation design and civil construction and assume others will address these technical areas.

The State of New Hampshire's Attorney General's office requested that ECE prepare a budgetary cost estimate for engineering services associated with performing a technical review, developing prepared testimony, and appearing as an expert witness for hearings that may be held in conjunction with Counsel for the Public's evaluation of the filings prepared by the developer. This letter proposal responds to your request.

ECE understands that Counsel for the Public will be engaging other consultants, including Dewberry and Siemens Power Technology International, to consider other aspects of the developer's application other than underground electrical design. The following sections summarize our understanding of the proposed scope of work and activities.

Assessment of Developer Filings & Discovery

ECE understands that submittals from the developer will be made available for evaluation including filing materials, relevant testimony, reports, design plans/maps, and permits. The activities related for this evaluation will include:

- Assessing if the underground cable electrical design is technically sound based on a review of developer-provided planning studies, conceptual and detailed design reports and material specifications; ECE will assist Counsel for the Public in preparing discovery requests where additional information is necessary.

- Evaluate underground cable cost options. ECE anticipates preparing a gross per-unit cost for underground cable options that can be apportioned based upon the underground segment length being considered. Economic evaluations will not specifically consider real estate costs, but we can provide an estimate of the land requirements for the underground alternatives for consideration by others.
- Evaluate the impact of construction, installation and operation as relates to electrical underground design issues based on the developer's proposed project design including developer-provided construction specifications, environmental management plans, and maintenance plans. In our report, ECE will describe techniques used to construct underground cable systems, general considerations for underground cable construction methods, physical requirements for underground cable infrastructure, and typical open-cut route construction methods.

ECE anticipates that others will assess traffic control, detailed civil and environmental impacts including the impact to natural resources, construction times, etc.; ECE will assist Counsel for the Public in preparing discovery requests where necessary.

- Provide guidance on magnetic field considerations for underground HVDC transmission systems; Counsel for the Public should recognize that underground cables do not impose an external electric field, and most magnetic field guidelines are related to power frequency alternating current (AC) fields
- Participate in limited site visits

ECE will review the available information provided by various sources. Where apparent information is missing or incomplete, ECE will assist Counsel for the Public in preparing discovery requests and incorporate any resulting discovering into a report we will prepare as part of the expert witness support described below.

Alternative Route Assessment

ECE understands that Counsel for the Public is considering alternative routes, including routes that may utilize only underground options. ECE will review these areas in conjunction with the civil design consultant to develop budgetary costs and comparative impacts for the alternative routes. ECE does not anticipate performing a detailed design of these alternative routes.

Expert Witness Support

In conjunction with reviewing the data that is available for this project, ECE will perform the following activities which will constitute the main deliverables:

- Prepare a report summarizing
 - Underground electrical design considerations and assessment of all materials provided as part of discovery, including a description of typical construction and electrical installation activities.
 - Consider and briefly describe alternative underground electrical design approaches that could be considered that would reduce impacts.
 - Provide comments on the electrical design portion of cable portions of underground to overhead transition structures in conjunction with civil design consultant.

Mr. Peter C.L. Roth
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- Prepare discovery requests for the developer
- Assist in preparing pre-filed testimony related to underground electrical design issues.
- Respond to discovery requests
- Participate in technical hearings as a witness and to hear other parties' witnesses
- Attend evidentiary hearings

PERSONNEL

ECE engineers each average over 25 years of experience working with underground pipe-type cable systems. We will call on this experience to evaluate the capacity of the lines. Personnel that will participate in this project include:

Earle C. (Rusty) Bascom, III, Principal Engineer, has been performing analysis and design of underground cable systems for his +25-year engineering career, including developing industry standards and numerical methods for ratings. He authored the underground chapter in the 14th, 15th, and 16th editions of the McGraw-Hill Standard Handbook for Electrical Engineers, was a reviewer of the 1992 edition of the EPRI *Underground Transmission Systems Reference Book* and the author of Chapter 11, Ampacity, in the 2006 edition, and he has developed engineering models and performed technical research studies for numerous EPRI projects. He is an author of 60 technical papers and publications. He was a member of CIGRÉ Working Group B1.35 and co-author of Technical Brochure 640, *A Guide for Rating Calculations of Insulated Power Cables*. He currently is the U.S. representative to CIGRÉ Working Groups B1.50 and B1.56, and is Vice Chair/Treasurer of the IEEE Insulated Conductors Committee. Mr. Bascom has been applying his experience in the power cable industry in many areas including preparing cable systems designs, developing material and installation specifications for underground cable systems, and acting as the "owner's engineer" during procurement, construction and commissioning. Mr. Bascom has been an expert witness for the New York State Attorney General's office, providing prepared testimony, rebuttal testimony and testimony under direct examination. He has also been an expert witness for a developer project in Texas where he provided prepared testimony (the case was settled before direct examination). Mr. Bascom will be the principal investigator and expert witness for the work of this project.

Dr. W. Graham Lawson, Principal Consultant, has over 45 years of experience in underground, submarine and optical fiber cable systems with background in both manufacturing and engineering consulting services. He has assisted in the evaluation and design of several major submarine cable projects, both AC and HVDC, in the United States and internationally working for other engineering firms and directly as the owner's engineer. Dr. Lawson has contributed to the 1992 edition of the EPRI *Underground Transmission Systems Reference Book*, and authored over 20 papers. He will assist in assessing some of the rating and technical feasibility details of the Northern Pass Project as support to other team members. However, he will be unavailable to provide prepared or direct testimony or participate in site visits or meetings.

COST ESTIMATE AND SCHEDULE

ECE performs much of its work on a per diem, time and materials basis, usually with a contract ceiling, in accordance with our published engineering rates (FIN-1, attached) and assuming acceptable terms and conditions can be negotiated, including agreement on any pass-down conditions.

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ECE estimates the following costs for this project (PE = Principal Engineer, PC =Principal Consultant). We understand that the Attorney General's office will need to obtain approval for the cost of all aspects of our activities at the onset, whether or not these services will be utilized.

- **Task 1 – Assessment of Developer Filings and Discovery**

Review & Assess Filings / Discovery	\$17,200
Limited Site Visits (Windshield Review), Up to 3 trips, 2 days / trip	
5 days, PE	\$ 8,600
5 days travel & living @ \$250 / day	\$ 1,250

- **Task 2 – Alternative Route Assessment**

High Level Design for Alternative Route	\$ 8,600
Budgetary Costs for Alternative Route	\$ 5,160

- **Task 3 - Expert Witness Support**

Prepare Written Report	\$17,200
Meet with Other Consultants / State of New Hampshire / Primer to Review Report	
Multiple (~1hr) WebEx Meetings	\$ 3,440
3 meetings / conference calls (Schenectady)	\$ 5,160
3 day travel & living for meeting (local) @ \$50 / day	\$ 150
Prepare Discovery Request & Review Response	\$ 3,440
Review/Assist Pre-Filed Testimony	\$ 3,440*
Respond to Discovery Requests	\$ 5,160*
Participate in Technical Hearings	\$ 6,880*
3 days travel & living @ \$250 / day	\$ 750*
Attend Evidentiary Hearings	\$ 8,600*
4 days travel & living @ \$250 / day	\$ 1,000*

Total Estimate: \$96,030

*ECE budgeted for each of these activities based on discussions with representatives from the New Hampshire Attorney General's office and Primmer. If the commitment in time exceeds these budgeted hours, including time required to be available for hearings, ECE reserves the right to seek payment for this activity and expenses on a *per diem*, time and materials basis.


In terms of schedule, ECE understands that Counsel for the Public will submit for approval to obtain the support of experts to assess the developer's project application and that this approval process would result in starting the work sometime in May or June 2016. ECE also understands that the initial application review is normally due to be completed within one calendar year which would end in December 2016 based on the application date of December 2015. However, an extension to the time schedule has been requested such that work might be completed in 18-24 months (June to December 2017). ECE is available to work under any reasonable schedule.

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Note that we do have other long-standing commitments, some of which may not be rescheduled, but we will make every reasonable effort to accommodate the requirements of Counsel for the Public as far as this evaluation is concerned.

We look forward to supporting Counsel for the Public with his evaluation of the Northern Pass project application. Please let me know if there are any questions or comments on the proposed scope or budget.

Regards,

A handwritten signature in blue ink, appearing to read 'Rusty', with a long horizontal flourish extending to the right.

Earle C. (Rusty) Bascom, III
Principal Engineer

Encl. ECB, WGL Bio
ECE FIN-1 rate sheet

**Northern Pass Transmission LLC and Public Service Company of New Hampshire dba
Eversource Energy
SEC 2015-06
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---	--

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