DURHAM REGION

York Region

CLERK'S OFFICE
FILE No. P42

April 15, 2011

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R.M.Y. CLERK

Denis Kelly, Regional Clerk
The Regional Municipality of York
17250 Yonge Street, 4th Floor
Newmarket, ON L3Y 6Z1

Dear Mr. Kelly:

RE: Durham/York Energy from Waste Project
MOE File No.: EA-08-02

In accordance with the Notice of Approval to Proceed with the Undertaking regarding The Amended Environmental Assessment for Durham and York Residual Waste Study, Section 3 Public Record, enclosed please find an additional hard copy of the following document:

- Identification of Professional Engineer to Complete an Independent Audit of the Undertaking (April 13, 2011)

The enclosed document is also available on the project website as follows:

http://www.durhamyorkwaste.ca/project/whats_new.htm

and

http://www.durhamyorkwaste.ca/project/project_doc.htm

Thank you,

Melodee Smart
Administrative Assistant
Works Department
The Regional Municipality of Durham
605 Rossland Road East, Level 5
Whitby, ON L1N 6A3
905-668-4113 or 1-800-372-1102 extension 3560
Melodee.Smart@durham.ca

Encl.

April 13, 2011

Ms. Agatha Garcia-Wright, Director
Environmental Assessment and Approvals Branch
Ministry of the Environment
2 St. Clair Avenue West, 12A Floor
Toronto, ON M4V 1L5

and

Mr. Greg Sones, Director
Operations Division
Ministry of the Environment
Place Nouveau
5775 Yonge Street, Floor 8
North York, ON M2M 4J1

Dear Ms. Garcia-Wright and Mr. Sones:

RE: Durham/York Energy from Waste Project
Identification of Professional Engineer to Complete an Independent Audit of the Undertaking
MOE File No.: EA-08-02

In the Notice of Approval to Proceed with the Undertaking for the amended Environmental Assessment (EA) for the Durham and York Residual Waste Study, Conditions 16.1 and 16.2 respectively stipulate that *"The proponent shall retain the services of a Qualified, Independent Professional Engineer to carry out an independent audit of the undertaking", and "[w]ithin six months from the date of approval or other such date as agreed to in writing by the Regional Director, the proponent shall submit to the Director and the Regional Director, the name of the Qualified, Independent Professional Engineer and the name of the company where he/she is employed."*

To meet the above EA condition the Regional Municipality of Durham and the Regional Municipality of York (the "Regions") have retained the services of HDR Corporation ("HDR"). HDR, under contract with the Regions, will provide project oversight to ensure the facility is designed, constructed and commissioned to meet all the conditions identified in the EA and the Certificates of Approval for the undertaking. Additionally, included in the HDR engineering assignment is a requirement to provide detailed design oversight, daily construction oversight consistent with the design build operate

approach, and provide administrative functions for the project, including regular reporting to the MOE. The executed contract with HDR specifies that qualified staff will be present on site for the entire 40 month construction period, supported by senior technical and managerial team members as outlined in Annex A to this letter.

The Qualified, Independent Professional Engineer currently identified by HDR responsible for the project is Glenn A. Mottershead (resume attached).

It is anticipated that in 2014, the contract with HDR will end following successful commissioning of the plant. At that time, the Regions will tender a service contract to provide annual third party operation audits. The purpose of these audits will be to ensure continued compliance with Condition 16. The proposed scope of work for these annual audits will follow the outline provided in Annex B to this letter.

We are available to meet and discuss this request at your convenience. Should you require additional information, please contact Mr. Gioseph Anello, Manager of Waste Planning and Technical Services at 905.668.4113 ext. 3445.

Sincerely,

Mirka Januszkiewicz, P.Eng.
Director, Waste Management
The Regional Municipality of Durham

Laura McDowell, P.Eng.
Director, Environmental
Promotion and Protection
The Regional Municipality of York

/ms

c. D. Dumais, Director, Approvals Program, Ministry of the Environment
G. Battarino, Project Officer, Ministry of the Environment

Encl.

Annex A

Services to be provided by HDR as part of Contract Administration on Regions' behalf include:

Throughout the Construction Period:

- Technical support to the Regions relative to the design, construction, commissioning, acceptance testing and acceptance of the Facility
- Act as liaison between the Regions and Covanta Energy Corp. (Covanta)

Prior to Notice to Proceed:

- Assist in supporting Regions' efforts with obtaining Ministry of the Environment Certificates of Approval
- Assist in confirming that Conditions Precedent to Notice to Proceed have been satisfied
- Review and Comment on Covanta Plan submissions

Design Phase

HDR activities during the Design Phase of the Project will include:

- Ongoing Monthly Design Review meetings and
- Review of the Basis of Design and Specifications
- 25% Design Review,
- 75% Design Review and
- 100% Design Review.

Construction Phase

HDR will provide Project Administration and Construction Monitoring services to the Region during the Construction Phase. This will include

- Review of construction documents, samples and drawings for Regions' interests, compliance with the Project Agreement and confirmation of Covanta's certification that the design complies with applicable building codes and regulatory requirements.
- Participate in Construction Progress Review meetings/review and prepare comments on Covanta Construction Progress Reports (weekly, biweekly or monthly).
- Onsite monitoring of daily construction activities. HDR will provide staffing for a single daily shift the Contractor is working on site (typically Monday through Friday) including any major construction activity such as concrete pouring that may occur outside typical working hours.
- Monitoring of Covanta's QA/QC process, follow up on failed QA/QC reports until adequately resolved,

- Monitor records management and as-built records.
- Review and monitoring of construction activities schedule.
- Monitor and review equipment installation and commissioning activities, including review of commissioning reports
- Support the Regions in responding to Requests For Information ("RFI") from Covanta
- Support the Regions in reviewing and monitoring implementation of Change Requests and issuing and monitoring and implementation of Change Orders
- Review, comment on and recommend for payment as appropriate draft progress / milestone payment applications.
- Monitor materials testing activities by the Contractor, and coordinate and monitor third party materials testing and sampling efforts for Quality Assurance purposes on the Regions' behalf.
- Assist the Regions in preparation of deficiency lists and follow-up to confirm that deficiency list work is scheduled and completed in a timely manner.
- Recommend appropriate deficiency holdback values
- Monitor Covanta's compliance with regulatory requirements and permit requirements, and required inspections and submissions to the regulatory authorities. (Compliance is Covanta's responsibility).

Acceptance Testing Phase

- Review and comment on acceptance test protocol prepared by Covanta
- Monitor the initial Acceptance Test on behalf of the Regions, and review final Acceptance Test Report and make recommendations for Regions' approval/disapproval as appropriate. If the results of the initial Acceptance Test are found to be unsatisfactory and additional testing is required, Covanta will be responsible for HDR's costs to monitor the additional testing per the Project Agreement.
    - Provide confirmation that the conditions for acceptance have been satisfied and recommend to the Regions the issuance of the Acceptance Test Certificate.

Issuance of Acceptance Certificate

- Work with Covanta and the Regions in development of the Punch List
- Monitor completion of the Finishing Work, including the Punch List Items
- Review and provide comments to the Regions regarding the submitted operating and maintenance manuals and final "as built drawings".

Review Covanta's application for final acceptance of the Facility and provide confirmation to the Regions that the applicable conditions regarding issuance of the Acceptance Certificate have been satisfied.

Annex B

TASK ORDER NO. 1
SCOPE OF SERVICES FOR EFW FACILITY AUDIT

Project Understanding:

The Regional Municipality of Durham and the Regional Municipality of York are together the owners of a 436 tonne per day (tpd) solid waste disposal and electric generating facility (the Facility) located in the Municipality of Clarington, Ontario. The Facility was designed, and constructed and is operated by Covanta Energy Corp. (Covanta). The Facility consists of two 218 tpd waste combustion units; air pollution control systems and a single turbine generator. The owners are requesting an annual independent engineering evaluation of the Facility that would include the inspection of the facility and, assessment of the facility condition and operating parameters.

Scope of Work for Facility Assessment:

Phase I- Facility Data Request and Review

The consultant will assign an experienced engineer to conduct the Facility site inspection. Prior to the visit, the consultant will submit a list of required information that will provide a baseline assessment of facility performance and maintenance practices. Information would include but not be limited to:

- The Service Agreement and amendments;
- Operating performance data;
- Maintenance Outage Reports (both for scheduled and unscheduled outages);
- Turbine/Generator Overhaul Reports;
- Plant operator and shift supervisor logs;
- Environmental permits and compliance history (e.g., stack tests, Notices of Violations);
- Technical Specifications and drawings; and
- Other agreements.

Phase II- Facility Inspection

Physical Plant Inspection

Following review of the requested documents, the consultant will identify key facility components or activities that are of interest to fully assess the issues associated with the facility. The consultant will attempt to schedule the first inspection to coincide with a scheduled unit outage (typically in the fall) so that they can fully inspect the existing equipment. During the site visit, the consultant representative(s) will inspect the condition of the critical operating equipment and buildings, review any information that

could not be provided beforehand, and interview the operators of the facility. The consultant will prepare a photographic log from the inspection.

Phase III - Report

The consultant will prepare a letter report to summarize the observations from the inspection. The letter report will highlight the observations of plant conditions, operating practices, identify areas of concern and recommend any further investigations that may be warranted.

Sample Tale of Contents:

1. Introduction
2. Facility Operations and Maintenance
    a. Refuse, bypass, process rejects and ash residue
    b. Steam and electric generation and electricity usage
    c. Utility and chemical reagent usage
    d. Ash and bypass waste management
    e. Environmental compliance
3. Annual Performance Guarantees
    a. Processing guarantee
    b. Environmental performance guarantee
    c. Service level performance guarantee
    d. Maximum utility usage
4. Equipment Availability and Maintenance Items
    a. Equipment availability
    b. Scheduled outages
    c. Unscheduled outages
    d. Electrical transmission interruption
5. Facility Modifications
6. Conclusions and Recommendations

Key Understandings:

- The Owner and the Facility Operator will provide the consultant with the requested information on a timely basis.
- The Owner and the Facility Operator will provide full access to the Facility for the inspections.

Glenn A. Mottershead, P.E

Corporate Consultant

Education
University of Waterloo, Waterloo, Ontario
BASc. Electrical Engineering, 1978

Professional Registrations
Registered Professional Engineer:

- Ontario
- Alberta
- British Columbia
- Newfoundland

Professional Affiliations
Senior Member: IEEE, PES EMC, PES Material and Generator Subcommittees

Senior Member: IEEE, DEIS

Chairman: W/G P1719

Member: Standards Council of Canada – IEC TC2 (International Synchronous Machines Standards)

Specialized Training and Certifications
In 1998, Mr. Mottershead received a Westinghouse Product Introduction Award for developing modern robust gradient coating for field repair of damaged high-voltage winding stress grading systems. He was trained and has considerable experience in the testing and interpretation of ELCID low energy core testing and high-voltage insulation partial discharge analysis (PDA).

Industry Tenure
31 Years

Professional Experience

Mr. Mottershead has 31 years of experience in the engineering design, installation, commissioning, testing, troubleshooting, and modernizing of large synchronous generators. He is an expert in all aspects of high voltage epoxy mica bar and coil insulation systems, including condition assessment, manufacturing systems, material development and all relevant North American and International standards. He also specializes in the evaluation and testing of large generator stator cores and is currently chairing the IEEE Standard working group that is developing the P1719 Guide for Evaluating Stator Cores of AC Electrical Machines Rated 1 MVA and Higher.

Prior to his recent position at HDR|DTA, Mr. Mottershead was a Senior Electrical Engineer for a large hydroelectric equipment manufacturer where he was responsible for basic electrical design and for numerous condition assessments, uprate studies, performance tests, failure analysis and unit performance calculations to support large hydro generator modernization projects. His design tasks included optimized high-voltage coil and bar winding designs plus cores, wedging, circuit rings, field windings, and other related part designs for generator uprates and life extension. He also provided factory and process engineering support for the manufacture of high voltage Epoxy VPI windings and the development and testing of new materials for improved dielectric performance. While in this role, Mr. Mottershead was a member of the corporate Generator Technology Council, which planned technical policy for all the equipment manufacturer's operating units worldwide and was a member of the corporate High Voltage Committee, which managed insulation development and related issues.

Mr. Mottershead is an active participant for creation and maintenance of IEEE standards having worked on or chaired committees responsible for the content of IEEE standards 286, 434, 492, 522, 1415, 1434, 1553, 1719, ANSI C50.12 and C50.13 and was recently added to the Standards Council Of Canada's IEC TC2 committee as a synchronous machine expert for reviewing applicability of international machine standards for Canada.

Mr. Mottershead's first eight years of engineering experience were in the Generator Services Department of his employer's Turbine and Generator Division where he worked in the field, installing and commissioning power plants.

Project Experience

LCHM McCormick Powerhouse Units 3, 4 and 5, Baie Comeau Quebec, 50 MVA to 70 MVA - Uprate and Modernization. Responsible for all aspects of the generator upgrade electrical engineering including data collection, condition assessment, DC ramp and PDA testing, upgrade study, winding and associated component design, field winding re-insulation process development, installation process writing, commissioning testing and finalizing of as built drawings.

LCHM McCormick Powerhouse Units 6 and 7, Baie Comeau Quebec, 62.5 MVA to 80

MVA Uprate and Modernization - Responsible for the generator upgrade electrical engineering including data collection, condition assessment, core repair, upgrade study, winding and associated component design, and finalizing of as-built drawings.

Exelon Conowingo Powerhouse Units 4,6,7, and 2, Conowingo PA, 40 MVA to 53 MVA Uprate and Modernization - Lead Engineer for the modernization and upgrade of four vertical generators having two different manufacturer's designs. Project required multi-turn to bar conversions in new redesigned cores and stator frames with reinsulated field windings. Changing to bars required the coordination of multiple studies to verify the suitability of structures when changing the number of slots and winding parallels. Developed a novel bar braze connector design for improved field brazing quality.

Pearblossom and Oso Pumphouse, California, 22,500, 11,600 and 4,000 Hp High-Speed Vertical Pump Motor Rewinds - Provided all electrical design and insulation development to replace original ashpaltic coils with epoxy mica form wound coils. Since the angle between top and bottom legs for the coil was very large, epoxy-based flexible knuckles needed to be developed to safely install the "hard" coil where heating the thermoplastic asphalt coil to provide flexibility was the original installation method. A new flexible knuckle approach was successfully developed, applied here and at many other high speed vertical and horizontal units since.

Modernized winding and associate part design drawings for manufacture, dimensional data collection and or verification, installation instructions, factory and field test procedures and client technical correspondence was performed for the followings rewind projects:

- Kananaskis, Transalta, 5.1 MVA (2007)
- Mountain Chute, Ontario Power Gen, 75 MVA (2007)
- Ashihik, Yukon Electric, 19.2 MVA (2006)
- Chevron Texaco, Southern Cal. Edison, 24 MVA (2004)
- Northfork, Portland General Electric, 24 MVA (2003)
- Faraday, Portland General Electric, 24 MVA (2002)
- Summer Falls, GCPHA, 48.7 MVA (2001)
- Oak Grove, Portland General Electric, 30 MVA (2001)
- Lemolo, PacifiCorp, 34.7 MVA (2000)
- Burrard Steam Plant, BC Hydro, 180 MVA (2000)
- Miranda Brazil, IMPSA Argentina, 136 MVA (2000)
- Wharton GE Fr.7, Houston Light & Power, 57 MVA (1999)
- Des Joachims, Ontario Hydro, 50 MVA (1999)
- Lauderdale Turbo, Florida Light & Power, 43.2 MVA (1998)
- Pelton, Portland General Electric, 50 MVA (1998)
- PPL Brazil, IMPSA Argentina, 90 MVA (1998)
- Lloyd Shoals, Georgia Power, 14.4 MVA (1997)
- Otto Holden, Ontario Power Gen. 27 MVA (1997)
- Fish Water, Us Army Corp., 13.8 MVA (1997)
- Woodleaf, Oroville Wyandotte ID, 58 MVA (1997)
- McKay, Great Lakes Power, 25 MVA (1996)
- Grand Coulee Pump Motor, USBR, 49.4 MVA (1996)
- Forbestown, Oroville Wyandotte ID, 46.6 MVA (1996)
- Narrows, Pacific Gas & Electric, 55 MVA (1995)
- Big Creek 3, Southern Cal. Edison, 35 MVA (1995)
- Salt Springs, Pacific Gas & Electric, 30 MVA (1995)
- Big Creek 1, Southern Cal. Edison, 28 MVA (1994)
- Portal, Southern Cal. Edison, 10 MVA, (1994)
- Big Creek 4, Southern Cal. Edison, 50 MVA (1993)

- Andrews, Great Lakes Power, 9 MVA (1993)
- Island Falls, Saskpower, 18 MVA (1992)
- Black Eagle, Montana Power, 10.5 MVA (1991)
- Chelsea, Hydro Quebec, 36 MVA (1990)

In addition to the above complete rewind projects, a number of projects were supported where input was for assessments or sub-system designs only, e.g., replacement core, re-wedging, winding or core condition assessment, performance calculations and or troubleshooting. Examples of these projects follow:

Uprate of Ross Dams, Seattle City Light - The Ross Dams are comprised of four 125 MVA units. The core and frame exhibited unusual behavior during full flux loop testing. The problem was studied, and core and frame frequency responses were measured and the core was found to be resonant in a zero mode which caused severe vibration amplitudes to occur during test excitation from loop test flux. The test that was intended to electrically stress interlaminar insulation was causing severe mechanical damage to frame welds and other components. It was demonstrated that careful ELCid testing would be more appropriate to determine interlaminar insulation quality in this case, and this was done successfully on three of the four units.

Stator Core Condition Assessment, Robert Moses Hydroelectric Facility, New York Power Authority- The Robert Moses Hydroelectric Facility is comprised of thirteen 215 MVA units. Evaluation of the expected remaining life of cores continuously operated since the 1960s. The generator's history review indicated they had endured air flow distribution problems for the majority of their service life. The core exhibited wide spread interlaminar insulation faults during full flux loop testing associated with original air flow pattern. Findings from study supported decision to replace the cores, showing repairs to existing core fault locations would not sufficiently reduce operational risks of future core faults. (2005)

Upgrade of Summer Falls, Grand Coulee Project Hydroelectric Authority - The Summer Falls Project is two 48.7 MVA units. Responsible for designing a replacement core and bar winding in the original machine which suffered from high voltage degradation due to the overstressing of the original stator winding. Additional insulation was required to reduce the ground wall stress and to maintain the current unit rating which required a new, deeper slot design. The resulting deeper slot offset the space taken up with thicker insulation to allow equivalent copper cross sections. It also caused a decrease in back iron depth which then changed the mechanical frequency response of the core and increased the core flux density. Calculations were done to ensure the new arrangement would not introduce objectionable noise or vibration and the flux density and core yoke loss were acceptable. (2003)

Generator Upgrade and Rehabilitation, Grant County, Wanapum Power Hydro Plant, Columbia River, Washington - Grant County PUD Wanapum is comprised of 10 units, each currently rated at 110 MVA, 13.8 kV, to be uprated to 128 MVA. Work for upgrading these 10 units is expected to include new frames, cores, stator windings and field windings. Mr. Mottershead is acting as owner's engineer in review of the basic upgrade and details of the manufacturer's design on this project, based on his experience as a design engineer for a major manufacturer. (Ongoing)

Ludington Pump Storage Plant, Eastern Shores of Lake Michigan, Michigan - Ludington Pump Storage Plant contains 6 reversible units each rated 315 MVA at 20 kV, to be uprated to 455 MVA. The generator-motors in this plant have had a history of corona based problems associated with 20 kV stator windings operating in air. The Owners were specific in requesting Mr. Mottershead's support for this very large re-habilitation project

because of his extensive experience in high voltage insulation, gradient system material development, application and design. (Ongoing)

Helms Pumped Storage Plant, Board of Consultants, Pacific Gas & Electric, Fresno County, CA - Mr. Mottershead was named to the Technical Consulting Board to evaluate specific operational risks within the generator-motors. Helms Powerhouse is a three vertical unit underground facility that was commissioned on June 30, 1984. The plant has three Hitachi vertical, reversible pump-turbines each coupled to a Westinghouse generator-motor. The pump-turbine nameplate rating in the generating mode is 480,000 HP at 1,625 ft net head. The rating in the pumping mode is 2,400 cfs at a total head of 1,500 ft. The generator-motor nameplate rating is 390 MVA at 18 kV. (Ongoing)

Cabin Creek, A & B Units, Xcel Energy - 166.7 MVA, Generator-Motor life extension and up-rate study. Cabin Creek pump storage plant operates 2 vertical generator-motor units originally manufactured in 1966. The units are designed to provide peaking and reserve generating capacity. The powerhouse is at an elevation of 10,018 feet above sea level. The two reversible pump-turbine generators operate at 13.8 kV and 360 RPM and have a combined rated generating capacity of 300MW at 1,190 ft net head. (Ongoing)

Boundary Units 55 and 56, 210 MVA, Seattle City Light - Owner Engineer for major generator overhauls including managing core structural vibration issue. Boundary hydro power plant operates 6 vertical generators with the 2 largest units being scheduled for up-rate and life extension. The generators, rated at 14.4 kV, 128.6 RPM were originally manufactured in 1984. These units have suffered from severe core and frame resonant vibration since initial commissioning, vendor selection and redesign will be based on proven ability to manage problems of this nature. (Ongoing)

Spray Unit 2, TransAlta - 60 MVA, Vertical generator manufactured in 1960, operating at 13.2 kV and 450 RPM. Problem – chronic recurring vibration at core split locations. Borescopic and visual inspection of core splits, core to frame attachments and other related areas leading to an understanding of the cause of core instability and recommendations for resolution. (2009)

Upper Bonnington, Units 1 to 4, 7.5 and 7.0 MVA, FortisBC – Two unique aged designs of vertical generators originally manufactured in 1906 and 1914, operating at 2.3 kV and 180 RPM. Plant runs infrequently and required special redesign knowledge for capital budget planning to determine viability of continued operation. Objective is to increase generator operating voltage to 7.2 kV at minimal cost. (Ongoing)

Rumford Falls, Unit 3, 10.9 MVA, Brookfield – one vertical generator originally manufactured in 1926 operating at 11 kV and 200 RPM. Perform a general condition assessment to determine the probability of re-using the generator stator core prior to dismantling and testing the core. Prepare generator major overhaul specification based on finding and recommendations. (2009)

- Cascade Unit 2, TransAlta, 20 MVA, Condition assessment (2008)
- Ludington, Consumers, 325 MVA, Motor/ Generator core damage diagnostics (2008)
- Blue Mesa, USBR, 48 MVA, Condition assessment (2008)
- Kemano, ALCAN, 122 MVA, Bar strand design and factory tooling design (2007)
- Gorge, Seattle City Light, 66.7 MVA, Emergency lower cap replacement design and repair process (2007)
- Bonneville, U.S. Army Corp., 68 MVA, Stator winding design. (2007)
- Horseshoe, Transalta, 2.5 MVA, Condition assessment (2006)
- Ghost, Transalta, 15 MVA, Condition assessment (2006)

- Ross, Seattle City Light, 125 MVA, Troubleshoot cooling air flow distribution problems (2006)
- Ludington Pump Generating Units, Detroit Edison/ Consumers, 20 KV, 325 MVA gradient system repairs, winding condition assessment (2005)
- High Falls, Great Lakes Power, 28.7 MVA, Commissioning tests (2005)
- New England Power, All Hydro Units, Due diligence (2005)
- Robert Moses, NYPA, 215 MVA, Stator core ELCid and loop testing. (2005)
- Ohio Falls, Louisville Gas & Electric, 17 MVA, Condition assessment, ELCid on Unit 6 (2005, 2007)
- Conowingo, Exelon, 62 MVA, Unit 8, troubleshooting high frequency core noise, changed number of slots to fix (2005)
- Beechwood, New Brunswick Power, 40 MVA, ELCid core testing (2005)
- Chief Joseph, U.S. Army Corp., 100 MVA, Troubleshoot burning group jumpers (2004)
- Hollingsworth, Great Lakes Power, 22.2 MVA, Condition assessment (2004)
- Lewiston, NYPA, 25 MW, Post fire investigation and stator core ELCid (2004)
- Bath County, Dominion, 447 MVA, 20 KV, Troubleshooting high voltage winding testing, bar installation problems, and PDA on multiple units (2003)
- Calderwood, Alcoa, 45 MVA, troubleshooting field pole fitting on replacement rotor rim (2003)
- Muddy Run, Exelon, 111 MVA, Lower bar cap replacement (2003)
- Minidoka, Idaho Power, 10 MVA, Novel loose field pole fix (2003)
- Alamo, DWR, California, 18 MVA, Fire damage emergency repairs and core testing (2002)
- Tillery, Carolina Power & Light, 27.5 MVA, Condition assessment (2002)
- Blewett, Carolina Power & Light, 5 MVA, Condition assessment (2002)
- Lower Bonnington, FortisBC, 24 MVA, Commissioning Tests (2001)
- Hyatt, PG&E, 115 MVA, ELCid core testing (2001)
- Outlet, Transalta, 12.5 MVA, Condition assessment (2000)
- Lois, Powell River Energy, 21 MVA, Condition assessment and stator winding design. (2000)
- South Slocan, FortisBC, 24 MVA, Commissioning Tests (1999)
- Grand Coulee, USBR, 125 MVA, Replacement stator winding design (1998)
- Wabush Synchronous Condensers, CFLCo, 60 MVA, Rewedge design, damper winding and novel shorted field coil fix (1995, 1988, 1976)
- Davis Dam, USBR, 45 MVA, Condition assessment and data collection. (1994)
- Noxon, WWP, 126 MVA Commissioning testing, core repair (1994)
- Sithe Energy, Brockville ON, 250 MVA PAC Plant, Offline PDA and condition assessment (1993)
- Dahurat, Morocco, 10 MVA, Commissioning tests (1992)
- BEO, Morocco, 45 MVA, Commissioning tests (1992)
- Little Long, Ontario Power Gen. 64 MVA, Replacement stator winding design (1989)
- Elk Falls, Fletcher Challenge, 29.4 MVA Turbo Inspection and Test (1988)
- Nanticoke, Ontario Hydro, 555 MVA, Turbo rotor rehabilitation process development (1984)
- Trenton, Nova Scotia Power, 150 MVA, Turbo condition assessment (1983)
- Palembang, PLN Indonesia, 21.5 MVA Gas Turbine Generator Performance testing (1976)

Selected Technical Papers and Standards

G. Mottershead, B. Paley, B. McNamara "Verification of the effectiveness of EL CID on a hydrogenerator stator core" Hydrovision Conference July 1998

IEEE 286 - 2001, Recommended Practice for Measurement of Power Factor Tip-Up of Electrical

Machinery Stator Coil Insulation

IEEE 434 - 2006, Guide for Functional Evaluation of Insulation Systems for AC Electric Machines Rated 2300 V and Above.

IEEE 492 - 1999, IEEE Guide for Operation and Maintenance of Hydro-Generators

IEEE 522 - 2004, IEEE Guide for Testing Turn Insulation of Form-Wound Stator Coils for Alternating-Current Electric Machines

IEEE 1415 - 2006 Guide for Induction Machinery Maintenance Testing and Failure Analysis.

IEEE 1434 - 2000, Guide to the Measurement of Partial Discharges in Rotating Machinery

IEEE 1553 - 2002, Trial-Use Standard for Voltage-Endurance Testing of Form-Wound Bars and Coils for Hydro-generators

IEEE P1665 – Draft Guide for the Rewind of Generators 50 or 60 Hertz, 1 MVA and Higher

IEEE P1719 - Draft Guide for Evaluating Stator Cores of AC Electric Machines Rated 1MVA and Higher (Chair)

ANSI/IEEE C50.12 - 2005, Standard for Salient-Pole 50 Hz and 60 Hz Synchronous Generators and Generator/Motors for Hydraulic Turbine Applications Rated 5 MVA and Above (Vice-chair)

ANSI/IEEE C50.13 - 2005, Standard for Cylindrical Rotor 50 Hz and 60 Hz Synchronous Machines 10 MVA and Above

Glenn Brewer 09.03.09