



ONTARIO ENERGY BOARD

Transmission System Code

July 14, 2000

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1. INTRODUCTION

1.1. Purpose

- 1.1.1. The Transmission System Code, (“the Code”), sets out the minimum conditions that a transmitter shall meet in designing, constructing, managing, and operating its transmission system.
- 1.1.2. The Code sets out the requirements, standards, terms and conditions of a transmitter’s obligation to offer to connect customers to the transmission system, and to maintain its operation as set out in the transmitter’s transmission licence. The Code and the connection agreement set out the requirements, standards, terms and conditions of the customer’s obligation to connect to, and to remain connected to, the transmission system.
- 1.1.3. The Code establishes the scope, principles and criteria for the economic assessment of new transmission connections and expansions.
- 1.1.4. The Code establishes minimum standards for all equipment connected to the transmission system, unless they are deemed to be compliant under section 2.6.
- 1.1.5. The Code establishes minimum testing, operational and maintenance standards, and establishes the standard terms and conditions of the connection agreement.
- 1.1.6. Compliance of transmitters with this Code and the terms of the connection agreement enables them to adhere to their licences and the Market Rules.
- 1.1.7. Unless otherwise stated in the transmitter’s licence, a Code, or an order of the Board these conditions apply to all transactions and interactions between a transmitter and all distributors, generators and consumers of electricity connected to its transmission system.

1.2. Definitions

- 1.2.1. “Act” means the Ontario Energy Board Act, S.O.1998, C.15, Schedule B, as amended;
- 1.2.2. “affiliate” has the meaning given to it under the Business Corporations Act, (Ontario) as it may be amended from time to time;
- 1.2.3. “agent” means a qualified person duly authorized by a party, transmitter or customer, to perform specific limited operations for the controlling authority;
- 1.2.4. “applicant” means a person seeking to make a connection to the transmission system;

- 1.2.9. “condition guarantee” means a guarantee issued by a controlling authority in support of work protection or another condition. Condition guarantees may be communicated orally or in writing, and shall be logged or otherwise documented by the controlling authority issuing the condition guarantee and by the controlling authority that receives the condition guarantee. The issuer of a condition guarantee must be the controlling authority of the equipment being guaranteed;
- 1.2.10. “connect” means to form a physical link to or through the transmitter’s transmission facilities;
- 1.2.11 “connection agreement” or “Agreement” means the agreement entered into by a transmitter with its customers governing the terms and conditions under which the customer is connected to the transmitter’s transmission system, and into which this Code is incorporated and of which it forms a part;
- 1.2.12 “connection point” means a point or points of connection between the transmitter’s transmission facilities and the customer’s facilities;
- 1.2.13 “connection request” means a request submitted by a customer to a transmitter for connection to the transmitter’s transmission facilities in accordance with the Market Rules, this Code, and the connection agreement;
- 1.2.14 “connection service” has the meaning given in the transmission Rate Order which is in effect at the relevant time.
- 1.2.15 “consumer” means a person using, for their own consumption, electricity that they did not generate and who is connected to the transmitter’s transmission system;
- 1.2.16 “controlling authority” means a person or officer responsible for performing, directing, or authorizing changes in the conditions or physical position of specific apparatus or devices;
- 1.2.17 “customer” means a generator, consumer, or distributor who is connected to the transmitter’s transmission system;
- 1.2.18 “customer’s facilities” means any and all equipment, elements, and facilities of any kind whatsoever owned by a customer, including but not limited to the equipment and facilities depicted in any schedule to the customer’s connection agreement;
- 1.2.19 “customer’s site” means the premises and the buildings on, in, or around which the customer’s facilities are located;
- 1.2.20 “de-energized” means a state at which the stored potential energy of an isolated piece of equipment has been discharged. Electrical equipment is considered de-energized when its electrical energy has been discharged through connection to an effective ground potential. Mechanical equipment is considered de-energized when hazards due to temperature, pressure, chemical substances, gases, radiation, and

- 1.2.24 “distribution system code” means the code approved by the Board, as it may be amended from time to time, that is in effect at the relevant time, governing licenced distributors in Ontario.
- 1.2.25 “distributor” means a person who owns or operates a distribution system;
- 1.2.26 “distribution system” means a system for distributing electricity, and includes any structures, equipment or other things used for that purpose;
- 1.2.27 “double contingencies” means two events, each of which usually involves the loss of one or more elements, that affects the transmission system at least momentarily;
- 1.2.28 “electricity” means electrical energy as measured in kilowatt hours;
- 1.2.29 “Electricity Act” means the Electricity Act, S.O.1998, C.15, Schedule A, as amended;
- 1.2.30 “element” means any electrical device that may be connected to other electrical devices but is usually limited to a generator, transformer, transmission circuit, circuit breaker, HVDC pole, series or shunt compensating device or bus section. A circuit breaker is understood to include its associated current transformer(s) and the bus section between the breaker bushing and its current transformer(s) CT(s). To constitute an “element” for the purposes of this Code, at least one terminal of an element must be operated at greater than 50 kV;
- 1.2.31 “embedded generation” means generation that is not directly connected to the transmitter’s transmission system, but is located behind the meter that registers the electricity supplied from the transmitter’s transmission system. All embedded generation for which all required approvals were obtained before October 30, 1998 is existing embedded generation. All other embedded generation is new embedded generation;
- 1.2.32 “emergency” means any abnormal condition on a transmitter’s transmission facilities or facilities owned by customers that requires automatic or immediate manual action to prevent or limit loss of transmission facilities or generation supply that could adversely affect the reliability of the transmission system, the integrity of customer’s and transmitter’s facilities, public safety, life, property, or the environment;
- 1.2.33 “equipment” means any structures, transmission or distribution lines, transformers, breakers, disconnect switches, buses, voltage/current transformers, protection systems, telecommunications systems, cables or any other auxiliary equipment for the purpose of conveying electricity whether owned by a transmitter or a customer, including without limitation any equipment in any of the relevant schedules attached to the connection agreement;
- 1.2.34 “facilities” means either the transmitter’s transmission facilities or the customer’s facilities as the context requires;

known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good utility practice is not intended to be limited to optimum practices, or methods, or act to the exclusion of all others, but rather to include all practices, methods or acts generally accepted in North America;

- 1.2.39 “harmonic” means a sinusoidal component of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency. For example, a component whose frequency is twice the fundamental frequency is called a second harmonic;
- 1.2.40 “harmonic current” means a periodic component of current having a frequency that is an integral multiple of that current’s fundamental frequency. Harmonic currents are normally measured in amperes or in percent of the fundamental frequency current, generally at specific frequencies, such as second and third harmonics;
- 1.2.41 “holiday” means a Saturday, Sunday, Statutory holiday, or any day as defined in the Province of Ontario as a legal holiday;
- 1.2.42 “IMO” means the Independent Electricity Market Operator;
- 1.2.43 “IMO-controlled grid” means a transmitter’s transmission facilities included in the IMO-controlled grid under an operating agreement with the IMO;
- 1.2.44 “isolate” means to separate equipment from any source of dynamic energy;
- 1.2.45 “isolating device” means a device used to separate equipment from any source of dynamic energy;
- 1.2.46 “licence” means any licence issued by the Board under Part V of the Act;
- 1.2.48 “line connection” means radial lines of the transmitter’s high voltage system (115 kV and 230 kV) that are dedicated to serving a single customer or a group of customers;
- 1.2.49 “load shedding” means the deliberate disconnection of pre-selected customers’ load from a power system (either manually or automatically) in response to an emergency in order to maintain the integrity of the system and minimize overall customer outages;
- 1.2.50 “maintenance” includes, but is not limited to, routine maintenance, troubleshooting, repairs, approved changes, and such other modifications as may be required for the safe and efficient operation of equipment;
- 1.2.51 “market participant” has the meaning prescribed in the Market Rules;

- 1.2.56 “outage” means the removal of equipment from service, unavailability for connection of equipment or temporary derating, restriction of use, or reduction in performance of equipment for any reason including, but not limited to, permitting the inspection, testing, maintenance or repair of equipment;
- 1.2.57 “party” means either the customer or the transmitter who have entered into a connection agreement, and “parties” means both of them;
- 1.2.58 “planned outage” means an outage that is planned or intentional by a controlling authority at a pre-selected time, usually for construction, preventative maintenance, or repair;
- 1.2.59 “promptly” means performed in a expeditious manner and without undue delay, using due diligence, and with the intent of completing a required act or task as quickly as practicable;
- 1.2.60 “protection systems” are equipment for detecting faults or abnormal conditions and taking appropriate corrective action to isolate the faulted system element(s);
- 1.2.61 “protective relay” means a relay that detects a fault or abnormal condition on a power system and initiates appropriate action by the control system;
- 1.2.62 “qualified” means assessed by a party as satisfactory in personal competency, familiarity with, and knowledge of all applicable rules, regulations, guidelines, policies, codes, procedures, apparatus and equipment, and dangers of work and operation;
- 1.2.63 “Rate Order” means an order made by the Board under the Act, and in effect at the relevant time, that, among other things, establishes a transmitter’s Transmission Rate Schedule;
- 1.2.64 “relay” means an electrical device designed to respond to input conditions in a prescribed manner and after specified conditions are met, to cause contact operation or similar abrupt changes in associated electric control circuits;
- 1.2.65 “reliability”, when applied to electricity service, means the ability to deliver electricity within reliability standards and in the amount desired;
- 1.2.66 “reliability organizations” means one or more of NERC’s reliability councils, successor(s) to NERC, or the IMO;
- 1.2.67 “reliability standards” means the criteria, standards and requirements relating to reliability set forth in this Code, and where relevant, by reliability organizations;
- 1.2.68 “single contingency” means a single event, usually involving the loss of one or more elements, that affects the transmission system at least momentarily. A protection design criterion to meet a single contingency, subject to system and local configurations, strives to prevent loss of power delivery if a

voltage feeder breakers; (2) for generators, typically ends at the first disconnection switch (not included) of the synchronizing breaker and/or step-up transformer combination;

- 1.2.72 “transmission services” means the facilities services provided by a transmitter to a Customer in accordance with the transmission Rate Order in effect at the relevant time, and means any one or more of Network Service, Line Connection Service, Transformation Connection Service or such other Transmission Services as may be described in the transmission Rate Order in effect at the relevant time;
- 1.2.73 “Transmission System Code” or the “Code” means this code, including all appendices, approved by the Board, as in effect at the relevant time, setting the standards for a transmitter’s existing transmission system and for expanding the transmitter’s transmission facilities in order to connect new customers to it or accommodate increase in capacity or load of existing customers. All technical and commercial obligations of transmitters and customers are in this Code and in the connection agreement, set out in Appendix 1, which forms part of this Code.
- 1.2.74 “transmit” with respect to electricity, means to convey electricity at voltages of more than 50 kV;
- 1.2.75 “transmitter” means a person who owns or operates a transmission system;
- 1.2.76 “transmitter’s site” means the premises and the buildings on, in, and around which the transmitter’s transmission facilities are located;
- 1.2.77 “transmitter’s transmission facilities” means facilities owned by a transmitter that form part of or all the transmission system owned by the transmitter;
- 1.2.78 “verification” means a process performed by the customer and witnessed by the transmitter to demonstrate that facilities will perform as expected to maintain the reliability of the transmission system;
- 1.2.79 “work” means installation, construction, commissioning, removal, inspection, obtaining of information, testing, undertaking of repairs or undertaking of maintenance by a party;
- 1.2.80 “work protection” means a guarantee issued by a party that an isolated or isolated and de-energized condition has been established for work on equipment, and shall continue to exist, except for authorized tests, until the guarantee is surrendered.

1.3. Interpretation

- 1.3.1. Unless otherwise defined in this Code, including the connection agreement, words and phrases shall have the meaning ascribed to them in the Act or the Electricity Act as appropriate. Headings are for convenience only and shall not affect the interpretation of this Code. Words imparting the singular include the plural and vice versa. A reference to a document or a provision of a document includes any amendment or supplement to or any replacement of that document or that provision. An event that is

1.5. Hierarchy of Codes

1.5.1. The order of hierarchy for the Transmission System Code in relation to other codes, subject to any specific conditions of a licence that apply to the transmitter, is as follows:

1.5.1.1. Affiliate Relationships Code;

1.5.1.2. Transmission System Code.

1.6. Amendments to this Code

1.6.1. This Code may be amended only in accordance with the procedures set out in the licence issued to a transmitter.

1.7. Coming into Force

1.7.1. This Code comes into force on the date that subsection 26(1) of the Electricity Act is proclaimed.

1.8. Requirements for Board Approvals

1.8.1. Any matter under this Code requiring a determination of the Board may be determined by the Board without a hearing or through an oral, written or electronic hearing, at the Board's discretion.

2. STANDARDS OF BUSINESS PRACTICE AND CONDUCT

2.1. General Requirements

2.1.1. A transmitter shall connect new customers and continue to offer transmission services to existing customers subject to:

2.1.1.1. each new customer, applying to connect on or after the date this Code comes into force as set out in subsection 1.7.1 above, entering into a connection agreement which is set out in Appendix 1.

2.1.1.2. each existing customer entering into a connection agreement as set out in Appendix 1. Where a connection agreement is not in place by the time this Code comes into force, and the customer's facilities are already connected to the transmitter's transmission system, provision of service to such a customer by the transmitter shall imply acceptance of all the terms of the connection agreement by that customer.

- 2.1.5. A single connection agreement shall be required from a customer (generator, consumer or distributor) who is connected either at a single site or at multiple sites, or service territory, that are geographically contiguous. For customers with multiple sites or service territories that are not geographically contiguous, a connection agreement shall be required for each site and /or service territory that is geographically contiguous.

2.2. Transmission Service Charges

- 2.2.1. The transmitter shall publish in a manner approved by the Board, and amend as necessary, a list of the approved services it offers to customers and the rates charged to customers for these services in accordance with the relevant transmission Rate Order made by the Board.

2.3. Equipment Standards

- 2.3.1. Transmitters shall ensure that their new or altered equipment connected to their respective transmission system: (1) meets the requirements of the Ontario Electrical Safety Authority; (2) conforms to relevant industry standards such as, but not limited to, CSA International, the Institute of Electrical and Electronic Engineers (IEEE), the American National Standards Association (ANSI), and the International Electrotechnical Commission (IEC); (3) conforms to good utility practice.
- 2.3.2. The minimum general performance standards for all equipment and system elements connected to the transmission system, except equipment deemed compliant under the provisions of section 2.6 of this Code, are set out in Appendix 2. A transmitter shall provide the technical parameters to assist customers to ensure that the design of a customer's equipment connected to the transmission system shall coordinate with the transmission system in compliance with this Code.
- 2.3.3. A transmitter, at its discretion, may participate in commissioning, inspecting, and testing customer connection facilities to ensure that equipment connected to the transmission system will not materially reduce or adversely affect the current level of reliability of the transmission system.

2.4. Operational Standards and Reporting Protocol

- 2.4.1. A transmitter shall take reasonable steps to ensure that its equipment connected to the transmission system is operated and maintained in accordance with this Code and all connection agreements.
- 2.4.2. Each transmitter shall specify the fault levels at all connection points, as required by the Market Rules, and shall record such fault levels in the appropriate schedule to all connection agreements.
- 2.4.3. A transmitter shall promptly report to a customer, receiving transmission services, any changes in its equipment, or equipment of another customer, that could materially affect the transmission services provided.

- 2.5.1.3. acceptable bands of performance at the customer-delivery point level for the transmission system configurations, geographic area, load, and capacity levels; and
 - 2.5.1.4. defined triggers that would initiate technical and financial evaluations by the transmitter and its customers regarding performance standards at the customer-delivery point level, exemptions from such standards, and study triggers and results.
- 2.5.2. A transmitter shall file these performance standards for the Board's review and approval.

2.6. Compliance of Equipment with Standards

- 2.6.1 All equipment which has been placed into operation, procured or ordered before the Code comes into force, is deemed to be in compliance with the performance standards set out in Appendix 2 of the Code. The purpose of deeming certain equipment to be compliant is to avoid investment in equipment upgrades that are not needed to maintain the reliability of a transmitter's transmission system.
- 2.6.2 A transmitter may require that equipment deemed compliant under section 2.6.1 be brought into actual compliance with the performance standards within a specified time period where it has identified that:
 - 2.6.2.1 there is a material deterioration of transmission system reliability resulting from the performance of the deemed compliant equipment;
 - 2.6.2.2 there are material negative impacts on an existing or a new customer's power quality resulting from the performance of the deemed compliant equipment; or
 - 2.6.2.3 there is a material increase in capacity or load at the site where the equipment deemed compliant is located.
- 2.6.3 The transmitter may act in accordance with section 2.6.2, once the transmitter has developed rules and procedures for requiring equipment to be brought into actual compliance and these rules and procedures have been filed with the Board for its review.
- 2.6.4 The Board may on its own motion review rules and procedures which have been previously reviewed by the Board under section 2.6.3.

3. REQUIREMENTS FOR OPERATIONS AND MAINTENANCE

3.1 Day-to-Day Operations

- 3.1.1 A transmitter shall ensure that the operation and maintenance of its transmission facilities are performed only by qualified persons

3.3 Scheduling of Planned Work

- 3.3.1 A transmitter shall follow the procedures for scheduling of planned work which are set out in the relevant sections of all connection agreements.
- 3.3.2 A transmitter's controlling authority shall coordinate outages arising from planned work scheduled by a customer that directly affect the transmitter's transmission facilities.
- 3.3.3 A transmitter shall obtain from its customers, to the best of the transmitter's ability, their anticipated planned outages for the upcoming year by October 1st of each year.

3.4 Shutdown of Customer's Facilities

- 3.4.1 A transmitter's controlling authority shall investigate and determine the cause of any reported shutdown of a customer's facilities, regardless of the reason for that shutdown event, using available evidence including input from the customer's staff.
- 3.4.2 Once the transmitter is satisfied that reconnection will not cause any adverse effects on its transmission system, its controlling authority shall immediately notify the customer once reconnection can take place. Reconnection to the transmitter's transmission facilities shall not take place until authorized by the transmitter's controlling authority.

3.5 Emergency Operations

- 3.5.1 During an emergency, either the transmitter or any of its customers may take whatever immediate action it deems necessary and is qualified to perform to safeguard public safety, life, and property without first notifying the other party.
- 3.5.2 The transmitter or any of its customers who is taking such action shall promptly report the action taken and the reason for it to the other party's controlling authority.
- 3.5.3 The transmitter may be required from time to time to implement load shedding as outlined in section 7, Schedule D of the connection agreement (Appendix 1).
- 3.5.4 The transmitter may review the rotational load-shedding schedule with the customer annually or more often as needed.
- 3.5.5 When the transmitter's transmission facilities return to normal, the transmitter's controlling authority shall notify the customer's controlling authority to re-energize the customer's facilities.
- 3.5.6 The transmitter may be required from time to time to interrupt supply to the customer during an

4. ESTABLISHING NEW OR MODIFIED TRANSMISSION CONNECTIONS

4.1. General Requirements.

- 4.1.1. Each transmitter shall undertake to design and construct any new or modified connections to its transmission system on a timely basis and in accordance with the requirements of its licence, this Code, including the connection agreement, the Act and good utility practice.
- 4.1.2. New or modified connections shall:
 - 4.1.2.1. not materially reduce the level of reliability of the transmission system, subject to equipment deemed compliant under section 2.6; and
 - 4.1.2.2. not increase the fault levels beyond the capabilities of the existing connection points.
- 4.1.3. A transmitter shall publish detailed procedures for processing requests to connect to its transmission system or to modify an existing connection. The transmitter's procedures shall be consistent with and complementary to the IMO's market procedures. The transmitter's procedures shall set out:
 - 4.1.3.1. documentation of the transmitter's capital contribution policy, which shall be consistent with this Code and relevant appendices.
 - 4.1.3.2. the transmitter's estimated time to complete each step of the process;
 - 4.1.3.3. the transmitter's fee schedule(s), which shall include the estimated total costs for activities carried out by the transmitter including studies, review of drawings, verification procedures, attendance at commissioning, constructing facilities, and connecting customers to the transmission system;
 - 4.1.3.4. the transmitter's typical construction times; and
 - 4.1.3.5. information to be made available to customers as set out in Appendix 3 of the Code.
- 4.1.4. The procedures set out in section 4.1.3 shall not discriminate between customers or improperly restrict their ability to connect to the transmission system.
- 4.1.5. A transmitter shall file its procedures for processing applicants requests with the Board.
- 4.1.6. The Board may review and amend the procedures proposed by a transmitter under section 4.1.3 as it deems appropriate.

5. COMPLIANCE, INSPECTION, TESTING AND MONITORING

6. GENERAL TECHNICAL REQUIREMENTS

6.1. Guidelines of Reliability Organizations

- 6.1.1. Transmitters shall follow all applicable reliability organizations' standards as they may be amended from time to time.
- 6.1.2. The transmitter shall provide to customers upon request, the address and contact persons at the relevant reliability organization.

6.2. Protection and Control

- 6.2.1. The transmitter's protection systems, which protect transmission system elements, shall be capable of minimizing the severity and extent of disturbances to the transmission system while themselves experiencing a first-order single contingency such as the failure of a relay protection system to operate or the failure of a breaker to trip. In particular:
 - 6.2.1.1. the elements designated by the transmitter or the IMO as essential to system reliability and security shall be protected by two protection systems. Each system shall be independently capable of detecting and isolating all faults on those elements. These elements shall have breaker failure protection, but breaker failure protection need not be duplicated. Both protection systems shall initiate breaker failure protection;
 - 6.2.1.2. to reduce the risk of both systems being disabled simultaneously by a single contingency, the protection system designs shall not use components common to the two systems;
 - 6.2.1.3. the use of two identical protection systems is not generally recommended, because it increases the risk of simultaneous failure of both systems due to design deficiencies or equipment problems;
 - 6.2.1.4. the protection systems shall be designed to isolate only the faulted element. For faults outside the protected zone, each protection system shall be designed either not to operate or to operate selectively in coordination with other protection systems;
 - 6.2.1.5. protection settings at tapped transformer stations owned by the transmitter, for protection of system elements affected by conditions on the transmission system, shall be coordinated with other system elements of the transmission system;
 - 6.2.1.6. protection systems shall not operate to trip for stable power swings following contingencies that are judged by protection system designers as not harmful to the transmission system or its customers;

- 6.2.1.10. the two protection systems shall be supplied from separate secondary windings on one voltage transformer or potential device and from separate current transformer secondary windings (using two current transformers – one current transformer for each protection system);
- 6.2.1.11. separately fused and monitored DC sources shall be used with the two protection systems. For all generating facilities connected to the transmission system, two separate DC station battery banks shall be required to provide the required degree of reliability;
- 6.2.1.12. protection system circuitry and physical arrangements shall be designed to minimize the possibility of incorrect operations from personnel error;
- 6.2.2. Transmitters shall follow the specific protection and control practices and equipment requirements which are set out in Schedule I of Appendix 1 (connection agreement);
- 6.2.3. Transmitters should apply protection systems using the typical tripping matrix for transmission system protection shown in Exhibit F.2, Schedule F of Appendix 1.

6.3. Insulation Coordination

- 6.3.1. Transmitters shall ensure that equipment connected to the transmission system is protected against lightning and switching surges. This shall include station shielding against direct lightning strokes, surge protection on all wound devices, and cable/overhead interfaces.
- 6.3.2. A tap connected to a shielded transmission circuit shall also be shielded.

6.4. Grounding

- 6.4.1. Transmitters' grounding installations shall be capable of carrying the maximum foreseeable fault current, for the duration of such fault currents, without risking safety to personnel that may be present on site when a fault occurs, damage to equipment, or interference with the operation of the transmission system.
- 6.4.2. Each tapped transformer station and network transformation/switching station, owned by the transmitter, shall have a ground grid on which all metallic structures, metallic equipment and non-energized metallic equipment are solidly connected. The size, type and requirements for the ground grid are site-specific, depending on such factors as soil conditions, station size, and short-circuit level.

7. TECHNICAL REQUIREMENTS FOR TAPPED TRANSFORMER STATIONS SUPPLYING LOAD

7.1. Supply Considerations

7.2. Protection Requirements

- 7.2.1. The typical technical requirements for a transmitter's tapped transformer stations protection are set out in Exhibit F.1, Schedule F of Appendix 1, and Exhibits H.1 and H.2, Schedule H of Appendix 1.
- 7.2.2. Line protections are required when transformers connected to separate supply circuits are operated in parallel on the low-voltage side, or if a large synchronous infeed exists at the low-voltage bus.
- 7.2.3. Directional current sensing relays may be required to detect infeed into faults within the transmission system and to isolate a tapped transformer station's contribution to the fault. Distance or impedance (21) relays as specified in Exhibit H.2, Schedule H of Appendix 1, may serve this need.
- 7.2.4. If the tapped transformer is connected ungrounded wye or delta on the primary, then ground under-voltage (64-27) and ground over-voltage (64-59) protections as shown in Exhibit H.2, Schedule H of Appendix 1 are required to detect ground faults.
- 7.2.5. Where the tapped transformer is connected wye-grounded on the primary (Yg/D or Yg/Yg), a ground over-current relay (64) as indicated in Exhibit H.2, Schedule H of Appendix 1, connected in the transformer neutral, may be used for detection.
- 7.2.6. Where remote/transfer trip circuits are used for tapped transformer faults to trip the transmitter's line breakers at the terminal stations, the tapped transformer shall be equipped with a motor-operated transformer disconnect switch at that station to provide a point of separation from the transmission system. Energization of remote/transfer trip and opening of the disconnect switch (89) shall be initiated simultaneously from the protection circuits. Full opening of the disconnect switch shall block sending of remote trip.

8. PROTECTION SYSTEM REQUIREMENTS

8.1. Telecommunications

- 8.1.1. Telecommunication facilities used for protection purposes shall have a level of reliability consistent with the required performance of the protection system.
- 8.1.2. Transmitters shall specify to all customers telecommunication channel media and protective systems.
- 8.1.3. Telecommunication circuits used for the protection and control of the transmission system shall be dedicated to that purpose.
- 8.1.4. Where each of the dual protections protecting the same system element requires communication channels, the equipment and channel for each protection shall be separated physically and designed to

- 8.1.6. Major disturbances caused by telecommunication failures shall have annual frequency of less than 0.002 per year from the dependability aspect and less than 0.002 per year from the security aspect.
- 8.1.7. Telecommunication protection for a single transmission system circuit shall have an unavailability of less than forty two (42) minutes per year, and for two circuits it shall be less than four (4) minutes per year.
- 8.1.8. The telecommunication false-trip rate used as part of a protection system for a single transmission system circuit shall be no more than 0.1 false trips per year, and for two circuits it shall be no more than 0.001 false trips per year.
- 8.1.9. Total transmission system circuit trips coincident with telecommunications failure shall be no more than 0.001 per year.

8.2. Test Schedule for Relaying Communication Channels

- 8.2.1. Communication channels associated with protective relaying shall be tested at periodic intervals to verify that the channels are operational and that their characteristics lie within specific tolerances. Testing should include signal adequacy tests and channel performance tests.
 - 8.2.1.1. signal adequacy test intervals are:
 - 8.2.1.1.1. Channels - for Protection (unmonitored) at one(1)-month intervals;
 - 8.2.1.1.2. Channels - for Protection (monitored) at twelve(12)-month intervals.
 - 8.2.1.2. channel performance testing on leased communication circuits shall be conducted at 24-month intervals, while intervals for testing power line carrier equipment shall be equipment-specific.

8.3. Verification and Maintenance Practices

- 8.3.1. Transmitters shall follow the maximum verification intervals established by reliability organizations and in accordance with applicable reliability standards: (a) four years for most 115-kV elements, most transformer stations, and certain 230-kV elements: (b) two years for all other high- voltage elements. All newly commissioned protection systems shall be verified within six months of the initial in-service date of the system.
- 8.3.2. Routine verification shall ensure with reasonable certainty that the protection systems respond correctly to fault conditions.
- 8.3.3. An electrically initiated simulated-fault clearing check is mandatory to verify new protection systems, after any wiring or component changes are made to a protection system, and for routine verification of a

- 8.4.2. "On potential" checks shall follow all necessary preliminary procedures. The main equipment shall be energized but not placed on load. The transmitter at its tapped transformer stations shall check all readings of potentials, including determination of correct phasing/phase rotation. The test must also demonstrate that all equipment performs as expected when energized and is in a condition to have primary load applied.
- 8.4.3. A transmitter at its tapped transformer stations shall make "On-Load" checks following the application of appropriate load, voltage, current, phase angle or crossed wattmeter readings at the appropriate instrument transformer outputs or protection input points, to ensure that all quantities are appearing as required with respect to magnitude, phase relation, etc. These checks are to determine that relays are properly connected and that the watt and var checks of all indicating and referenced equipment are correct. At times it may be necessary to repeat some or all tests, e.g. relay performance, using load currents.

8.5. Failure Protection for High-Voltage Interrupting Devices

- 8.5.1. Protection shall be provided to trip local and remote breakers if a high voltage interrupting device (HVI) fails to clear a fault properly. The requirements for HVI failure protection vary depending on the maximum permissible fault duration and the location of the connection on the transmission system. Some portions of the transmission system are designed and operated to more stringent requirements to avoid adversely affecting neighbouring transmission systems.
- 8.5.2. If the IMO or the transmitter so determines, the HVI failure protection shall be achieved by using remote or transfer trip circuits and opening of the motor operated disconnect switch.
- 8.5.3. In portions of the transmission system having less stringent requirements, the HVI failure protection may be achieved by opening of the motor-operated disconnect switch. If the disconnect switch experiences a flashover, the line protection at the transmitter's transmission station(s) shall operate to isolate the fault.
- 8.5.4. Automatic ground switches are not acceptable for any transmitter-owned new installations for triggering line protection operation following the failure of a HVI.
- 8.5.5. When circuit switchers are used, the interrupter and disconnect switch shall operate independently. Protection systems that trip the interrupter shall simultaneously initiate opening of the disconnect switch.
- 8.5.6. The DC voltage supplied to the interrupter and disconnect switch shall be fed from separately fused and monitored DC supplies: that is, by two (2) DC cables to the control cabinet.

8.6. Instrument Transformers

- 8.6.1. Current transformer output shall remain within acceptable limits for all anticipated fault currents and for all anticipated burdens connected to the current transformer.

8.7. Battery Banks and Direct Current Supply

- 8.7.1. When station battery banks are used, as a minimum requirement the transmitter shall ensure that if either the battery charger fails or the AC supply source fails, the station battery bank shall have enough capacity to allow the station to operate for at least eight hours.
- 8.7.2. Critical DC supplies such as relay protection circuits and high voltage interrupters (HVIs) shall be monitored and annunciated.
- 8.7.3. Where the use of a single battery bank is allowed, the transmitter shall ensure that the following conditions are met:
 - 8.7.3.1. the battery bank can be tested and maintained without removing it from service;
 - 8.7.3.2. where two separate protective systems are required, each protection system shall be supplied from physically separated and separately fused direct current circuits; and
 - 8.7.3.3. no single contingency other than failure of the battery bank itself shall prevent successful tripping for a fault.

9. ECONOMIC EVALUATION OF NEW OR MODIFIED CONNECTIONS

9.1. New or Modified Generator Connections

- 9.1.1. A transmitter shall require that a generator customer designs, constructs, pays for, and owns all new or modified specific connection line and transformation facilities required to connect it to the transmitter's transmission system.
- 9.1.2. A transmitter shall collect from a generator customer the cost of any required modifications, enhancements and reinforcements of the transmitter's existing transmission facilities required to accommodate the generator customer's initial connection or subsequent generating capacity increases. Such modifications enhancements and reinforcements include but are not limited to the following:
 - 9.1.2.1. protective relay and control facilities, and associated telecommunications attributed to the project;
 - 9.1.2.2. modifying existing special protection systems;
 - 9.1.2.3. shared radial connection lines attributed to the project;
 - 9.1.2.4. breakers attributed to the project;

- 9.1.4.1. advancement costs of replacing existing breakers and switches before the end of their useful life; and
- 9.1.4.2. the incremental costs of upgrading the equipment to the next practical rating.
- 9.1.5. A generator shall not pay the transmitter's ongoing operation and maintenance costs associated with the transmitter's facilities which connect the generator to the transmitter's transmission system.

9.2. New or Modified Load Customers' Connections

- 9.2.1. A transmission load customer, distributor or consumer, requiring new line connection and/or transformation connection facilities to connect to a transmitter's electrical system, may, at the customer's sole discretion, either:
 - 9.2.1.1. design, construct, pay for, and own new line connection line and/or transformation connection facilities; or
 - 9.2.1.2. opt for a pool-funded option for new line connection and/or transformation connection facilities that would be owned by the transmitter.
- 9.2.2. When a load customer opts for pool-funding for a new or modified connection the transmitter may require a capital contribution from the customer to keep the pool harmless. A capital contribution to construct or reinforce transmission facilities shall not exceed the difference between the present value of the projected capital costs and on-going maintenance and other related incremental costs for the connection, and the present value of the projected incremental revenue for transmission services provided by those facilities over a specific economic study horizon. The principles, criteria, and methodology that a transmitter shall use to calculate this amount are set out in Appendices 4 and 5. A transmitter shall have a written policy regarding capital contribution covering all aspects of financial project evaluation and collection of capital contributions.
- 9.2.3. If a shortfall is calculated between the present value of the projected costs and revenues, the transmitter shall collect that amount from the transmission customer requesting an offer to connect in accordance with the transmitter's documented policy.
- 9.2.4. For connection facilities shared among customers, the costs shall be apportioned by considering such factors as: the relative load level (based on an annual non-coincident peak value); the relative connection line length (in proportion to the connection line length being shared among parties); and the proportion of transformation capacity being used by each party.
- 9.2.5. Modifications and upgrades to specific network facilities or installations of new network facilities that are triggered by a load customer and are for its sole benefit shall be borne by that customer.

9.3. Establishing an Economic Study Horizon for Load Connections

- 9.3.1. A transmitter shall develop transparent guidelines in order to establish an economic study horizon that it shall use in determining the level of capital contribution to be collected, if required according to the economic evaluation, from each load customer when a connection is pool-funded. These guidelines shall be consistent with the provisions of this Code and in particular Appendices 4 and 5.

9.4. Calculation of Capital Contribution Rebates

- 9.4.1. A transmitter may require a capital contribution or a load guarantee from new transmission customers. Customers connecting to the transmission system later may then benefit without having to contribute. In such an event, the initial contributor shall then be entitled to a rebate from the transmitter as follows:
- 9.4.1.1. For a period of up to the economic study horizon, the initial contributor shall be entitled to a rebate without interest, based on apportioned benefit for the remaining period.
- 9.4.1.2. The apportioned benefit shall be determined by considering such factors as the relative load level (based on an annual non-coincident peak value), the relative connection line length (in proportion to the connection line length being shared by both parties), and the proportion of transformation capacity being used by each party. Further details are included in section 7 of Appendix 4.

9.5. Replacement and Relocation of Existing Facilities

- 9.5.1. Transmitters shall not require capital contributions from customers to replace transmission facilities upon their physical retirement, with generally similar transmission facilities, subject to the standard sizes for transmission system components/elements and the good utility practice in effect at the relevant time. Where allowable under the Rate Order in effect at the relevant time, a customer (distributor or consumer) may choose to replace a connection facility e.g. transformation connection and pay for it, and avoid paying for that facility through the relevant service rates e.g. the transformation connection service rates.
- 9.5.2. The transmitter shall notify all customers that will be affected by its plans to retire a transmission facility, such as a transformer station or a transmission line, at least five years in advance of the effective date of the retirement in order to adequately plan for continuity of supply to the customer. The options available to the customer are: (1) replace a connection facility and pay for it, e.g. using a third party to build a transformation connection, and thus avoid paying the relevant transformation connection service rates; (2) choose to remain with the pool and continue to pay the relevant pool charges and have the transmitter replace the connection facility at the transmitter's cost with no capital contribution requirement if the replacement is in accordance with section 9.5.1.
- 9.5.3. If a transmitter is legally required to relocate its transmission facilities and/or plants, the transmitter shall charge its customers for the relocation based on recovering the costs of moving the facilities. The transmitter shall take appropriate steps to recover the cost from the party requiring the relocation, in

9.7. Record Keeping and Reporting Requirements

- 9.7.1. Transmitters shall keep records of the detailed economic evaluations of projects requiring capital contribution, load guarantees, or other financial arrangements related to new or modified connections between the transmitter and the customer. All such financial arrangements shall be consistent with the methodology set out in section 9 of the Code and Appendices 4 and 5.
- 9.7.2. The records referred to in section 9.7.1 shall be submitted to the Board on request. Each record must show the details of the economic evaluation, including justification for all the study parameters including, but not limited to, the economic study horizon, the project capital costs, the ongoing operation and maintenance costs, and the project incremental cost of capital.

APPENDIX 1

Form of Connection Agreement

This Connection Agreement is made this ___ day of _____, _____,

BETWEEN _____, a corporation incorporated pursuant to the laws of the Province of Ontario, (the “Transmitter”) and licensed by the Ontario Energy Board.

PARTY OF THE FIRST PART;

and _____, a corporation incorporated pursuant to the laws of the Province of Ontario, (the “Customer”)

PARTY OF THE SECOND PART.

From time to time, the Transmitter and the Customer shall be individually referred to in this Agreement as “Party” and collectively as “Parties”.

RECITAL

In accordance with its licence and the Market Rules, the Transmitter has agreed to offer, and the Customer has agreed to accept Connection Service, on the terms and conditions of this Agreement.

AGREEMENT

NOW THEREFORE in consideration of the foregoing, and of the mutual covenants, agreements, terms and conditions herein contained, the Parties, intending to be legally bound, hereby agree as follows:

1. DEFINITIONS

- 1.1. All defined terms that appear in this Connection Agreement that are not defined herein shall have the meanings ascribed thereto in the Transmission System Code (“the Code”) issued by the Board in effect at the relevant time. All capitalized terms in the Connection Agreement shall have the same meaning as their non-capitalized counterparts as defined in the Transmission System Code;

- 1.6. "Event of Default" means either a financial or a non-financial default but does not include any default caused by, arising out of, or in any way connected to, an emergency;
- 1.7. "Export Transmission Service" has the meaning given in the transmission Rate Order in effect at the relevant time;
- 1.8. "Financial Default" means failure by either party to a Connection Agreement to pay any amount when due under that Agreement. It includes failure to pay compensation or indemnification for loss or damage agreed to by the parties, or for amounts determined to be owed to a party in accordance with the dispute resolution procedure outlined in section 13 of the Connection Agreement;
- 1.9. "Insolvency Event" means, with respect to the Customer, the occurrence of any one of the following:
 - 1.9.1. The winding up, dissolution, liquidation, or bankruptcy of the Customer, except as part of a bona fide corporate reorganization, unless its existence is immediately reinstated or a resolution to that effect is passed, or it makes a general assignment for the benefit of its creditors or a proposal under the Bankruptcy and Insolvency Act (Canada), as amended or re-enacted from time to time, or is adjudged bankrupt or insolvent; or if it proposes a compromise or an arrangement under the Companies' Creditors Arrangement Act, (Canada), as amended or re-enacted from time to time, or files any petition or answer seeking any reorganization, arrangement, composition, readjustment, liquidation, or similar relief for itself under any present or future law relating to bankruptcy, insolvency, or other relief for or against debtors generally;
 - 1.9.2. A court of competent jurisdiction enters an order, judgment or decree against the Customer seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution, winding up, termination of existence, declaration of bankruptcy or insolvency or similar relief under any present or future law relating to bankruptcy, insolvency or other relief for or against debtors generally, and such order, judgment or decree remains unvacated and unstayed for 60 days (whether or not consecutive) from the day of entry; or if any trustee in bankruptcy, receiver, receiver and manager, liquidator or any other officer with similar powers is appointed for the Customer with its consent or acquiescence and that appointment remains unvacated and unstayed for 60 days (whether or not consecutive); or
 - 1.9.3. The Customer becomes insolvent.
- 1.10. "Line Connection Service" has the meaning given in the transmission Rate Order in effect at the relevant time
- 1.11. "Network Rate" has the meaning given in the transmission Rate Order in effect at the relevant time;
- 1.12. "Network Service" has the meaning given in the transmission Rate Order in effect at the relevant time;
- 1.13. "non-defaulting Party" means a Party that is not a defaulting Party;

- 1.15. "Rate Schedule" means the rates in effect from time to time and the terms and conditions relating to those rates that are approved by the Board in the transmission Rate Order as payable by the Customer to the IMO in accordance with the Market Rules for the Transmission Services (as defined in the Market Rules). These Rate Schedules include a set for connection services;
- 1.16. "Transformation Connection Service" has the meaning given in the transmission Rate Schedule;
- 1.17. "Transmission Services" means the facilities services provided by a transmitter to a Customer in accordance with the transmission Rate Order in effect at the relevant time, and means any one or more of Network Service, Line Connection Service, Transformation Connection Service or such other Transmission Services as may be described in the transmission Rate Order in effect at the relevant time;
- 1.18. "Transmission Service Rate" or "Transmission Rate" means the rate paid by the Customer for the Transmission Services under the transmission Rate Order in effect at the relevant time;

2. PURPOSE OF AGREEMENT.

This Agreement sets out the terms and conditions upon which the Transmitter has agreed to offer, and the Customer has agreed to accept connection service.

3. TRANSMISSION SYSTEM CODE

The Transmission System Code (the "Code") and this Agreement establish minimum testing, operational and maintenance standards for the Transmitter and the Customer. The Parties hereto hereby agree to be bound by, and to act at all times in accordance with the Code which is hereby incorporated in its entirety by reference into, and which hereby forms part of this Agreement.

4. CONFIDENTIALITY OF INFORMATION

4.1. For the purposes of this section Confidential Information means:

(a) all information disclosed by a Party to the other Party under the Code or under this Agreement or in negotiating a Connection Agreement which by its nature is confidential to the Party disclosing the information; and

(b) all interpretative reports or other data generated by a Party that are based in whole or in part on information that is made Confidential Information by clause (a).

- (c) information that must be disclosed in compliance with a judicial or governmental order or other legal process.
- 4.3. The Transmitter and the Customer shall exchange all Information subject to the confidentiality terms and definitions set out in subsection 4.1 above. This exchange of Information is needed to maintain reliable operations of the transmission system, including but not limited to the Information listed in Appendix 3 of the Code, Schedules E and K of this Agreement, and subsection 4.6. below, subject to the terms of the Transmitter's Licence and the conditions set out below:
- 4.3.1. The Information shall at all times be treated as confidential, and shall be prepared, given, and used in good faith;
- 4.3.2. Parties shall use the Information only for the requirements of the work being performed including, but not limited to, planning or operating the Parties' facilities, and not for any other purpose, and shall not disclose it to any third Party, directly or indirectly, without the prior written consent of the Party that provided the Information, and in such events the third Party must agree to use the Information solely for the requirements of the work as specified;
- 4.3.3. Information shall not be used for any commercial purpose of any kind whatsoever other than contemplated herein.
- 4.4. The Parties shall make the Information available to each other in a timely and co-operative manner.
- 4.5. The Information disclosed by the Parties in accordance with this section shall only be used by the recipient of the Information for the requirement of the work being performed including, but not limited to, planning or operating the Parties' facilities and shall not be used for any other purpose or disclosed to a third Party. All Information disclosed hereunder shall be Confidential Information except as provided in subsection 4.2 above.
- 4.6. A Party, Party "A", shall indemnify and save harmless the other Party, Party "B", from and against any and all claims occasioned or suffered by Party "B" as a result of Party "A" disclosing any of the Information contrary to the provisions of this Agreement.
- 4.7. The Information shall include, but not be limited to, the types set out below:
- 4.7.1. equipment capacities and ratings;
- 4.7.2. situations when equipment limits are being approached;
- 4.7.3. changes in the configuration of each Party's facilities (either permanent or temporary) that may affect each Party's system security, load distribution, protective relay settings, and other parameters;
- 4.7.4. details of defective equipment or hazardous conditions that may become known to one controlling authority but not to the other;

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- 4.7.9. upon request a Transmitter shall provide to the Customer a “relay and breaker trip report” which includes: the date and time of breaker trip and reclose or close; cause of incident if known; and quantity of load lost.;
 - 4.7.10. substantial changes in power demand;
 - 4.7.11. changes in operating setup and operating diagrams;
 - 4.7.12. planned changes in each Party's facilities affecting its operation;
 - 4.7.13. line and load data required for protective relay settings;
 - 4.7.14. protective relay settings on equipment protection systems;
 - 4.7.15. annual facility performance data required for reliability organization reporting;
 - 4.7.16. notification of planned shutdown of a facility;
 - 4.7.17. Information on scheduling of maintenance outages;
 - 4.7.18. work protection Information; and
 - 4.7.19. all such other Information as the other Party may require in the circumstances.
- 4.8. Each Party shall keep Confidential Information confidential except:
- 4.8.1. as may be necessary in an emergency;
 - 4.8.2. to the extent required by law;
 - 4.8.3. if required in connection with legal proceedings, arbitration or any expert determination relating to the subject matter of the Code, this Agreement, or for the purpose of advising a Party in relation thereto; or
 - 4.8.4. to the extent required by the Party's licence; or
 - 4.8.5. to the extent required by the Market Rules or as may be required to enable a Transmitter to fulfill its obligation to any reliability organization.
- 4.9. If the Transmitter or the Customer become aware of any material change to any part of the Information contained within, or relevant to, a connection application or a change in its connection, then it shall promptly notify the other

- 5.2 The minimum general performance standards for all equipment connected to the transmission system are set out in Appendix 2 of the Code. The Transmitter shall provide the technical parameters to assist the Customer to ensure that the design of the Customer's equipment connected to the transmission system shall coordinate with the transmission system to achieve compliance with the Code and this Agreement.
- 5.3 The Transmitter and the Customer shall fully cooperate to ensure that modelling data required by the Code and this Agreement for the planning, design and operations of connections are complete and accurate, and the Transmitter shall order required tests where there are grounds to question the validity of such data. This includes, but is not limited to, the Information in Appendix 1, Schedule E, Parts (A) to (E), where applicable.
- 5.4 The Transmitter, at its discretion, may participate in commissioning, inspecting, and testing the Customer connection facilities to ensure that equipment connected to the transmission system will not materially reduce or adversely affect the current level of reliability of the transmission system.
- 5.5 The Customer shall permit the Transmitter to participate in any necessary commissioning, inspection and testing of its connection facilities to ensure that their equipment connected to the transmission system will not adversely affect the reliability of the transmission system.

6 OPERATIONAL STANDARDS AND REPORTING PROTOCOL

- 6.1 Equipment connected to the transmission system shall be operated and maintained in accordance with the Code and this Agreement.
- 6.2 The Transmitter shall specify the fault levels at all connection points, including the Customer's connection points, as required by the Market Rules, which shall be recorded in Schedule D to this Agreement.
- 6.3 The Transmitter shall promptly report to the Customer any changes in its equipment that could materially affect the transmission or connection services provided.
- 6.4 The Customer shall promptly report to the Transmitter any changes in its equipment that could materially affect the performance of the transmission system.
- 6.5 The Customer shall provide prompt notice to the Transmitter in accordance with the Code or as agreed in Schedule D to this Agreement before disconnecting its equipment from the transmission system.
- 6.6 Upon the Transmitter's request, the Customer shall promptly report to the Transmitter any and all incidents involving the automatic operation of the Customer's facility protective relaying that affect the Transmitter's transmission facilities.
- 6.7 Upon learning of any changes that affect the reliability of the Transmitter's transmission facilities, the Customer shall promptly submit a written report to the Transmitter describing any and all changes in the Information that it submitted as registered system planning data in the connection application form, including

7 DISCONNECTION

7.1 Voluntary Disconnection

- 7.1.1 The Customer may voluntarily disconnect its facilities permanently from the Transmitter's transmission facilities in accordance with procedures set out in the Code and this Agreement at any time during the term of this Agreement, provided that the Customer is not in default of its obligations hereunder.
- 7.1.2 The Customer shall give the Transmitter notice in writing of its intention to permanently disconnect its facility from the connection point in accordance with the procedure set out in the Code and this Agreement. Such notice shall be given ten (10) days before the date when the Customer wishes to disconnect.
- 7.1.3 Before the Customer's facilities are permanently disconnected from the Transmitter's transmission facilities, the Parties shall develop appropriate operating and decommissioning procedures for the Customer's facilities in accordance with the provisions of the Code and this Agreement.
- 7.1.4 The Customer shall pay all reasonable costs, including the removal of any of the Transmitter's equipment from the Customer's facilities, that are directly attributable to the voluntary disconnection and decommissioning of the Customer's facilities.
- 7.1.5 The Transmitter shall reconnect the Customer's facilities to its transmission system following a voluntary disconnection when it is reasonably satisfied that all obligations listed in this section are satisfied and that all other aspects of the Code and this Agreement are met.

7.2 Involuntary Disconnection

- 7.2.1 The Transmitter may disconnect the Customer's facilities, at any connection point at any time throughout the term of this Agreement in any of the following circumstances:
 - 7.2.1.1 in accordance with subsection 40 (5) of the Electricity Act, applicable law, its licence, the Market Rules, or provisions set out in the Code and this Agreement;
 - 7.2.1.2 in obedience to a decision by an arbitrator or court in accordance with the dispute resolution procedure set out in this Agreement.
 - 7.2.1.3 during an emergency in accordance with the provisions of the Code, this Agreement, and the Market Rules;
 - 7.2.1.4 if the Transmitter determines, acting reasonably, that the Customer's facilities do not comply with the Code (subject to section 2.6 of the Code) or other applicable codes and laws;

7.3 Disconnection-General

- 7.3.1 The Customer shall continue to pay the applicable transmission rates during the notice period leading up to a disconnection.
- 7.3.2 The Customer shall pay all costs that are directly attributable to an involuntary disconnection, and decommissioning of its facilities, including the cost of removing any of the Transmitter's equipment from the Customer's property and shall cooperate in establishing appropriate procedures for such decommissioning.
- 7.3.3 For the duration of the disconnection the Transmitter shall not be obliged to fulfill any agreement to convey electricity to or from the Customer's facilities .

7.4 Reconnection after Involuntary Disconnection

- 7.4.1 The Transmitter shall reconnect the Customer's facilities to its transmission facilities following an involuntary disconnection when it is reasonably satisfied that the emergency, which was the cause of the disconnection, has ceased or has been rectified and all other requirements and obligations contained in the Code and this Agreement have been complied with.
- 7.4.2 The Transmitter shall reconnect the Customer's facilities to its transmission system following a non-emergency disconnection when it is reasonably satisfied that the reason for the disconnection no longer exists and
 - 7.4.2.1 the reason for the disconnection has been remedied to the Transmitter's satisfaction;
 - 7.4.2.2 remedies as determined in accordance with the dispute resolution procedure contained in this Agreement have been implemented and/or assurances have been given to the satisfaction of the affected Party that remedies or compensation shall be paid;
 - 7.4.2.3 the Customer has taken all necessary steps to prevent circumstances causing the disconnection from recurring and has delivered binding undertakings to the Transmitter that the circumstances leading to disconnection shall not recur; and
 - 7.4.2.4 the Customer agrees to pay reasonable reconnection costs as determined by the Transmitter.

8 LIABILITY

- 8.1 The Transmitter shall only be liable to the Customer and the Customer shall only be liable to the Transmitter for any damages which arise directly out of the willful misconduct or negligence:

9 REPRESENTATIONS AND WARRANTIES

9.1 Customers' Representations and Warranties

- 9.1.1 The Customer represents and warrants to the Transmitter as follows, and acknowledges that the Transmitter has relied upon such representations and warranties in entering into this Agreement:
- 9.1.1.1 that it has all the necessary corporate power, authority, and capacity to enter into this Agreement and to perform its obligations hereunder;
 - 9.1.1.2 that it has authorized by all required corporate action, the execution, delivery and performance of the terms, conditions, covenants and obligations contained in this Agreement;
 - 9.1.1.3 that its facilities meet the technical requirements of the Code and this Agreement, excluding equipments that are deemed compliant under section 2.6 of the Code which is listed in Schedule J of this Agreement; and
 - 9.1.1.4 that all required licences including but not limited to its Distributor or Generator licences , where one is required to carry out its business such as a Distributor and Generator licences, are in full force and effect.

9.2 Transmitters' Representations and Warranties

- 9.2.1 The Transmitter represents and warrants to the Customer as follows, and acknowledges that the Customer is relying upon such representations and warranties in entering into this Agreement:
- 9.2.1.1 that It has all the necessary corporate power, authority and capacity to enter into a Agreement and to perform its obligations hereunder;
 - 9.2.1.2 that its facilities meet the technical requirements of the Code and this Agreement:
 - 9.2.1.3 that it has authorized by all required corporate action, the execution, delivery and performance of the terms, conditions, covenants and obligations contained in this Agreement; and
 - 9.2.1.4 that its licence is in full force and effect.

10 REQUIREMENTS FOR OPERATIONS AND MAINTENANCE

10.1 Work by the Transmitter's Staff on the Customer's Site and Facilities

10.2 Work by the Customer's Staff on the Transmitter's Site and Facilities

- 10.2.1 When the Customer's staff, its contractors, or agents work at the Transmitter's facilities or a site, the Transmitter's safety and environmental requirements shall be observed by such staff, contractors and agents.
- 10.2.2 When the Customer can show the Transmitter, to the Transmitter's satisfaction, that the Customer's safety and environmental practices provide for an equivalent or better level of safety or environmental protection, the Transmitter shall give permission to work to the Customer's safety and environmental practices. As a minimum, all applicable statutes and regulations shall govern such work.

10.3 Day-to-Day Operations

- 10.3.1 Operations and maintenance shall be performed only by qualified persons.
- 10.3.2 The Customer shall be responsible for operating and maintaining its facilities as described in Schedule D to this Agreement and in accordance with provisions of the Code.
- 10.3.3 The Transmitter shall be responsible for the operating and maintaining its transmission facilities in accordance with the Code and provisions of this Agreement.

10.4 Controlling Authorities

- 10.4.1 Each Party shall specify its controlling authority in accordance with the operations schedule attached to this Agreement.
- 10.4.2 The Transmitter and the Customer shall comply with all requests by the other Party's controlling authority in accordance with this Agreement and the Code.

10.5 Communication Between the Parties

- 10.5.1 All communications between the Parties about day-to-day operating and maintenance matters shall at all times go through the controlling authorities, or those other persons to whom a controlling authority has delegated the communication authority.
- 10.5.2 Each Party shall provide the other with the name of a current 24-hour contact to respond to operating and maintenance matters, which shall be listed in a schedule to the Agreement.
- 10.5.3 The Customer shall provide the Transmitter with all necessary instructions for emergency responses, including reporting procedures and the names of site emergency co-ordinators.

10.6 Switching

- 10.6.1 A Party's controlling authority shall be responsible for establishing in writing for agreement by the other Party, the appropriate conditions for and the co-ordination of switching on the equipment under its control from time to time throughout the term of this Agreement.
- 10.6.2 When the Parties have so agreed in writing, one Party may appoint an employee of the other as its designate for switching-purposes.
- 10.6.3 The Customer shall comply with all switching instructions issued by the Transmitter's controlling authority to maintain the security and reliability of the transmission system. The two controlling authorities shall agree to procedures prior to undertaking any switching-operations.

10.7 Isolation of Customer's Facilities

- 10.7.1 If the Customer requires isolation of its own facilities or facilities under the Transmitter's control, then the Customer's controlling authority shall:
 - 10.7.1.1 Deliver a written notice in accordance with the provisions of the Code and this Agreement by facsimile transmission to the Transmitter's controlling authority to ask for a condition guarantee.
 - 10.7.1.1.1 the notice shall set out the Transmitter's assigned equipment operating designations if applicable.
 - 10.7.1.1.2 the Customer's equipment designations shall be set out in the notice whenever the Transmitters' equipment operating designations have not been assigned.
- 10.7.2 Upon the request of one Party's controlling authority, the other Party's controlling authority or its designate shall provide the required timely isolation of equipment as required for emergency switching or to establish a condition guarantee.
- 10.7.3 The Transmitter shall provide to the Customer the isolation and reconnection of the Customer's equipment at the Customer's request at no cost to the Customer, once per year, during normal business hours. The Customer shall pay the Transmitter's reasonable costs for isolating and reconnecting the Customer's equipment if the requested isolation and reconnection is for a time outside of normal business hours.
- 10.7.4 The Transmitter shall charge the Customer, and the Customer shall pay, the reasonable costs incurred by the Transmitter for isolating and reconnecting the Customer's equipment for any isolation and reconnection request in excess of one per year as specified in section 10.7.3 above.

10.9.2 The controlling authority of the facilities required to establish the work protection shall provide the other Party with access to such facilities.

10.9.3 Establishing work protection shall be limited to hanging tags and locking of devices.

10.10 Forced Outage

10.10.1 When a forced outage by one Party adversely affects the other's facilities, the first Party's controlling authority shall give prompt notice to the controlling authority of the second Party.

10.10.2 Each Party's controlling authority shall have sole authority to identify the need for and initiate a forced outage on equipment under its control.

10.11 Scheduling of Planned Work

10.11.1 The Customer shall schedule all planned work with the Transmitter's controlling authority to co-ordinate outages that directly affect the Transmitter's transmission facilities.

10.11.2 The Customer shall, take all reasonable steps to ensure that its anticipated and planned outages for the upcoming year are submitted to the Transmitter by October 1st of each year.

10.11.3 At least four days in advance of planned work that requires a feeder breaker to be opened or operated and at least ten days in advance of planned work that requires operations of multiple feeder breakers, station bus or a whole transformer station, the Customer's controlling authority shall fax requests to the appropriate Transmitter contact identified in the operations schedule of this Agreement.

10.11.4 At least four days in advance of planned work, the Customer's controlling authority shall fax requests to the appropriate Transmitter contact identified in the operations schedule if the planned work involves:

10.11.4.1 any disconnection from the Transmitter's transmission facilities of less than 50 kV e.g. disconnection from a feeder breaker owned by the Transmitter or by the Customer,

10.11.4.2 load changes greater than 5 MW, or

10.11.4.3 load transfers or switching operations that directly affect the Transmitter's transmission facilities,

10.11.5 The Transmitter's controlling authority shall notify the Customer's controlling authority at least four days in advance of any planned work that requires a feeder breaker to be opened or operated and at least ten days in advance of planned work that requires operations of multiple feeder breakers, station bus or a whole transformer station, that directly affects the Customer's facilities, by contacting the appropriate Customer contact identified in the operations schedule to this Agreement.

10.12 Shutdown of Customer's Facilities

- 10.12.1 If the Customer's facilities are shutdown for any reason, its controlling authority shall contact the Transmitter's controlling authority, who shall investigate the reported event, using available evidence including input from the Customer's staff, to determine the cause of the shutdown.
- 10.12.2 The Customer shall not reconnect to the Transmitter's transmission facilities until first notified to do so by the Transmitter's controlling authority. Once the Transmitter is satisfied that reconnection will not cause any adverse effects on the transmission system, it shall immediately notify the Customer that reconnection can take place.

10.13 Emergency Operations

- 10.13.1 During an emergency, either Party may take whatever immediate action it deems necessary and is qualified to perform to safeguard public safety, life, and property without first notifying the other Party.
- 10.13.2 The Party taking such actions shall promptly report them to the other Party's controlling authority.
- 10.13.3 The Transmitter may be required from time to time to implement load shedding as outlined in this Agreement, Schedule D, section 7.
- 10.13.4 The Customer shall identify the loads (and their controllable devices) to be included on the rotational load shedding schedules to achieve the required level of emergency preparedness.
- 10.13.5 The Transmitter may review the rotational load-shedding schedule with the Customer annually or more often as required.
- 10.13.6 The Customer shall comply with all requests by the Transmitter's controlling authority to shed load. Such requests shall be initiated to protect transmission system security and reliability in response to a request by the IMO.
- 10.13.7 When the Transmitter's transmission facilities return to normal, the Transmitter's controlling authority shall notify the Customer's controlling authority to re-energize the Customer's facilities.
- 10.13.8 The Transmitter may be required from time to time to interrupt supply to the Customer during an emergency to protect the stability, reliability, and integrity of its own facilities and equipment, or to maintain its equipment availability. The Transmitter shall advise the affected Customer as soon as possible/practical of the transmission system's emergency status and when to expect normal resumption and reconnection to the transmission system.

10.14 Access and Security of Facilities

- 10.14.4 Either Party and its representatives shall be entitled to access to the other's facilities or site, and the host Party shall grant such access, to carry out work at all reasonable times on reasonable prior notice to the host Party, subject to each Party's policies and procedures.
- 10.14.5 If either Party or its representatives wishes to have access to the other's facilities, the accessing Party shall notify the host Party of the particular work to be undertaken and of the date and time when it proposes to access the relevant facilities, subject to each Party's policies and procedures. The other Party shall not unreasonably withhold access to its facilities.
- 10.14.6 At any time when the accessing Party or its representatives are on or in the host Party's site, the accessing Party and its representatives shall
- 10.14.6.1 use all reasonable precautions not to damage or interfere with the host Party's site and facilities;
 - 10.14.6.2 observe the host Party's requirements for reporting occupational health and safety, electrical safety, environmental requirements, technical requirements, and matters of industrial relations; and
 - 10.14.6.3 neither ask questions, nor give any direction, instruction or advice to any person involved in operating or maintaining the site or facilities of the host Party, other than the person whom the host Party has designated for that purpose.
- 10.14.7 If the accessing Party or its representatives cause any loss or damage when given access to the host Party's site, the accessing Party shall promptly advise the host's controlling authority of the loss or damage.
- 10.14.8 Subject to subsection 10.14.7, a Party shall not, and shall ensure that its representatives do not, intentionally interfere with any of the other Party's facilities in or on its sites.
- 10.14.9 In an emergency a site owner may, as far as reasonably necessary in the circumstances, have access to and interfere with the other Party's facilities. The site owner shall use reasonable efforts not to cause loss or damage to the other Party's facilities. If the site owner interferes with any of the facilities, it shall indemnify the other Party for reasonable costs and expenses incurred from any resulting loss or damage.

11 TERM AND TERMINATION OF CONNECTION AGREEMENTS

11.1 Coming into Force

- 11.1.1 The term of this Agreement shall commence on the later date of either the execution date of this Agreement by both Parties or the date that subsection 26(1) of the Electricity Act is proclaimed, and shall remain in full force and effect until terminated in accordance with this Agreement's provisions.

11.3 Right to Disconnect

- 11.3.1 If a non-defaulting Party gives notice to terminate the Agreement under section 12.2.1, the Transmitter shall disconnect the connection point on the termination date specified in that notice or on another date that the Parties have agreed upon in writing.

11.4 Right to Remove Assets

- 11.4.1 When a non-defaulting Party has terminated the Agreement under section 8.2.1, the Transmitter may disconnect the connection point and shall be entitled to de-commission and remove any of its assets associated with the connection and the connection point.
- 11.4.2 The Transmitter shall notify the Customer in writing of the days the de-commissioning and removal of its assets shall occur, and the Customer shall provide the Transmitter with any and all access to the Customer's site, provided such dates and times are reasonable to both Parties, that may be required by the Transmitter to de-commission and remove its assets.

12 EVENTS OF DEFAULT AND TERMINATION

12.1 Occurrence of an Event of Default

- 12.1.1 If an event of default occurs, the non-defaulting Party may (without prejudice to its other rights and remedies as provided for in this Agreement) serve the defaulting Party with a default notice specifying the event of default that has occurred.

12.2 Cure Periods

- 12.2.1 Upon service of a default notice, the defaulting Party shall be entitled to remedy the default specified in the default notice either:
- 12.2.1.1 within the cure period specified in Schedule C of this Agreement from the date of receiving the specified default notice; or
 - 12.2.1.2 within the cure period specified in a detailed plan to remedy the default, the terms of which are agreed to by the non-defaulting Party.
- 12.2.2 During the Cure Period, the defaulting Party (or any person on its behalf) shall diligently seek to remedy the event of default specified in the default notice. For a non-financial default, any remedy shall be made in accordance with good electricity utility practice.

12.3.1.1 the defaulting Party (or any person acting on its behalf) has paid any amount that is the subject of the financial default, including interest from the date of default until the date paid using the Transmitter's approved debt rate at the relevant time; and

12.3.1.2 the defaulting Party (or any person acting on its behalf) has reimbursed all costs of enforcement, recovery, or attempted enforcement or recovery incurred, including reasonable legal costs and expenses, by the non-defaulting Party in respect of the relevant financial default.

12.3.2 A non-financial default, shall be remedied when:

12.3.2.1 The default has been remedied to the reasonable satisfaction of the non-defaulting Party; and

12.3.2.2 The defaulting Party (or any person acting on its behalf) has reimbursed all costs of enforcement or recovery or attempted enforcement or recovery incurred, including reasonable legal costs and expenses, by the non-defaulting Party in respect of the relevant non-financial default.

12.4 Right to Terminate and Disconnect when an Event of Default Occurs

12.4.1 A non-defaulting Party may, without prejudice to other rights and remedies provided for in this Agreement with respect to an Event of Default, which has not been remedied within the periods set forth below, terminate this Agreement by written notice to the defaulting Party:

12.4.1.1 For an unremedied non-financial default, by giving twenty business days' notice in writing to the defaulting Party, stating its intention to terminate by the expiry of that notice period; or

12.4.1.2 For an unremedied financial default, subject to giving seven business days' notice in writing to the defaulting Party, stating its intention to terminate by the expiry of that notice period.

12.5 Effect of Termination and Remedies

12.5.1 Neither the Transmitter nor the Customer may terminate the Agreement except in accordance with the applicable provisions set out in the Code or this Agreement.

12.5.2 If either a Transmitter or a Customer chooses to terminate this Agreement pursuant to its rights under section 12.4, then upon termination the Agreement will, subject to section 12.5.3, be of no further force and effect.

12.5.3 The termination of this Agreement shall not affect any rights or obligations of either Party that may have accrued before termination, nor affect either Party's rights or obligations as set out in section 4, section 8 and section 13 of this Agreement, which will continue in full force and effect notwithstanding the termination of the Agreement.

12.6 Right to Disconnect Connection Point

- 12.6.1 If the Transmitter is the non-defaulting Party, the default has not been remedied and the cure period has expired, it may, on providing a written notice ten business days in advance, disconnect the connection point where the default remains unremedied at the end of the ten business days notice period.
- 12.6.2 When either Party has terminated this Agreement, the Transmitter may disconnect the connection point and the Parties shall be entitled to de-commission and remove any of their respective assets associated with the connection and the connection point.

12.7 Rights and Remedies not Exclusive

- 12.7.1 The rights and remedies of the Parties in this Agreement are not intended to be exclusive but rather are cumulative and are in addition to any other right or remedy otherwise available to the Parties at law or in equity. Either Party may exercise one or more of its rights and remedies from time to time, independently or in combination, without prejudice to any other right or remedy that either Party may have exercised. This subsection shall not operate to void the application of section 13 of this Agreement, to any dispute arising between the Customer and the Transmitter.
- 12.7.2 If any of the remedies provided for and chosen by a non-defaulting Party are found to be unenforceable, the non-defaulting Party may exercise any other right or remedy available to it at law or in equity.

13 DISPUTE RESOLUTION

13.1 Exclusivity

- 13.1.1 Except where this Agreement states otherwise, the dispute resolution procedures set forth in this Agreement shall apply to all disputes arising between the Customer and the Transmitter regarding the Agreement and the Code and shall be the only means for resolving any such disputes.
- 13.1.2 The dispute resolution procedures set forth in this Agreement do not apply to disputes in which the Transmitter or the Customer have not sought to have the matter referred in accordance with section 13.2.1 prior to this Agreement being terminated.

13.2 Duty to Negotiate

- 13.2.1 Any dispute between the Customer and the Transmitter over this Agreement shall first be referred to a designated representative chosen by the Customer and to a designated representative chosen by the Transmitter for resolution on an informal basis.

13.2.2 Such designated representatives shall attempt in good faith to resolve the dispute within thirty days of the

13.3 Referral of Unresolved Disputes

- 13.3.1 If the designated representatives cannot resolve the dispute within the time period set out in subsection 13.2.2, either Party may submit the dispute to binding arbitration and resolution in accordance with the arbitration procedures set out below.

13.4 External Arbitration Procedures

- 13.4.1 Subject to subsection 13.5.2 below, the Parties shall submit any arbitration begun under this section to a single neutral arbitrator.
- 13.4.2 In choosing an arbitrator, the Parties shall negotiate in good faith. All arbitration taken under this Agreement shall be conducted in accordance with the *Arbitration Act*, 1991, S.O. c17 ("the Arbitration Act") as amended from time to time, except as modified herein.
- 13.4.3 The arbitrator(s) shall have exclusive authority to hear and decide any dispute between the Parties that is subject to arbitration under this Agreement or the Code.

13.5 Appointment of Arbitrator

- 13.5.1 If the Parties cannot agree upon a single arbitrator within fifteen days after referring of the dispute to arbitration, each Party shall within five more days choose one individual who shall sit on a three-member arbitration panel.
- 13.5.2 The two arbitrators chosen by the Parties shall within twenty business days, in good faith, choose a third person to be the third arbitrator, who shall chair the arbitration panel.
- 13.5.3 Neither Party may at any time during the arbitration revoke its choice of arbitrator, unless the other Party consents in writing.
- 13.5.4 If the Parties do not choose the two arbitrators within the time period set out in subsection 13.5.1, either Party or both Parties, with the five days set out in subsection 13.5.1, may apply to the court to appoint a single arbitrator.
- 13.5.5 The individual(s) chosen as the arbitrator(s) shall be qualified by education and experience to decide the matter. The arbitrator(s) shall be at arm's length from all Parties to the arbitration and shall not be members of the audit or legal firm or firms who advise any Party to the arbitration, nor shall the arbitrator(s) be otherwise regularly retained by any of the Parties to the arbitration.

13.6 Written Statement of Dispute and Response

- 13.6.1.4 the proposed resolution or relief sought,
- 13.6.1.5 the names of any third Parties with material knowledge or Information relevant to the dispute, and
- 13.6.1.6 any documents that the Party wishes the arbitrator(s) to consider.

13.6.2 The responding Party shall have twenty business days to respond to the filing, setting forth its position and the Information that it deems relevant..

13.7 Discovery of Facts

- 13.7.1 There shall be no discovery of facts taken, sought, or otherwise instituted by any means except as approved by the arbitrator(s).
- 13.7.2 The arbitrator(s) shall provide a time schedule for any such discovery.
- 13.7.3 The arbitrator(s) may at any time retain non-Party technical experts to advise and assist them during the arbitration. The advice of these experts shall be made known to the Parties.

13.8 Confidentiality of Documents

- 13.8.1 All meetings and hearings shall be in private unless the Parties to the arbitration agree otherwise. The Party providing any document or other Information in the arbitration that would not otherwise be available to the other Party may in good faith designate it as confidential, provided that
 - 13.8.1.1 the Parties shall first submit to the arbitrator(s) an agreed upon written statement of procedures for handling and protecting material designated as confidential, which the arbitrator(s) may accept or modify as they may deem appropriate. If the Parties cannot agree upon confidentiality procedures, the arbitrator(s) shall decide them as appropriate.

13.9 Procedural Rules

- 13.9.1 The arbitrator(s) may adopt any procedural rules that they, at their sole discretion, deem appropriate to conducting the arbitration and facilitating the resolution of the dispute.
- 13.9.2 No procedural rule adopted by the arbitrator(s) shall extend the time period set forth in subsection 13.10.1; but the arbitrator(s) shall render a final disposition of the dispute within that period, which may not be extended or reduced unless the Parties consent in writing.
- 13.9.3 Refusal by either Party to comply with an order of the arbitrator(s) adopting or modifying any procedural rule shall constitute, in the sole discretion of the arbitrator(s), grounds for default and a finding in favour of

13.10.2.2 be based on the evidence before them, the applicable laws of Ontario and Canada, the Market Rules, the licences, the Agreement and any relevant decisions of courts, agencies, or earlier arbitrations under this Part.

13.10.3 A copy of the decision, with any Confidential Information expunged, shall be made available to the public.

13.11 Finality of Decisions

13.11.1 The decision shall be final and binding on the Parties to the arbitration and shall not be subject to any appeal or review procedure.

13.11.2 Each Party hereby waives any and all rights or ground it believes that it has, or at any time after may have, to challenge, appeal in any way, or otherwise seek to set aside in any court or other tribunal any decision by the arbitrator(s).

13.11.3 Notwithstanding anything else in this sub-section, if either Party fails to act in accordance with the decision of the arbitrator(s), the other Party may then seek enforcement of the decision in any court of competent jurisdiction .

13.12 Arbitration Act (Ontario)

13.12.1 Nothing in this Code shall be construed as affecting any rights available to the Parties under section 3 of the *Arbitration Act* (Ontario).

13.12.2 If and so far as any provision of section 13.11 is adjudged or otherwise deemed invalid by a court of competent jurisdiction, the provisions of the *Arbitration Act* (Ontario) shall apply.

13.13 Costs

13.13.1 The arbitrator(s) shall award costs for an arbitration as if it had been a proceeding in Ontario Superior Court, and the arbitrator(s) shall therefore, in awarding or denying costs to a Party, follow:

13.13.1.1 the provisions on costs set out in the Ontario Courts of Justice Act and the Ontario Rules of Civil Procedure, including without limitation the provisions in those rules concerning settlement offers; and

13.13.1.2 case law applicable in Ontario.

13.13.2 If either Party fails to comply with the decision of the arbitrator(s) and the other Party afterwards seeks relief under subsection 13.12, the Party seeking the relief shall be entitled to receive from the other Party its costs of seeking the relief from the other Party (including its reasonable legal costs) once a court of

14.2 Limitation

- 14.2.1 Subject to section 14.3, neither Party shall be held to have committed an event of default in respect of any obligation under this Agreement if prevented from performing that obligation, in whole or in part, because of a force majeure event.

14.3 Obligations in the Event of a Force Majeure

- 14.3.1 If a force majeure event prevents a Party from performing any of its obligations under the Code and this Agreement, that Party shall:
- 14.3.1.1 promptly notify the other Party of the force majeure event and its assessment in good faith of the effect that the event will have on its ability to perform any of its obligations. If the immediate notice is not in writing, it shall be confirmed in writing as soon as reasonably practicable.
 - 14.3.1.2 not be entitled to suspend performance of any of its obligations under this Agreement to any greater extent or for any longer time than the force majeure event requires it to do;
 - 14.3.1.3 use its best efforts to mitigate the effects of the force majeure event, remedy its inability to perform, and resume full performance of its obligations;
 - 14.3.1.4 keep the other Party continually informed of its efforts; and
 - 14.3.1.5 provide written notice to the other Party when it resumes performance of any obligations affected by the force majeure event.
- 14.3.2 Notwithstanding any of the foregoing, settlement of any strike, lockout, or labour dispute constituting a force majeure event shall be within the sole discretion of the Party to the Agreement involved in the strike, lockout, or labour dispute. The requirement that a Party must use its best efforts to remedy the cause of the force majeure event, mitigate its effects, and resume full performance under this Agreement and the Code shall not apply to strikes, lockouts, or labour disputes

15 COMPLIANCE, INSPECTION, TESTING AND MONITORING

15.1 Requirements

- 15.1.1 The Customer shall inspect, test and monitor its facilities and equipment connected to the transmission system to ensure and maintain compliance with all applicable standards required by the Code and this Agreement. The Customer shall pay to the Transmitter all costs associated with such testing and monitoring of its own equipment that would be carried out by the Transmitter.

- 15.1.5 When requested by the Transmitter, the Customer shall produce test certificates certifying that its facilities have passed the relevant tests and comply with all applicable Canadian standards before connection.
- 15.1.6 The Transmitter may inspect the Customer's facilities and witness the commissioning tests related to new or replacement equipment that could reasonably be expected to affect the performance of the transmission system. The Customer shall pay the Transmitter all reasonable costs associated with such tests. Upon demand from the Transmitter, the Customer shall produce a certificate of approval, or exemption, from the Ontario Electrical Safety Authority.
- 15.1.7 The Transmitter has the right to specify by addendums to this Agreement the types of changes that require prior approval of the Transmitter before the Customer implements such changes. Such changes, that require prior approval of the Transmitter, shall be set out in Schedule A of this Agreement, and shall be limited to those that can have material adverse effect(s) on the Transmitters's transmission facilities or facilities of its other Customers.

15.2 Right of Entry

- 15.2.1 The Customer shall allow the Transmitter access to its facilities subject to the Code and this Agreement to assess compliance, or to investigate any possible past or potential threat to the security of the transmission system.

16 GENERAL TECHNICAL REQUIREMENTS

The Transmitter and the Customer shall follow the general technical requirements set out in Schedule F of this Agreement.

17 TECHNICAL REQUIREMENTS FOR GENERATORS

The Transmitter and the Generator Customer shall follow the technical requirements for Generators set out in Schedule G of this Agreement.

18 TECHNICAL REQUIREMENTS FOR TAPPED TRANSFORMER STATIONS SUPPLYING LOAD

The Transmitter, the Customer, who is either a Distributor or a Consumer, shall follow the technical requirements set out in Schedule H of this Agreement.

19 PROTECTION SYSTEM REQUIREMENTS

The Transmitter and the Customer shall follow the protection system requirements set out in Schedule I of this

21 TRANSMISSION SERVICE

The Transmitter hereby agrees to provide the transmission service to the Customer, and the Customer hereby agrees to accept the transmission services as outlined in the Transmission System Code, the Rate Order and this Agreement, in effect at the relevant time.

22 TRANSMISSION SERVICE CHARGES

For Transmitters whose transmission systems are under IMO Operating Control, the Customers shall pay the Transmission Service Charges, for the Transmission Services they receive to the IMO in accordance with the Market Rules, the Transmission System Code, the relevant Rate Order, and the Connection Agreement, in effect at the relevant time.

23 INCORPORATION OF SCHEDULES

Set out below are the schedules and appendices that form a part of, and that are hereby incorporated by reference into, this Agreement:

- Schedule "A" - Single Line Diagram and Description of the Customer's Connection Point
- Schedule "B" - Application of Transmission Rate Schedule
- Schedule "C" - Cure Periods for Non-Financial Default Events
- Schedule "D" - Details of Specific Operations
- Schedule "E" - Customer Connection Information
 - Part A: Generic Information
 - Part B: Information Concerning Generation Facilities
 - Part C: Impact Information Concerning Consumers and Distributor Facilities
 - Part E: Transmission Facilities e.g. Tapped Transformer Stations and Circuit Breakers
 - Part F: Other Data that the Customer must Submit to Transmitter
- Schedule "F" - General Technical Requirements
- Schedule "G" - Technical Requirements for Generators
- Schedule "H" - Technical Requirements for Tapped Transformer Stations Supplying Load:
 - (a) Transmitter's Tapped Transformer Stations
 - (b) Distributor's and Consumer's Tapped Transformer Stations
- Schedule "I" - Protection System Requirements
- Schedule "J" - Exceptions to Customer's Representations, Warranties and Equipment Compliance Details
- Schedule "K" - Data that Transmitter must Submit to Customer
 - (a) Listing of information and data items subject to availability and confidentiality restrictions.
 - (b) Other Information: to be specified based on site specific considerations.
- Schedule "L" - Contacts for Purposes of Notice

The Parties may append such additional Schedules to this Agreement as may be necessary, from time to time, and upon which they shall mutually agree. All such Schedules shall form a part of, and are hereby incorporated by reference into this Agreement.

24 NOTICE

Notice sent in accordance with this section shall be deemed to have been delivered and received:

- (a) if delivered by hand, upon receipt;
- (b) if delivered by electronic transmission, 48 hours after the time of transmission, excluding from the calculation weekends and public holidays;
- (c) if delivered by registered mail, six (6) days after the mailing thereof, provided that if there is a postal strike such notice shall be delivered by hand.

25 ASSIGNMENT

The rights and obligations under this Agreement may not be assigned by the Customer to any other person without the prior written consent of the Transmitter which consent shall not be unreasonably withheld.

26 FURTHER ASSURANCES

Each Party shall, upon the reasonable request of the other, do or cause to be done all further lawful acts, deeds, assurances whatever in order to more effectively carry out the intent and purpose of this Agreement.

27 WAIVER

The failure of any Party to exercise any right, power or option or to enforce any remedy or to insist upon the strict compliance with the terms, conditions and covenants of this Agreement shall not constitute a waiver of the terms, conditions and covenants herein with respect to that or any other or subsequent breach thereof nor a waiver by the Party at any time thereafter to require strict compliance with all terms, conditions and covenants hereof, including the terms, conditions and covenants with respect to which the Party has failed to exercise such right, power or option. Nothing shall be construed or have the effect of a waiver except an instrument in writing signed by a duly authorized officer of the Party which expressly or impliedly waives a right, power or option under this Agreement.

28 ENTIRE AGREEMENT

This Agreement, together with the schedules attached hereto, constitutes the entire agreement between the Parties and supersedes all prior oral or written representations and agreements of any kind whatsoever with respect to the matters dealt with herein.

29 AMENDMENTS

Except as otherwise provided herein, no amendment, modification or supplement to this Agreement shall be valid or binding unless set out in writing and executed by the Parties with the same degree of formality as the execution of this Agreement.

29.1 The Transmitter and the Customer can jointly amend the following schedules of the Agreement:

29.1.1 Schedule A ;

29.1.2 Schedule B – limited to any approved changes to reflect a relevant new Transmission Rate Order;

29.3 The Parties to this Agreement agree to forthwith, upon receipt of notice from the Board, do all things and take all actions necessary to amend this Agreement as specified by the Board.

30 APPLICABLE LAW

This Agreement shall be construed and enforced in accordance with, and the rights of the Parties shall be governed by, the laws of Ontario and the laws of Canada applicable therein.

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound, have caused this Agreement to be executed by the signatures of their proper officers duly authorized in their behalf.

Name of Transmitter

Name of Customer

By: Name: _____

By: Name: _____

SCHEDULE A

SINGLE LINE DIAGRAM AND DESCRIPTION OF THE CUSTOMER'S CONNECTION POINT

- Includes a list of any Customer Equipment on Transmitter's property and vice Versa
- Includes the type of changes that require Transmitter's prior approval before implementation by Customers as set out in subsection 11.1.7 of this Agreement.

[Draft Note: To be completed by the Parties]

SCHEDULE B

APPLICATION OF TRANSMISSION RATE SCHEDULE

1. Customer Eligibility

Transmission Services are available to all Customers, as defined in the pertinent transmission Rate Order, that are directly connected to, and take power from, the Transmitter's transmission facilities.

For Transmitters whose transmission systems are under IMO operating control, Export Transmission Service is available to all Market Participants authorized under the Market Rules to cause electricity to be conveyed through or out of Ontario using the Transmitter's transmission facilities.

2. Application of Transmission Rates by Delivery Point:

3. Arranging for Transmission Services

The Customer or its representative shall not have access to Transmission Services until it has met all the requirements of the Code and this Agreement to the Transmitter's satisfaction, including the installation of all equipment required to connect the Customer to the Transmitter's transmission facilities and to meter the provision of the Transmission Service for the purpose of billing and settlement as per the relevant Rate Order approved by the OEB. All revenue type meters and associated equipment required for billing and settlement for Transmission Services shall meet the IMO's requirements, for Transmitters whose transmission systems are under IMO operating control, as described in the Market Rules and applicable procedures and standards.

4. Point of Delivery and Point of Billing for Transmission Services

The point of delivery, or Delivery Point, for the Transmission Services is the identified point of supply to the Customer from the IMO-controlled grid.

The point of billing for Transmission Services shall be aligned with IMO's Defined Point of Sale. Loss adjustments shall be made based on the IMO Metering Standards' site-specific loss adjustments prior to calculating transmission charges applicable to the Customer.

Each Delivery Point for a Customer shall be billed as a separate service, meaning a Transmission Customer having two or more Delivery Points will not be permitted to aggregate its demands.

Where a Delivery Point is common to two or more Customers, those Customers shall be permitted to aggregate demand at that Delivery Point if they are affiliates of each other within the meaning of Ontario's Business Corporations Act.

6. Rate Schedule for Transmission Services

The Customer shall pay the transmission service charges for Transmission Services to the IMO in accordance with the Market Rules and in accordance with the transmission Rate Order in effect at the time.

7. Information Requirements

The Customer shall provide Information to the Transmitter as outlined in the appropriate schedules and appendices that form part of the Agreement. The Information shall include, but not be limited to, the following:

- a) The identity, address, telephone and facsimile number of the person requesting Transmission Facilities Service
- b) Agreement; start date, expiration date, and conditions for extension of term
- c) Identification of each Delivery Point connecting to the Transmitter's transmission facilities (IMO-controlled grid) including voltage supply level.
- d) A forecast of load requirements at each Delivery Point
- e) If applicable, identification of each Embedded Generation Unit rated 1 MW and above that is located in the premises of the Consumer or Distributor, along with the following Information:
 - i) Installed capacity
 - ii) Date when required approvals were obtained to install the Generator
 - iii) Technology Type
 - iv) Fuel Type
- f) If applicable, immediate written notice of material changes in any Information relating to that new Embedded Generation, its transmission or distribution system, or other aspects of the Customer's facilities or operations affecting the operation of the Transmitter's Transmission System.

8. Bills

The IMO will submit monthly invoices for Transmission Services to Market Participants that utilize the Provincial Transmission Service, as indicated in transmission Rate Order.

The IMO will submit invoices for Export Transmission Service at the same time as it submits invoices for energy related charges to the Market Participants that utilize Energy service, as indicated in the transmission Rate Order.

9. Payment Conditions

In accordance with the Market Rules, Market Participants are required to make payment for Transmission Service to the IMO.

SCHEDULE C**CURE PERIODS FOR NON-FINANCIAL DEFAULT EVENTS**

Areas of Impact	Cure Period
Safety – Immediate	Promptly
Environment – Immediate	Promptly
Asset Integrity	Promptly
Security	<i>(not applicable – IMO accountability addressed in Market Rules)</i>
Adequacy	<i>(not applicable – IMO accountability addressed in Market Rules)</i>
Safety – Potential	10 DAYS
Power Quality	30 DAYS
Environment – Potential	30 DAYS
Maintenance	60 DAYS
Any Other Areas of Impact	30 DAYS

Areas of Impact

Safety – Immediate: Any aspect that could result in immediate injury or loss of life (e.g. exposed wires, destroyed station fence, etc.).

Environment – Immediate: Any aspect that could result in immediate impact on the natural system of land air, water, plants, and animals, including humans and their social, economic and cultural interactions with the system.

Asset Integrity: The extent to which an asset is operated within prescribed ratings (voltage, thermal, short circuit) and maintained to required standards to prolong asset lifespan and satisfy safety and environmental requirements.

Security: The ability of the transmission system to withstand sudden disturbances such as short circuits or unanticipated loss of system facilities.

Adequacy: The ability of the transmission system to supply the aggregate electrical demand and energy requirements of the Customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements or components.

Safety – Potential: The threat to human life depends on the occurrence of a single contingency (e.g. substandard

SCHEDULE D**DETAILS OF SPECIFIC OPERATIONS****1. Telephone Contacts**

Either Party has the right to change the position designations and telephone numbers listed below with immediate effect at any time by notice in writing delivered to the other Party by fax or other telegraphic means. Any employee of a Party with apparent authority may deliver such a notice to the other Party.

Day-to-Day Operations

For the operation of the Transmitter's transmission facilities and the Customer's facilities.

	Transmitter	Customer
<u>Operating Contacts:</u>		
Position:		
Name:		
Location:		
Phone Number:		
Fax Number:		
<u>Outage Planning:</u>		
Position:		
Name:		
Location:		
Phone Number:		
Fax Number:		
Position:		
Name:		
Location:		
Phone Number:		
Fax Number:		
Position:		
Name:		
Location:		
Phone Number:		
Fax Number:		

SCHEDULE D (CONT'D)

Contract Administration for operating services

Transmitter	Customer
Position: Name: Location: Phone Number: Fax Number:	
Position: Name: Location: Phone Number: Fax Number:	
Position: Name: Location: Phone Number: Fax Number:	

SCHEDULE D (CONT'D)

2. Description of Facilities

3. Owner and Operating Control

A Party may change its designated controlling authority set out below at any time during the term of the Agreement, subject to the following conditions:

1. (a) The Transmitter may change its designated controlling authority only for the Transmitter’s transmission facilities.
- (b) The Customer may change its designated controlling authority only for the Customer.
- (c) Either Party shall notify the other in writing of any change in its designated controlling authority at least ten business days before implementing a change.
- (d) Notification of any changes to the controlling authority shall be exchanged between the Transmitter and the Customer as follows:

Transmitter	The Customer
Director – Transmission Operations Division All affected Controlling Authorities and Transmission Operations Management Centre	General Manager [Appropriate level of Management to be identified by the Customer] All affected Controlling Authorities

The Customer owns:

The Customer has operating control of:

The Transmitter owns:

The Transmitter has operating control of:

4. Single Line Diagram

7. Emergency Operations

This Schedule would include Customer specific Information during Emergency operations.

(a) Scope:

This instruction assigns authority and defines responsibilities for manual primary load shedding that may be required to correct abnormal conditions on the IMO-controlled grid or the Transmitter's transmission facilities. Procedures are also outlined for conducting simulation of rotational load shedding.

(b) Information:

From time to time the IMO-controlled grid or the Transmitter's transmission facilities may experience abnormal conditions. To minimize their impact, and to restore and maintain security of operations, prompt control action must be taken. The control actions are numerous and vary according to the abnormal condition.

In extreme situations, the only way to correct abnormal conditions may be to shed primary firm load. Recognizing the impact on the Customer, this control action must be pre-planned as much in advance as possible. Rotational load shedding of primary firm load provides assurance that the abnormal condition will be quickly corrected while allowing for Customer selectivity. The schedule shall comply with the IMO's rules, procedures and policies in effect at the relevant time.

(c) Response to Controlled Rotational Load Shedding:

The request to implement a controlled rotation load shed will be as directed by the IMO and can come from the Transmitter's controlling authority located at the Transmitter's territory operating centre.

The request for implementation will follow this model:

"To comply with directions from the IMO, this is the Transmitter's controlling authority calling. We are currently implementing a rotational load shed. Would you please reduce your load to X MW's. You will be notified when conditions allow you to return to full load."

The Customer's response will follow this model:

"I understand that the Transmitter's controlling authority is implementing a rotational load shed and that I am to reduce load to X MW's. Is that correct?"

The Transmitter's controlling authority will confirm the request.

(d) Response to Controlled Rotational Load Shedding Simulation:

The request to simulate a controlled rotation load shed will be as directed by the IMO and can come from the Transmitter's controlling authority located at the Transmitter's territory operating centre.

The request for simulation will follow this model:

"To comply with directions from the IMO, this is the Transmitter's controlling authority calling. We are currently simulating a rotational load shed. Would you please simulate a load shed of X MW's. Please inform me of your steps and the actual amount of the simulated load shed you are able to achieve."

SCHEDULE D (CONT'D)**8. Re-verification Schedules-Protection and Control (sample only)**

1. A Customer shall re-verify its station protections and control systems that can impact on the Transmitter's transmission system.. The maximum verification or re-verification interval is: four (4) years for most of the 115 kV transmission system elements including transformer stations and transmission lines, and certain 230 kV transmission system elements; and two (2) years for all other high voltage elements. The maintenance cycle can be site specific.
2. The Customer shall advise the Transmitter at least fourteen (14) business days' notice of its intention to conduct a reverification test, so that the Transmitter's protection and control staff and system performance staff (if required) can observe.
 - a) re-verification of protection equipment settings specified in this Agreement.
 - b) relay recalibration
 - c) test tripping of station breakers that impact on the Transmitter/Customer interface measurement and analysis of secondary AC voltages and currents to confirm measuring circuit integrity as well as protection directioning.
 - d) measurement and analysis of secondary AC voltages and currents to confirm measuring circuit integrity.

Note: All tests must be coordinated and approved ahead of time through the normal outage planning process.

3. The following specific actions are required:
 - a) observe all station protections that trip and open the "enter the devices that interface with the Transmitter" for proper operation
 - b) confirm that settings approved by the Transmitter are applied to the following protections:
 - (i) over and under voltage;
 - (ii) transformer differential;
 - (iii) transformer phase and ground backup protection;
 - (iv) line protections;
 - (v) breaker or HVI failure protection; and
 - (vi) transfer and remote trip protections.

9. General Protections (Sample only)

SCHEDULE D (CONT'D)**10. Telecommunication Facility Details for Protection and Control Applications (sample only)****a) Telecommunication Medium**

The communication medium used will be two (2) leased telephone circuits from Bell Telephone and these circuits are the responsibility of the Customer

b) Types of Telecommunication Channels

2 Blocking Channels
2 Transfer Trip Channels

c) Ownership of Telecommunication Terminal Equipment

The terminal equipment located at a given facility is owned by the Customer. The communication medium (leased telephone circuits) is considered to be owned by the Customer.

The terminal equipment located at a switching station is owned by the Transmitter.

d) Responsibility for Work and Costs Associated with Breakdown and Routine Maintenance

If maintenance is required on the terminal equipment located at the Customer's facility, the Customer will bear all incurred costs.

If maintenance is required on terminal equipment located at sites owned by the Transmitter, the Transmitter will bear all incurred costs.

If maintenance or repair is required on the leased telephone circuits, the Customer will incur all associated costs. These costs will include charges by Bell Telephone and the Transmitter if its personnel are required to participate in any of the related activities.

e) Reverification Schedule

Routine Maintenance on communication equipment and the communication channels must be performed every two years.

f) Inventory of Communication Equipment

The provision of spare communication equipment is the Customers' responsibility and will be located at its site.

g) Failure of Communication Equipment

If a communication failure affects either the transfer trip channels or the blocking channels:

The Transmitter will decide whether or not the Customer should remain connected to the high-voltage system. The Transmitter must advise the Customer, through the appropriate communication protocol outlined in this code, of the situation, the choices available to the Customer and the risks involved. Since the Transmitter will take the

SCHEDULE E**CUSTOMER CONNECTION INFORMATION****PART A: Generic Information****[This Information is for use by both the Transmitter and the IMO]**

Submission Date		
Identification	Market participant identifier	
	Facility identifier	
Service Dates	Initial in-service:	
	Permanent in-service:	
	Permanent out-of-service:	
Protection System Description (for Transmitters only)	<p>A functional description of all protective systems shall be provided to allow a detailed analysis of all credible contingencies. These descriptions shall include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Operating times for protection components (e.g. primary relaying, auxiliary relaying, communication), • General models for normal and delayed (breaker failure) fault clearing, and • Exceptions to the general model (e.g. LEO, HIROP). <p>For all recognized contingencies, the functional description must enable fault clearing times at all terminals to be determined for both normal and delayed clearing.</p> <p>This Information is required from Generators and connected wholesale Customers only upon request.</p>	
Parameters and practices for thermal limit calculations	<p>Equipment parameters to enable continuous and limited time ratings to be calculated under prevailing and predicted conditions. All practices that could have a bearing on equipment operation shall be reported. These include but are not (AMPCO) limited to the following:</p> <ul style="list-style-type: none"> • ferrous or non-ferrous connectors • bolted or not-bolted connections • indoor or outdoor locations • 	
Relay Information	Settings and characteristics to enable relay margin analysis of credible contingencies	
Detailed Single-Line	A detailed single-line diagram showing equipment and protection and telemetry points	
Test Results	Copies of all commission tests to all power system components	

Notes:

- (1) To avoid multiple requests and for administrative efficiency, the Information being collected in this Appendix 1, Schedule E, Parts A through D, is for use by both the Transmitter and the IMO. All tables, in Parts A through D, are consistent with the IMO's Facility Registration Technical Data Forms and applicable Market Rules.
- (2) All Customers are to complete the relevant portions of the following appendices to describe their facilities. Customers also shall provide nameplate data for equipment directly connected to the transmission system upon request.

SCHEDULE E (CONT'D)

CONNECTION INFORMATION (CONT'D)

PART B: Information Concerning Generation Facilities

[This Information is for use by both the Transmitter and the IMO]

Unit Data	Identifier							
	Manufacturer							
	Serial Number							
	Type (e.g. salient pole, round rotor, induction)							
	Frequency (Hz)							
	NERC Unit type(e.g. Candu, Steam Turbine, Hydraulic Turbine, Wind Turbine)							
	NERC Status							
	NERC Cooling Water Source							
	NERC Fuel Type (primary, alternate)							
	NERC Fuel Transportation (primary, alternate)							
	NERC Capacity (summer, winter)							
	NERC Primary fuel heat rate at full load (BTU/kWhr)							
	Rated capability (MVA)							
	Rated voltage (kV)							
	Power Factor							
Total rotational inertia of Generator and turbine (s)								
Unsaturated reactances in pu on machine base								
	Xd	X'd	X''d	Xq	X'q	X _l	X ₂	X _o
Open circuit time constants (s)								
	T'do		T''do		T'qo		T''qo	
Speed (RPM)								
Station load (MW, Mvar)								
Minimum power (MW)								
Normal loading and unloading ramp rates (MW/min)								
Emergency loading and unloading ramp rates (MW/min)								
Armature (Ra) and field resistance (Rfd*) (Ω)								
Saturation at rated voltage (S1.0) and 20% above (S1.2)								
Rotational inertia for Generator without turbine (s) (required only upon request)								
Damping								
Base field current (A)								
Base field voltage (volts)								
Losses at 1.0 and 0.9 power factor (MW)								
Characteristics	Open circuit saturation curve							
	Short circuit curve							
	V curves							
	Capability curve							

*Field resistance for hydraulic units should be specified at 75°C and at 100°C for thermal units.

SCHEDULE E (CONT'D) CONNECTION INFORMATION (CONT'D)

PART C: Impact Information Concerning Consumer and Distributor Facilities ¹

[This Information is for use by both the Transmitter and the IMO]

Load Schedule			Date	Peak Load	Power Factor	Load Factor				
	Commissioning			MW	%	%				
	Initial			MW	%	%				
	Ultimate			MW	%	%				
Nature of Load	Composition (e.g. % industrial, % commercial, %residential)									
	Requirement for dual supply									
	Description of unusual sensitivity to voltage or frequency fluctuations									
	Description of unusual consequences of power outages									
Power Quality upon request	Harmonics (frequency, magnitude)									
	Flicker (voltage change, frequency)									
	Phase Imbalance (%)									
	Variable Speed Drives				Demand (kVA)		Description			
	Welding Equipment				Demand (kVA)		Description			
	Static Converters				Demand (kVA)		Description			
	Furnace				Demand (kVA)		Description			
	Other discontinuous or harmonic rich load				Demand (kVA)		Description			
	Capacitors				Demand (kVA) KVAR (AMPCO)		Description			
	Generators				Total Size (kVA)		Description			
	Load Shape			November to April (Winter) Maximum Demand				May to October (Summer) Maximum Demand		
		Weekday		Weekend		Weekday		Weekend		
Hours			MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
0-4										
4-8										
8-12										
12-16										
16-20										
20-24										
Motors 500 HP or larger	Type (e.g. squirrel cage, wound rotor, synchronous)									
	Rated capability (MVA)									
	Power factor									
	Starting method (e.g. full-voltage, resistive, reduced voltage, delta-wye)									
	Starts per day									
Induction Motors = 25,000 HP or = 500 HP per request	Identifier									
	Rated capability (MVA or HP)									
	Rated torque (per unit on machine base)									
	Rated slip (per unit on machine base)									
	Starting torque (per unit on machine base)									
	Starting current (per unit on machine base)									
	Starting power factor									
	Peak torque (per unit on machine base)									
	Locked rotor current (per unit on machine base)									
Synchronous Motors	Identifier									

parameter values for the exciter. Models for stabilizers, under-excitation limiters, and over-excitation limiters shall be provided where applicable.	motor 10 MVA or larger
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SCHEDULE E (CONT'D)
CONNECTION INFORMATION (CONT'D)

PART D: TRANSMISSION FACILITIES

[This information is for use by both the Transmitter and the IMO]

Shunt Capacitors	Identifier			
	Station			
	Manufacturer			
	Serial Number			
	Rated voltage (kV)			
	Rated capability (Mvar)			
	Discharge time (ms)			
	Current limiting reactor (ohms)			
	Synchronous closing unit			
	Bank arrangement (e.g. delta, wye, double-wye, etc)			
	Description of protection			
	Description of automatic switching			
	Anticipated switching restrictions			
	Circuit Breakers	Identifier		
Station				
Manufacturer				
Serial Number				
Rated voltage (kV)				
Interrupting time (ms)				
Interrupting media (e.g. air, oil, SF ₆)				
Rated continuous current (A)				
Rated symmetrical short circuit capability (A)				
Shunt Reactors		Identifier		
	Station			
	Manufacturer			
	Serial Number			
	Rated voltage (kV)			
	Rated capability (Mvar)			
	Winding configuration (e.g. delta, wye)			
	Description of protection			
	Description of automatic switching			
Transformers	Description of anticipated switching restrictions			
	Identifier			
	Station			
	Manufacturer			
	Serial Number			
	Construction (e.g. shell or core)			
	Configuration (e.g. 3 phase or three single phase)			
	Temperature rise (°C)			
	Cooling types (e.g. ONAN, ONAF, OFAF)			
	Associated Thermal Rating for each cooling type (MVA)			
	Winter (10°C) continuous, 15 minute and 10 day thermal ratings			
	Summer (30°C) continuous, 15 minute, and 10 day thermal			
	Connection for each winding H, X, Y (e.g. wye, delta, zig-zag)			
	Rated voltage for each winding (kV)			
	Rated capability for each winding (MVA)			
	Impedance to ground for each winding H, X, Y (ohms)			

SCHEDULE E (CONT'D)

CONNECTION INFORMATION (CONT'D)

PART D : Transmission Facilities - [THIS INFORMATION WILL BE USED BY BOTH THE TRANSMITTER AND THE IMO] (CONT'D)

Overhead Circuits (For each section)	Identifier			
	Terminal station(s)			
	Voltage (kV)			
	Length (km)			
	Conductor sheltering			
	Identifier(s) and length of circuit(s) on common towers			
	Positive sequence impedance (R, X, B)			
	Zero sequence impedance (Ro, Xo, Bo)			
	Winter (10°C) continuous and 15 minute thermal ratings (A)			
	Summer (30°C) continuous and 15 minute thermal ratings (A)			
Overhead Circuits (For each segment)	Identifier			
	Length (km)			
	Distance from the "from" terminal (km)			
	Maximum operating temperature (°C)			
	Phase conductor size (kcmil)			
	Phase conductor type (ASC,ACSR)*			
	Phase conductor stranding (# of Al strands/ # of Steel strands)			
	Phase conductors per bundle and spacing (m)			
	Geometry of all phase and sky wires for each tower type			
	Ground resistivity (ohms)			
	Skywire size (kcmil)			
	Skywire type (Alumoweld, EHS, HS)*			
	Skywire stranding (# of Al strands/ # of Steel strands)			
	Skywire number if more than one			
	Identifier and length of circuits sharing the same right of way			
	Mutual impedance to other circuits (Z_{zero})			
Underground	Identifier			
	Complete steady state and dynamic electrical and physical of conductors, insulators and surrounding material			
Buses	Identifier			
	Station			
	Maximum operating temperature (°C)			
	Conductor size (kcmil)			
Surge Arresters	Conductor type (ASC,ASCR,Al tube)*			
	Identifier			
	Station			
	Manufacturer			
	Serial number			
	Voltage rating (kV)			
	Type (e.g. ZnO, SiC)			
Class (e.g. secondary, distribution, intermediate, station)				
Switches	Identifier			
	Station			
	Manufacturer			
	Serial number			
	Voltage rating (kV)			
	Type (e.g. disconnect, interrupt)			

SCHEDULE E (CONT'D)
CONNECTION INFORMATION (CONT'D)

PART F: Other Data that the Customer must Submit to Transmitter.

SCHEDULE F

GENERAL TECHNICAL REQUIREMENTS

1.1 Guidelines of Reliability Organizations

- 1.1.1 Customers and Transmitters shall follow all reliability organizations' standards as they may be amended from time to time.
- 1.1.2 The Transmitter shall provide to Customers upon request, the address and contact persons at the relevant reliability organization.

1.2 Isolation from the Transmission System

- 1.2.1 The Customer shall provide an isolating disconnect switch or device at the point or junction between the Transmitter and the Customer i.e.at the point of the interconnection, which physically and visually opens the main current-carrying path and isolates the Customer's facility from the transmission system..
- 1.2.2 The isolating disconnect switch shall meet the following criteria:
 - 1.2.2.1 it shall simultaneously open all phases to the connection;
 - 1.2.2.2 it shall be lockable in the open and closed positions;
 - 1.2.2.3 it shall be operated only upon prior notice to either Party, unless an emergency requires it to be open;
 - 1.2.2.4 when the device is used as part of the HVI failure protection system, it shall be motor-operated and equipped with appropriate control circuitry; and
 - 1.2.2.5 it shall be suitable for safe operation under the conditions of use.
- 1.2.3 With advance notice to the Customer, the Transmitter's personnel may lock the isolating disconnect switch in the open position:
 - 1.2.3.1 if it is necessary to protect the Transmitter's maintenance staff and the Transmitter received a condition guarantee from the Customer. The lock, during the condition guarantee, shall be under the control of the Transmitter's operator;

1.3 Protection and Control

- 1.3.1 The protection systems, which protects transmission system elements, shall be capable of minimizing the severity and extent of disturbances to the transmission system while themselves experiencing a first-order single contingency such as the failure of a relay protection system to operate or the failure of a breaker to trip. In particular:
- 1.3.1.1 the elements designated by the Transmitter as essential to system reliability and security shall be protected by two protection systems. Each system shall be independently capable of detecting and isolating all faults on those elements. These elements shall have breaker failure protection, but breaker failure protection need not be duplicated. Both protection systems shall initiate breaker failure protection;
 - 1.3.1.2 to reduce the risk of both systems being disabled simultaneously by a single contingency, the protection system designs shall not use components common to the two systems;
 - 1.3.1.3 the use of two identical protection systems is not generally, recommended, because it increases the risk of simultaneous failure of both systems due to design deficiencies or equipment problems;
 - 1.3.1.4 the protection systems shall be designed to isolate only the faulted element. For faults outside the protected zone, each protection system shall be designed either not to operate or to operate selectively in coordination with other protection systems;
 - 1.3.1.5 Customer protection settings for protections affected by conditions on the transmission system shall be coordinated with those of the transmission system;
 - 1.3.1.6 protection systems shall not operate to trip for stable power swings following contingencies that are judged by protection system designers as not harmful to the transmission system or its Customers;
 - 1.3.1.7 the components and software used in all protection systems shall be of proven quality for effective utility application and following good utility practice;;
 - 1.3.1.8 critical features associated with the operability of protection systems and the high voltage interrupting device (HVI) shall be annunciated or monitored;
 - 1.3.1.9 the design of protection systems shall facilitate periodic testing and maintenance. Test facilities and procedures shall not compromise the independence of the redundant protection systems. Test switches shall be used to eliminate the need to disconnect wires during testing;
 - 1.3.1.10 The two protection systems shall be supplied from separate secondary windings on one voltage

- 1.3.2 Specific protection and control practices and equipment requirements are set out in Schedule I of this Agreement.
- 1.3.3 Transmitters and Customers should apply protection systems, using the typical tripping matrix for transmission system protection shown in Exhibit F.2, of this Schedule F. It is a simplified tripping-matrix representation showing the breakers that trip for different protection systems on the transmission system based on a single-line supply to a Customer station or a transmitter's tapped transformers stations operating above 50kV.

1.4 Insulation Coordination

- 1.4.1 Equipment connected to the transmission system shall be protected against lightning and switching surges. This shall include station shielding against direct lightning strokes, surge protection on all wound devices, and cable/overhead interfaces.
- 1.4.2 A tap connected to a shielded transmission circuit shall also be shielded.
- 1.4.3 The Transmitter shall review surge arrester ratings:
 - 1.4.3.1 the Transmitter shall provide all relevant Information, e.g. ratings, to Customers upon request. The Transmitter, however is not responsible for the adequacy of design or correctness of the operation of any equipment or apparatus including the surge arrester(s).

1.5 Grounding

- 1.5.1 Grounding installations shall be capable of carrying the maximum foreseeable fault current, for the duration of such fault currents, without risking safety to personnel that may be present on site when a fault occurs, damage to equipment, or interference with the operation of the transmission system.
- 1.5.2 Each transformer, switching, or generating station shall have a ground grid on which all metallic structures, metallic equipment and non-energized metallic equipment are solidly connected. The size, type and requirements for the ground grid are site-specific, depending on such factors as soil conditions, station size, and short-circuit level.
- 1.5.3 The Transmitter shall review the ground potential rise (GPR) study submitted by the Customer at the Customer's cost. The Customer shall comply with the Bell System Practices as they may be amended or modified from time to time and the IEEE standard 487 as it may be amended or modified from time to time for providing special high-voltage protection devices on metallic communication cables. The Transmitter assumes no responsibility for the adequacy of design or correctness of the operation of any equipment or apparatus associated with the Customer's installation.
- 1.5.4 The placement of any additional grounding points on the transmission system shall require the approval

- 1.6.2 A Transmitter may require a Customer to install monitoring equipment to track the performance of its facilities, identify possible protection system problems, and provide measurements of power quality. As required, the monitoring equipment shall perform one or several of the following functions:
- 1.6.2.1 sequence of events recording (SER) to record protection related events at a connection;
 - 1.6.2.2 digital fault recording (DFR) to permit analysis of transmission system performance under normal and abnormal conditions; or
 - 1.6.2.3 power quality monitoring (PQM) to record voltage transient surges, voltage sags and swells, voltage unbalance, supply interruptions, frequency variations and other voltage and current waveform monitoring;
- 1.6.3 Customers' telecommunications facilities shall be compatible with those of the Transmitter and have similar reliability and performance characteristics. At the Transmitter's discretion, some or all of the following functions may require telecommunication: protective relaying; system control and data acquisition (SCADA); voice communication; and special protection systems (e.g. generation rejection or runback).
- 1.6.4 Telecommunication facilities, design details, and performance requirements, associated with Customers' facilities, shall be provided at the Customer's expense.
- 1.6.5 The Customer shall bear all costs, without limitation, of providing all required telemetry data, associated with its facilities, to the Transmitter and providing all required connection inputs to the Transmitter's disturbance-monitoring equipment.

1.7 Inspecting and Commissioning Procedures

- 1.7.1 Customers shall ensure that any new or replacement equipment that they own is inspected and tested before initial connection to the transmission system. The initial verification tests shall confirm that the connection of the Customer's facility to the transmission system:
- 1.7.1.1 does not pose any safety hazards;
 - 1.7.1.2 does not adversely affect operation of the transmission system in a material manner;
 - 1.7.1.3 does not violate any requirement of the Code or this Agreement.
- 1.7.2 The Transmitter has the right to inspect the Customer's facility and witness commissioning tests related to any new or replacement equipment that could reasonably be expected to adversely affect the transmission system. The initial verification shall include high-voltage interrupting devices, line disconnect switches, the line and bus connections from the dead end structure to Customer's facility.

commissioning schedule, the proposed test procedure, the test equipment to be used, and the transmission system conditions required, and also the name of the individual responsible for coordinating the proposed tests on the Customer's behalf.





- 1.7.5 Within fifteen business days of receiving the notice, the Transmitter shall notify the Customer that it:
 - 1.7.5.1 agrees with the proposed connection commissioning program and test procedures; or
 - 1.7.5.2 requires changes in the interest of safety or maintaining the reliability of the transmission system, and that such changes shall be sent to the Customer promptly.
- 1.7.6 If the Transmitter requires changes, then the Parties shall act in good faith to reach agreement and finalize the commissioning program within a reasonable period.
- 1.7.7 The Customer shall submit the results of the commissioning tests to the Transmitter and must demonstrate that all its equipment complies with the Code and this Agreement.
- 1.7.8 If the commissioning test reveals non-compliance with one or more requirements of the Code or this Agreement, the Customer whose equipment was tested shall promptly meet with the Transmitter and agree on a process aimed at achieving compliance.
- 1.7.9 The Transmitter may withhold permission to complete the commissioning and subsequent connection of the Customer to the transmission system if the relevant equipment fails to meet any technical requirement stipulated in the Code or this Agreement.
- 1.7.10 All reasonable costs incurred or associated with Transmitter's witnessing of the verification tests shall be borne by the Customer.

1.8 Procedures for Maintenance and Periodic Verification

- 1.8.1 The Transmitter may at its sole discretion specify the maintenance criteria and the maximum time intervals between verification cycles for those parts of Customers' facilities that may materially adversely affect the transmission system. The obligations for maintenance and performance re-verification shall be stipulated in the appropriate schedule to this Agreement.
- 1.8.2 Test switches shall be provided to isolate current and potential transformer input to the relays as well as a set of switches to isolate the relays tripping outputs from the power equipment control circuitry.
- 1.8.3 The reasonable cost of conducting maintenance and verification tests shall be borne by the Customer.
- 1.8.4 The Transmitter may appoint a representative to witness relevant maintenance and verification tests and

-
- 1.8.7 If a verification test reveals that the electrical equipment or protective relay system covered under the operations schedule does not comply with requirements, the Customer shall:
- 1.8.7.1 promptly notify the Transmitter of that fact;
 - 1.8.7.2 promptly advise the Transmitter of its proposed remedial steps and its timetable for their implementation;
 - 1.8.7.3 diligently undertake appropriate remedial work and provide the Transmitter with monthly reports on progress; and
 - 1.8.7.4 conduct further tests or monitoring on completing the remedial work, to confirm compliance with the relevant technical requirements.
- 1.8.8 The Transmitter's reasonable costs associated with witnessing the performance tests following remedial work shall be borne by the Customer.
- 1.8.9 Customers shall make their maintenance records and verification test results, including up-to-date as-built drawings, available to the Transmitter upon request.

SCHEDULE F (CONT'D)**Exhibit F.1 Protection System Symbols and Devices**Protection Systems - Symbols and Device Functions

51B	Transformer Phase Backup
50 / 51	Instantaneous / Timed Overcurrent
51V	Voltage Controlled Overcurrent
64	Line Ground Protection
79-25	Synchronizing Relay
A21 / B21	Line Phase Protection - A&B Group
A27 / B27	Undervoltage - A&B Group
A59 / B59	Overvoltage - A&B Group
A64-27 / B64-27	Ground Undervoltage - A&B Group
A64-59 / B64-59	Ground Overvoltage - A&B Group
A81U / B81U	Underfrequency - A&B Group
A81O / B81O	Overfrequency - A&B Group
A87 / B87	Transformer Differential - A&B Group
F	Failure Protection
L1, L2	Supply Line
T1, T2	Power Transformer
RT/TT	Remote or Transfer Trip for HVI Device Failure Protection
	Circuit Breaker
	Circuit Breaker with Reclosure
	HV Interrupting Device
	a) Circuit Breaker
	b) Circuit Switcher
	c) Vacuum Interrupter
	Motor Operated Disconnect Switch

SCHEDULE F (CONT'D)**Exhibit F.2 Typical Transmission System Protection Tripping Matrix**

The following is a simplified tripping matrix showing the breakers that trip for different protection systems on the transmission system based on a single line supply to a Customer station or a transmitter's tapped transformer station operating, at the high voltage side, above 50 kV 50kV. The type of Customer (i.e. load or Generator) station configuration and other site-specific factors will influence the desired tripping matrix. The same approach can be applied to large 44-kV developments. In some applications, it may be desirable to trip the MV breaker for Line ZI/T operations instead of the HV Breaker.

PROTECTION FUNCTION	INITIATING PROTECTION							
	LINE ZI	LINE ZT	TTR LOCAL	XFRM	BUS	B/F HV	FRAME LEAK *	B/F MV
TRIP HV BREAKERS	T	T		T	T	T	T	T
HV BREAKER FAILURE	I	I		I	I			
HV AUTO-RECLOSE	C	C		C	C	C	C	C
TRIP MV BREAKERS			T	T	T	T	T	T
MV BREAKER FAILURE			I	I	I		I	
MV AUTO-RECLOSE					C	C	C	C
TTT	S					S	S	
OPEN XFR DISC				I				
TRIP ADJACENT HV ZONES						I		
TRIP ADJACENT MV ZONES								I

T – trip breakers

I – initiate

C – cancel

S – send signal

HV – high voltage

TTR/T – transfer trip receive/transmit

ZI/T – impedance instantaneous/timed

B/F – breaker failure

MV – medium voltage

* - Frame leakage protection is normally associated with 500kV breakers

All transmission system elements, including breakers, in the zones of protection shall be fitted with redundant protection systems if devices operated at more than 50 kV, except as noted.

All breakers in the zone of protection that includes devices operated at more than 50 kV shall be fitted with the non-redundant breaker failure-protection systems. Transmission system reliability, as determined by the IMO, may require breaker failure protection on the transformer MV breaker.

The Customer must be able to isolate (self-contain) his internal problems without having a major impact on the transmission system. Under certain circumstances, HV breakers may not be required for load Customer step-down transformers, provided that a motorized disconnect switch and redundant communication channels and paths are provided to isolate the transformer at the terminal stations if a fault occurs in the transformer zone of protection.

SCHEDULE G

TECHNICAL REQUIREMENTS FOR GENERATORS

1.1 Supply Considerations

- 1.1.1 A high-voltage interrupting device (HVI) shall provide a point of isolation for the Generator's station from the transmission system. HVIs shall be provided with appropriate back-up protection. The HVI shall be a circuit breaker unless the Transmitter authorizes another device.
- 1.1.2 The HV side of the Generator's transformer shall be protected by surge arresters.
- 1.1.3 All protection systems shall be redundant and be complete with separate trip auxiliary relays and separately fused DC supplies.
- 1.1.4 The standard transformer winding connection for large Generators is LV delta – HV wye. Any other winding connections shall require the approval of the Transmitter. The Transmitter shall give its approval if it is satisfied that the reliability of its transmission system is not affected.
- 1.1.5 The method of grounding the neutral of all power transformer primary windings shall require the approval of the Transmitter. The Transmitter shall give its approval if it is satisfied that the reliability of its transmission system is not affected.

1.2 Typical Generator Protection

- 1.2.1 The typical technical requirements for Generator protection should be followed, as set out in Exhibit F.1 of Schedule F and Exhibits G.1 and G.2 of this Schedule G.
- 1.2.2 The typical Generator protections used are shown in Exhibit G.3 of this Schedule G.

1.3 Protection against Internal Faults

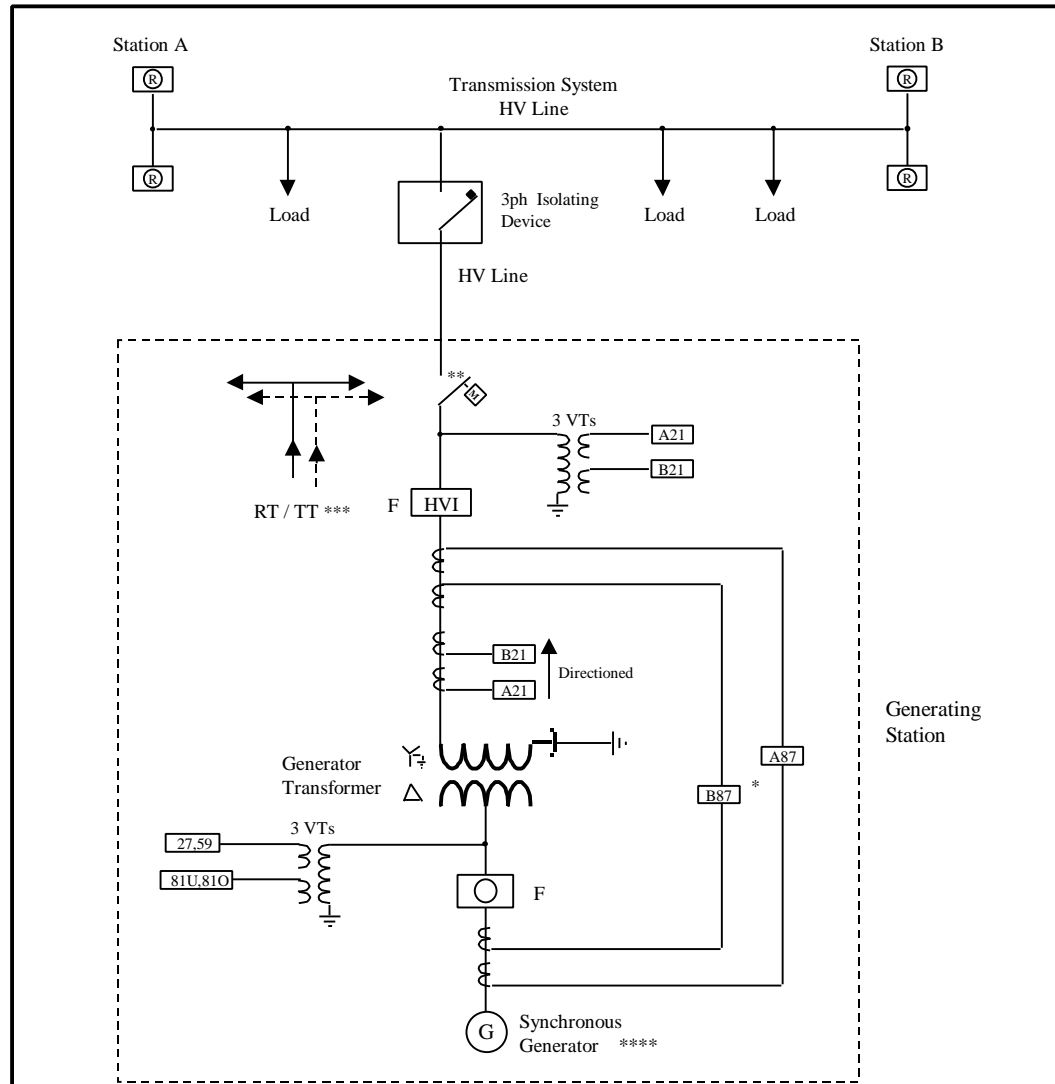
- 1.3.1 The Generator shall provide a protection package to detect and isolate faults on its equipment as required by the Transmitter to respect the stability and reliability of the transmission system, equipment ratings, and safety requirements.
- 1.3.2 Transmission system reliability may require two transformer differential protections (A87, B87) and low-voltage breaker failure protection, as shown in Exhibit G.2 of this Schedule G.

- 1.4.1.1 if the transformer is connected ungrounded wye or delta on the primary, then ground undervoltage (64-27) and ground overvoltage (64-59) protections as shown in Appendix 11 are required to detect ground faults.
- 1.4.1.2 where the Transmitter has accepted a solidly grounded wye connection on the primary (Yg/D or Yg/Yg), ground overcurrent (64) protection(s) in the transformer neutral may be used to detect ground faults, as shown in Exhibit H.2 of Schedule H.
- 1.4.2 Typical protections that may be installed are: Distance Instantaneous and Timed (21), Phase Directional Overcurrent (67), Voltage Restrained Overcurrent (51V), Overcurrent (50/51), and Undervoltage (27), as shown in Exhibits G.1 and G.2 of this Schedule G.
- 1.4.3 To provide reliable phase-fault detection, the timed distance protection shall overreach the apparent impedance of the transmission line.
- 1.4.4 A remote/transfer trip system may be required to trip one or more breakers at the Generator's station or to trip breakers at a remote station.
 - 1.4.4.1 generator protections that initiate opening of the remote supply breakers on the transmission system shall at the same time initiate opening of the main transformer high-voltage disconnect switch or line disconnect switch.
 - 1.4.4.2 a signal that opens remote breakers on the transmission system shall be automatically removed when the main transformer disconnect switch or line disconnect switch opens. The signal shall only "seal-in" if the disconnect switch fails to open.
 - 1.4.4.3 for DC remote tripping or transfer tripping, Generators shall provide all necessary equipment associated with two monitored teleprotection channels of adequate conductance between the Customer's station and one of the Transmitter's terminal stations or tapped stations. Normally two circuits in the same cable would be acceptable, but to satisfy transmission system requirements, two separate cables following separate routes may be required. Generators shall use relays and associated equipment following good utility practice guidelines and are compatible with the Transmitter's remote trip or transfer trip equipment.
- 1.4.5 The protective setting to detect islanding/abnormal condition for smaller Generators shall be different from that used for larger Generators.
 - 1.4.5.1 protections that may be required to detect islanding/abnormal conditions include, but are not limited to, Overvoltage (59), Undervoltage (27), Voltage balance (60), Overfrequency (81 O), and Underfrequency (81 U), as shown in Exhibits G.1 and G.2 of this Schedule G.
 - 1.4.5.2 the frequency-protection settings on larger generating units shall coordinate with the provincial

- 1.5.2 Following a protection operation on a transmission line, the transmission breakers, located mainly in network switching and/or transformation stations, shall reclose after a certain time delay. The Generator shall provide a reliable means of disconnecting its equipment before this reclosure. The Generator is responsible for protecting its own equipment and the Transmitter is not liable for damage to the Generator's equipment. The Generator may request a means of supervising the transmission reclosure prior to the disconnection of its equipment e.g. changes in protection logic at one or both stations to reduce the risk of such events.
- 1.5.3 A Generator's transmission system breaker shall not autoreclose without the Transmitter's approval.
- 1.5.4 Manual energization of a Transmitter's line by a Generator's facilities is permitted only under the Transmitter's direction.

SCHEDULE G (CONT'D)

Exhibit G.1 Typical Generator Protection Requirements



Figure

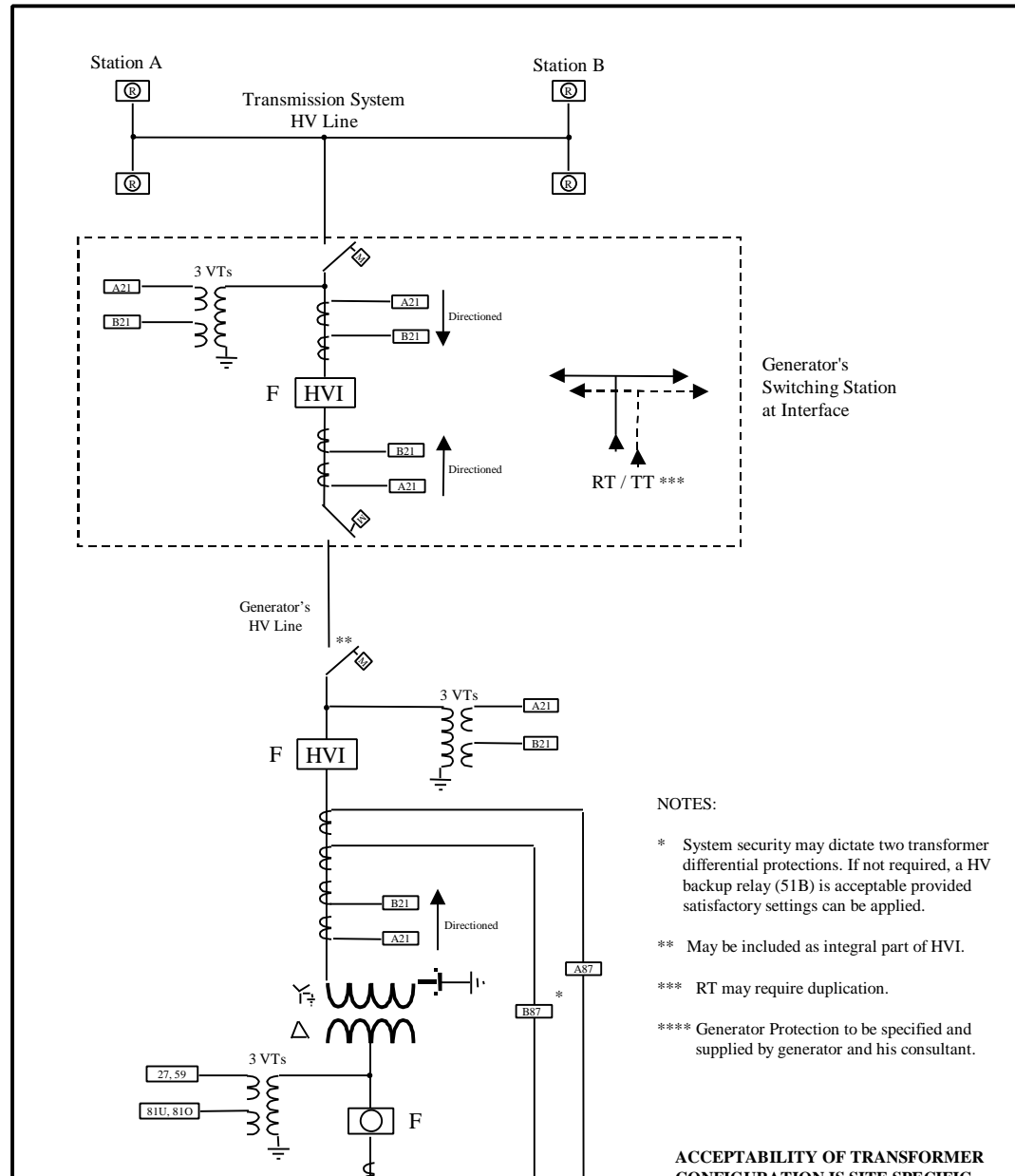
NOTES:

* System security may dictate two transformer differential protections. If not required, a HV backup relay (51B) is acceptable provided satisfactory settings can be applied

ACCEPTABILITY OF TRANSFORMER CONFIGURATION IS SITE SPECIFIC.

SCHEDULE G (CONT'D)

Exhibit G.2 Typical Generator-owned Transmission Line Protection Requirements



- NOTES:
- * System security may dictate two transformer differential protections. If not required, a HV backup relay (51B) is acceptable provided satisfactory settings can be applied.
 - ** May be included as integral part of HVI.
 - *** RT may require duplication.
 - **** Generator Protection to be specified and supplied by generator and his consultant.

ACCEPTABILITY OF TRANSFORMER CONFIGURATION IS SITE SPECIFIC

SCHEDULE G (CONT'D)**Exhibit G.3 Typical Generator Protections**

The following are typical Generator protections. The actual ones are to be specified and supplied by the Generator and his consultants. The Transmitter will be interested in the capabilities and settings of the frequency protections and voltage protections. The settings of the frequency protections on large units must comply with NPCC performance requirements. All protections settings must be submitted to the Transmitter and the IMO.

Typical Protections

Thermal Units	Protections	Hydraulic Units	Protections
Differential	A87,B87	Differential	A87,B87SP
Stator Ground	A64N,B64N	Stator Ground	A64N,B64N
Loss of Excitation	A40,B40	Loss of Excitation	B40
Phase Unbalance	A46,B46	Phase Unbalance	A46
Over/under frequency	B81H,B81L	Overvoltage	A59
Over/under excitation	A59H,A59L	Phase Backup	B21B
Out-of-step	B21	Over/under frequency	B81H,B81L
Low Forward Power	A32,B32	Condense-to-Generate	B81-83
Sup Start Phase	A50S		
Sup Start Ground	A64S		
U/F Supervision	A81S		
Speed Switch	A14S		

SCHEDULE H

TECHNICAL REQUIREMENTS FOR TAPPED TRANSFORMER STATIONS SUPPLYING LOAD:

a) Transmitter's Tapped Transformer Stations

b) Distributor's and Consumer's Tapped Transformer Stations

1.1 Supply Considerations

- 1.1.1 The Transmitter shall determine, in consultation with its Customers, the supply voltage to the Customer. The 115 kV or 230 kV voltage shall be generally used for supply of Customers with a peak demand of 20 MW or more.
- 1.1.2 Tapped transformers of Transmitters, Consumers or Distributors, excluding those that are deemed compliant under section 2.6 of the code, shall have adequate on-load tap-changer or other voltage-regulating facilities to operate continuously within normal variations on the transmission system as set out in the Market Rules and to operate in emergencies with a further transmission system voltage variation of \pm six per cent ($\pm 6\%$).
- 1.1.3 The neutrals of the power transformer primary windings at transmission system tapped stations are normally not grounded. Transmitters shall approve grounded transformers by exception only.
- 1.1.4 Consumers and Distributors shall participate in load shedding to meet reliability standards.
- 1.1.5 A transmission system breaker of a Consumer or Distributor shall not autoreclose without Transmitter's approval.
- 1.1.6 A Consumer or a Distributor shall not manually energize a Transmitter's line without the Transmitter's approval.
- 1.1.7 To meet the minimum general requirements for all equipment connected to the transmission system, a Customer may have to install any necessary equipment, including, for example, capacitors and filters.

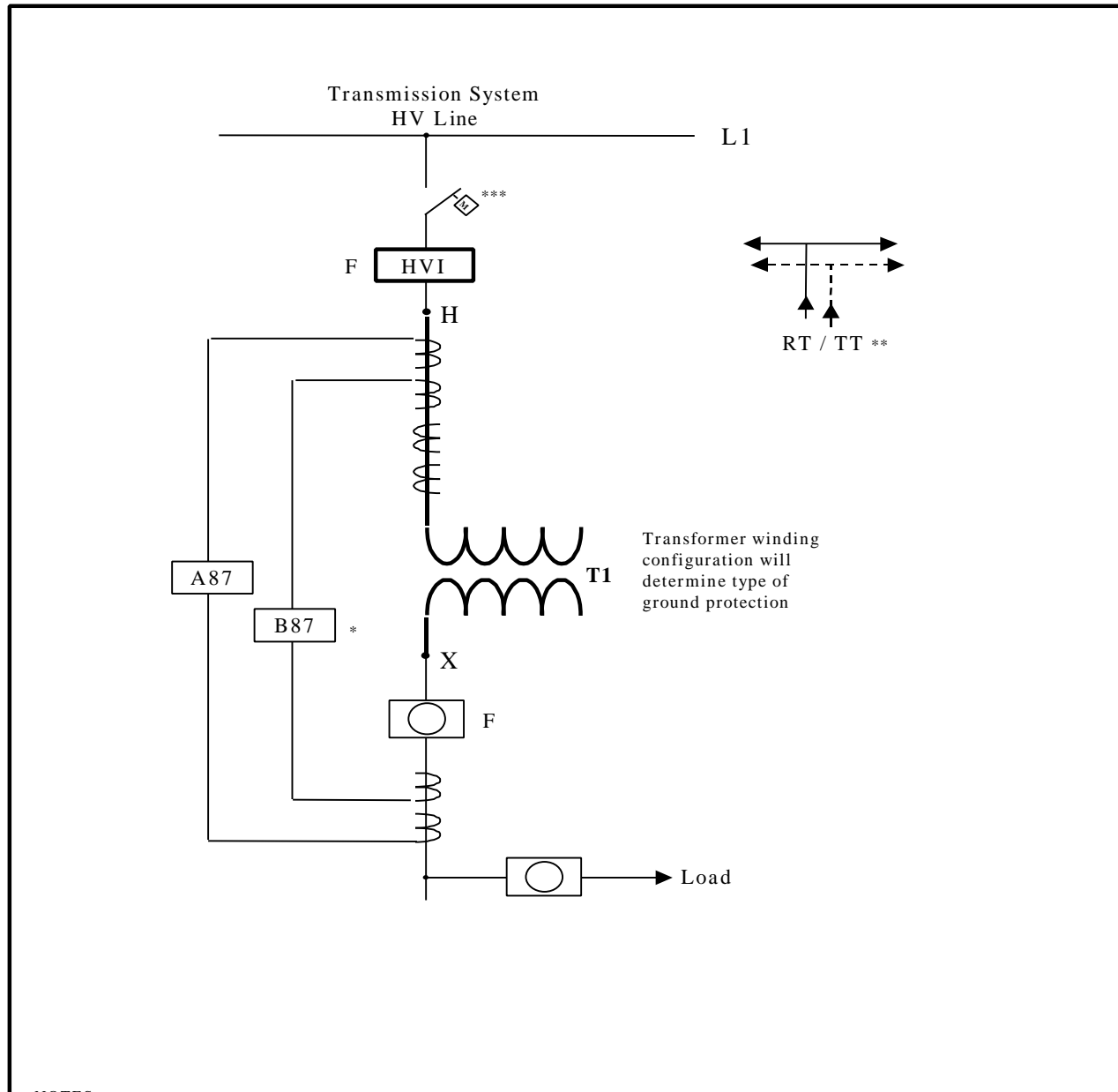
1.2 Protection Requirements

- 1.2.1 The typical technical requirements for Distributor and Consumer protection shall be followed, as presented in Exhibit F.1 of Schedule F and Exhibits H.1 and H.2 of this Schedule H.

- 1.2.5 Where the Transmitter has accepted transformers connected wye-grounded on the primary (Yg/D or Yg/Yg), a ground-overcurrent relay (64) as indicated in Exhibit H.2 of this Schedule H, connected in the transformer neutral, may be used for detection.
- 1.2.6 Where remote/transfer trip circuits are used for transformer faults to trip the Transmitter's line breakers at the terminal stations, the Customer shall use a motor-operated transformer disconnect switch at its station to provide a point of separation from the transmission system. Energization of remote/transfer trip and opening of the disconnect switch (89) shall be initiated simultaneously from the protection circuits. Full opening of the disconnect switch shall block sending of remote trip.
- 1.2.7 For a DC remote trip on a 115-kV system, the Customer shall provide all necessary equipment associated with one monitored teleprotection channel between its station and one of the supply terminal stations or tapped stations. Industry standard relays and associated equipment that is compatible with the Transmitter's remote trip equipment shall be used. A 115-kV transfer trip shall have a similar requirement, except that audio-tone equipment shall be used instead of the DC battery voltage.
- 1.2.8 For a DC remote trip on a 230-kV system, the Customer shall provide all necessary equipment associated with two monitored teleprotection channels between its station and one of the supply terminal stations or tapped transformer stations. Normally two circuits in the same cable would be acceptable, but two separate cables going by and following separate routes may be required. The Customer shall use industry standard relays and associated equipment that is compatible with the Transmitter's remote trip equipment. A 230-kV transfer trip shall have a similar requirement, except that audio-tone equipment shall be used instead of the DC battery voltage.

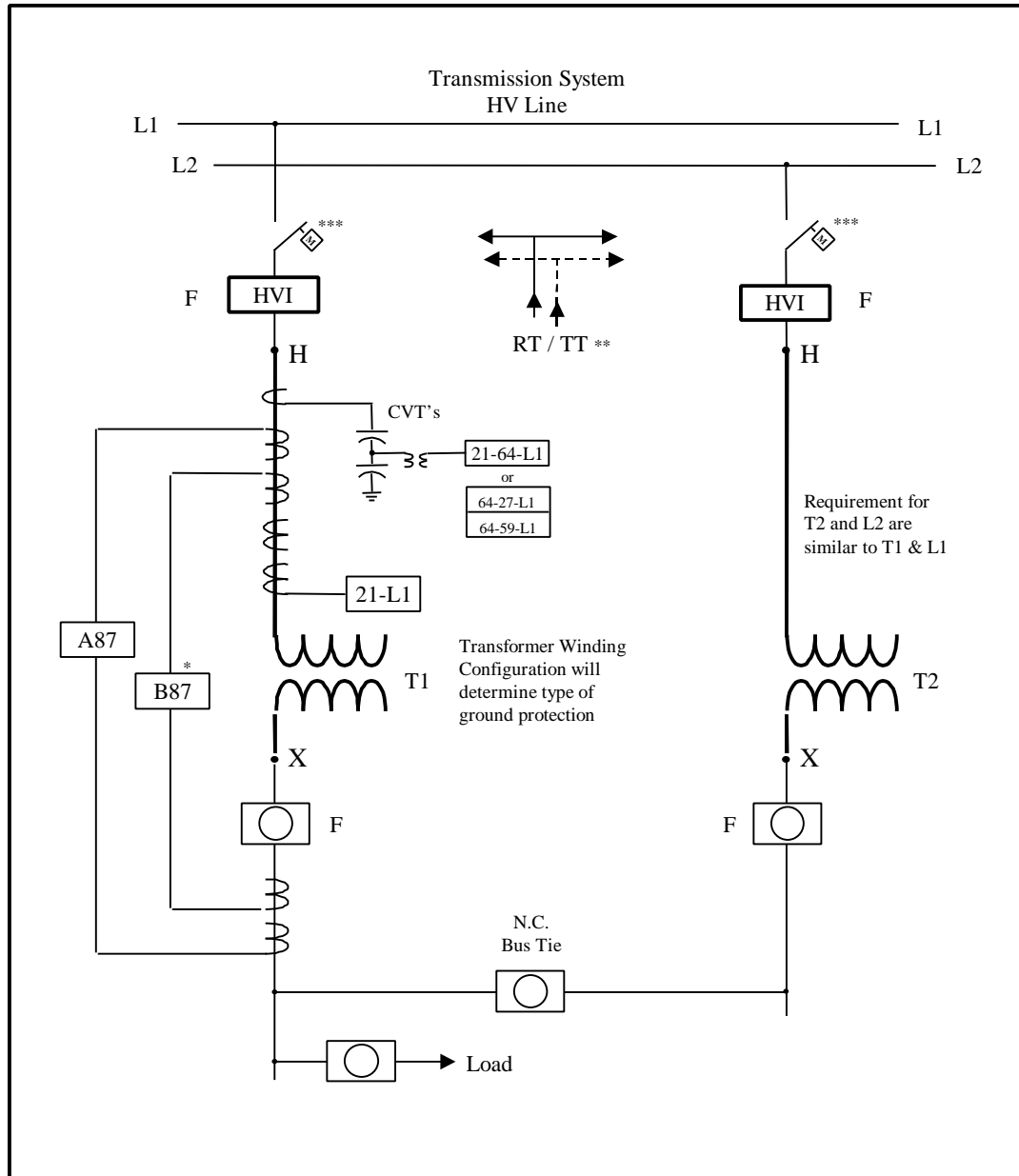
SCHEDULE H (CONT'D)

Exhibit H.1 Typical Single-Line Protection Requirements



SCHEDULE H (CONT'D)

Exhibit H.2 Typical Two Line Protection Requirements



SCHEDULE I

PROTECTION SYSTEM REQUIREMENTS

1.1 Telecommunications

- 1.1.1 The telecommunication facilities, used for protection purposes, shall have a level of reliability consistent with the required performance of the protection system.
- 1.1.2 Transmitters shall specify telecommunication channel media and protective systems.
- 1.1.3 Telecommunication circuits used for the protection and control of the transmission system shall be dedicated to that purpose.
- 1.1.4 Where each of the dual protections protecting the same system element requires communication channels, the equipment and channel for each protection shall be separated physically and designed to minimize the risk that both protections might be disabled simultaneously by a single contingency.
- 1.1.5 Telecommunication systems shall be:
 - 1.1.5.1 designed to prevent unwanted operations such as those caused by equipment or personnel;
 - 1.1.5.2 powered by the station's batteries or other sources independent from the power system; and
 - 1.1.5.3 monitored in order to assess equipment and channel readiness.
- 1.1.6 Major disturbances caused by telecommunication failures shall have annual frequency of less than 0.002 per year from the dependability aspect and less than 0.002 per year from the security aspect.
- 1.1.7 Telecommunication protection for a single transmission system circuit shall have an unavailability less than forty two (42) minutes per year, and for two circuits it shall be less than four (4) minutes per year.
- 1.1.8 The telecommunication false-trip rate used as part of a protection system for a single transmission system circuit shall be not more than 0.1 false trips per year, and for two circuits it shall be not more than 0.001 false trips per year.
- 1.1.9 Total transmission system circuit trips coincident with telecommunications failure shall be not more than 0.001 per year.

- 1.2.1.2 channel performance testing on leased communication circuits shall be conducted at 24-month intervals, while intervals for testing power line carrier equipment shall be equipment-specific.

1.3 Verification and Maintenance Practices

- 1.3.1 Customers shall perform routine verifications of protection systems on a scheduled basis as specified by the Transmitter in accordance with applicable reliability standards. The maximum verification interval is four years for most 115-kV elements, most transformer stations, and certain 230-kV elements and two years for all other high-voltage elements. All newly commissioned protection systems shall be verified within six months of the initial in-service date of the system.
- 1.3.2 Routine verification shall ensure with reasonable certainty that the protections respond correctly to fault conditions.
- 1.3.3 An electrically initiated simulated-fault clearing check is mandatory to verify new protections, after any wiring or component changes are made to a protection, and for routine verification of a protection.
- 1.3.4 Customers shall ensure that the functional testing of protection and metering can be properly performed and that all verification readings are obtainable.
- 1.3.5 The Transmitter shall co-ordinate the initial verification upon receipt of the approved and final set of drawings. The initial verification shall be used during the final commissioning phase of the station and shall be used as a basis for future periodic verifications.
- 1.3.6 Transmitters and Customers shall agree upon the final functional test procedures before the tests begin. If they cannot agree, the supply or continuity of supply shall depend on the performance of the tests that the Transmitter shall require.
- 1.3.7 Before the initial functional tests are performed, the Customer shall supply the Transmitter with written documentation that shall readily provide confirmation that appropriate verifications have been completed and that all calibrations, tests, etc., have been performed. For components that may affect the transmission system (such as relays, meters, etc.), the Customer must satisfy the Transmitter that the proper settings have been applied.
- 1.3.8 Customers shall make available to the Transmitter records of relay calibrations and protection verifications, so that records of the facility's performance can be maintained. The specific records required shall be identified in this Agreement.

1.4 Functional Tests and Periodic Verification

- 1.4.1 Upon verification that the Customer's static tests on protection and control equipment, outlined in the Code and this Agreement, have been satisfactorily completed, a series of tests shall be performed with

portable sequence-of-events recorder may be required for proper analysis. Operation/tripping of all interrupting/isolating devices shall always be verified, as well as annunciation and target operation.

- 1.4.4 "On potential" checks shall follow all necessary preliminary procedures. The main equipment shall be energized but not placed on load. The Customer shall check all readings of potentials, including determination of correct phasing/phase rotation. The test must also demonstrate that all equipment performs as expected when energized and is in condition to have primary load applied.
- 1.4.5 Customers shall make "On-Load" checks following the application of appropriate load, voltage, current, phase angle or crossed wattmeter readings at the appropriate instrument transformer outputs or protection input points, to ensure that all quantities are appearing as required with respect to magnitude, phase relation, etc. These checks are to determine that relays are properly connected and that the watt and var checks of all indicating and referenced equipment are correct. At times it may be necessary to repeat some or all tests, e.g. relay performance, using load currents.

1.5 Failure Protection for High-Voltage Interrupting Devices (HVIs)

- 1.5.1 Protection shall be provided to trip local and remote breakers if a HVI fails to clear a fault properly. The requirements for HVI failure protection vary depending on the maximum permissible fault duration and the location of the connection on the transmission system. Some portions of the transmission system are designed and operated to more stringent requirements to avoid adversely affecting neighbouring transmission systems.
- 1.5.2 Some portions of the transmission system will require the HVI failure protection to be achieved by using remote or transfer trip circuits and opening of the motor operated disconnect switch.
- 1.5.3 In portions of the transmission system having less stringent requirements, the HVI failure protection may be achieved by opening of the motor-operated disconnect switch. If the disconnect switch experiences a flashover, the line protection at the transmission station(s) shall operate to isolate the fault.
- 1.5.4 Automatic ground switches are not acceptable for any new installations for triggering line protection operation following the failure of a HVI.
- 1.5.5 When circuit switchers are used, the interrupter and disconnect switch shall operate independently. Protections that trip the interrupter shall simultaneously initiate opening of the disconnect switch.
- 1.5.6 The DC voltage supplied to the interrupter and disconnect switch shall be fed from separately fused and monitored DC supplies: that is, by two (2) DC cables to the control cabinet.

1.6 Instrument Transformers

- 1.6.1 Current transformer output shall remain within acceptable limits for all anticipated fault currents and for all

- 1.6.5 Interconnected current transformer secondary wiring and voltage transformer secondaries shall each be grounded at only a single point.

1.7 Battery Banks and Direct Current Supply

- 1.7.1 When station battery banks are used, as a minimum requirement the Customer shall ensure that if either the battery charger fails or the AC supply source fails, the station battery bank shall have enough capacity to allow the station to operate for at least eight hours.
- 1.7.2 Critical DC supplies shall be monitored and annunciated such as relay protection circuits and high voltage interrupters (HVIs).
- 1.7.3 Where the use of a single battery bank is allowed, the following conditions shall be met:
- 1.7.3.1 it can be tested and maintained without removing it from service;
 - 1.7.3.2 where two separate protective systems are required, each protection system shall be supplied from physically separated and separately fused direct current circuits; and
 - 1.7.3.3 no single contingency other than failure of the battery bank itself shall prevent successful tripping for a fault.

SCHEDULE J

EXCEPTIONS TO CUSTOMER'S REPRESENTATION, WARRANTIES AND EQUIPMENT COMPLIANCE DETAILS

Notes:

(1) To be completed by each Customer.

(2) Particulars of Equipment Compliance to be included .

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SCHEDULE K**DATA THAT TRANSMITTER MUST SUBMIT TO CUSTOMER**

- (a) The following Information shall be made available to the Customer, provided that: (1) such data is available; (2) the confidentiality of Information process and safeguards are not violated :
- feeder amperes per phase,
 - bus voltage,
 - real and reactive power flow per feeder (where available; otherwise per bus level),
 - feeder breaker open/close status,
 - feeder breaker recloser blocked/not blocked status,
 - bus tie breaker open/close status,
 - capacitor bank breaker open/close status,
 - energy pulse output in kW.h and kVar.h per Customer feeder.
 - energy pulse output in kW.h and kVar.h per station bus.
 - transformer/bus breaker open/close status.
- (b) Other Information: to be specified based on site specific considerations.

SCHEDULE L

CONTACTS FOR PURPOSES OF NOTICE

[Note: To be Completed by Transmitter and Customer].

APPENDIX 2

TRANSMISSION SYSTEM AND CONNECTION POINT PERFORMANCE STANDARDS

[Note: This Table is consistent with the IMO's Facility Registration Technical Data Forms and applicable Market Rules]

Ref	Item	Requirement																								
1	Voltage variations	. Transmission voltages of 500 kV, 230 kV and 115 kV shall be maintained in accordance with the Market Rules. Voltages below 50 kV shall be maintained in accordance with CSA 235																								
2	Fault Levels	<table border="1"> <thead> <tr> <th>Nominal Voltage (kV)</th> <th>Maximum 3-Phase Fault (kA)</th> <th>Maximum SLG Fault (kA)</th> </tr> </thead> <tbody> <tr> <td>500</td> <td>80 (usually limited to 63 kA)</td> <td>80 (usually limited to 63 kA)</td> </tr> <tr> <td>230</td> <td>63</td> <td>80 (AMPCO: 63 & Check with OHNC)</td> </tr> <tr> <td>115</td> <td>50</td> <td>50</td> </tr> <tr> <td>44</td> <td>20</td> <td>19 (usually limited to 8 kA)</td> </tr> <tr> <td>27.6 (4-wire)</td> <td>17</td> <td>12</td> </tr> <tr> <td>27.6 (3-wire)</td> <td>17</td> <td>0.45</td> </tr> <tr> <td>13.8</td> <td>21</td> <td>10</td> </tr> </tbody> </table>	Nominal Voltage (kV)	Maximum 3-Phase Fault (kA)	Maximum SLG Fault (kA)	500	80 (usually limited to 63 kA)	80 (usually limited to 63 kA)	230	63	80 (AMPCO: 63 & Check with OHNC)	115	50	50	44	20	19 (usually limited to 8 kA)	27.6 (4-wire)	17	12	27.6 (3-wire)	17	0.45	13.8	21	10
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3	Circuit Breaker Interrupting and Automatic Single Shot Reclose Time	<table border="1"> <thead> <tr> <th>Nominal Voltage (kV)</th> <th>Rated Interrupting Time (cycles)</th> <th>Automatic Reclose Time (seconds)</th> </tr> </thead> <tbody> <tr> <td>500</td> <td>=2</td> <td>10-15</td> </tr> <tr> <td>230</td> <td>=3</td> <td>5-15</td> </tr> <tr> <td>115</td> <td>=5</td> <td>3-6</td> </tr> <tr> <td>< 50</td> <td>=8 (AMPCO : <= 8 & Check withOHNC)</td> <td>varies significantly</td> </tr> </tbody> </table>	Nominal Voltage (kV)	Rated Interrupting Time (cycles)	Automatic Reclose Time (seconds)	500	=2	10-15	230	=3	5-15	115	=5	3-6	< 50	=8 (AMPCO : <= 8 & Check withOHNC)	varies significantly									
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4	Unbalance	Voltage unbalance is limited to 2% (CAN/CSA E 1000 2-2-97)																								
5	Flicker	Voltage flicker shall be limited as tabulated.																								
		<table border="1"> <thead> <tr> <th>Magnitude (%)</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td>3 per second</td> </tr> <tr> <td>1.0</td> <td>20 per minute</td> </tr> <tr> <td>2.0</td> <td>45 per hour</td> </tr> <tr> <td>3.0</td> <td>4 per day</td> </tr> </tbody> </table>	Magnitude (%)	Limit	0.5	3 per second	1.0	20 per minute	2.0	45 per hour	3.0	4 per day														
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		A higher flicker may be acceptable for infrequent starts.																								
6	Switching Surges	All <i>Equipment</i> shall be able to withstand capacitor switching surges that transiently increase voltage to twice normal levels. Sustained voltage changes shall be limited to 4% for capacitor switching events and 10% for line switching events.																								
7	Voltage Harmonics	Voltage harmonics shall respect limitations described in Table 11.1 Voltage Distortion Limits IEEE Std 519-1992																								
8	Current Harmonics	Current harmonics shall respect limitations described in Tables 10.3 to 10.5 Current Distortion Limits IEEE Std 519-1992.																								
9	Telephone	LT Product balanced (in phase conductors) shall be less than 5,000 amperes																								

APPENDIX 3

INFORMATION TO BE MADE AVAILABLE TO CUSTOMERS BY TRANSMITTERS

Notes:

- (1) Customers are only entitled to Information that is available and specific to their own existing or proposed connection, as per the Market Rules.
- (2) Where Information requested by a customer involves other customers' Confidential Information, consent from the other customers must be obtained by the first customer before the information can be provided.
- (3) Some of the following items may not be provided to customers if the Information is deemed to be irrelevant by the transmitter for the proposed connection.

Listing of Information

1. Nominal supply voltage and insulation-class requirements.
2. Minimum time required before power is made available at the proposed location.
3. Space and other requirements for billing, metering and other equipment, and details regarding any necessary ancillary facilities.
4. Preliminary requirements for conductor spacing and line tension for the interface structure.
5. Long-term voltage variation (to select fixed taps and indicate need to provide for future voltage control).
6. Short-term voltage variation (to select ULTC or regulator range).
7. Temporary overvoltages due to faults or the operation of special protection systems.
8. Voltage dips caused by transmission system faults and the starting of motors, voltage variations caused by capacitor switching, and other transients caused by transmission system operation.
9. Short-circuit infeed from the transmission system: initial, maximum future, minimum normal, and minimum emergency.
10. Transformer connection and grounding requirements.
11. Protective relaying requirements.
12. Transmission system frequency variations at the connection point.
13. Voltage flicker at the connection point.
14. Voltage unbalance at the connection point.
15. Voltage harmonics at the connection point.
16. Where: (1) appropriate; (2) available; (3) the confidentiality of Information process and safeguards are not violated, the following operating Information shall be made available including:
 - feeder amperes per phase,
 - bus voltage,

APPENDIX 4

SCOPE, PRINCIPLES AND CRITERIA OF ECONOMIC ASSESSMENT

1. PRINCIPLE

For economic evaluation of customer-driven development projects, a consistent approach based on established rate making principles and user-pay approaches, is desirable because it offers:

- (i) similar customers equal treatment across the province, and
- (ii) a consistent framework for financial contribution that can be applied to all appropriate undertakings within a transmitter's boundary.

1.1 Discounted Cash Flow Approach & Holding the Pool Harmless

Economic assessment of a project application shall rely on calculating its Net Present Value (NPV) using project-specific discounted cash flow (DCF) analyses. In addition to assessing economic feasibility, the analysis shall also be used in determining the appropriate level of financial contribution. Financial contribution can occur when the NPV is negative i.e. NPV is less than \$ 0.

In "holding the pool harmless", the cumulative discounted cost and revenue streams to the Pool for the investment (including cost and return to the transmitter) shall equal at the crossover year. This means that the Pool would be negatively impacted up to that time, and positively impacted after that. This means that the pool, on a year by year basis, would have a negative NPV up to the cross-over year and a positive NPV thereafter. The desired crossover year would be a function of investment risk and is customer specific as outlined in section 6.1 of this Appendix 4.

Load forecast risk shall be addressed by the parties and an appropriate agreement entered into.

1.2 Matching Revenues and Costs - Incremental Attributable Expenditures and Revenues

The economic analysis and evaluation is intended to predict the financial impacts of project proposals by examining the "incremental project expenditures" and "associated revenues" and "attributable expenses". It is therefore inappropriate to include prior (historic) expenditures, considered sunk costs, or revenues from connections in prior periods. In effect this should result in isolating the specific project and its economic feasibility.

2. NEW CUSTOMERS CONNECTED TO NEW FACILITIES

Revenues from new customers connected to new facilities shall be included in the economic evaluation for each new project. Conversely, new customers connecting to existing facilities shall be excluded from the economic evaluation of new projects. In other words, an estimate of the NPV without new customers connected to prior expansions shall be required.

3. CUSTOMER CONNECTION & CAPITAL CONTRIBUTION POLICIES

If there is a reasonable expectation of further expansion, the contribution in aid of construction is expected to take into account the forecast of future incremental load growth and timing of any such forecast load growth and forecast amount of investment that would be required during the economic study horizon.

4. CONSUMERS AND DISTRIBUTORS CONNECTED TO TRANSMISSION SYSTEMS & CUSTOMER DEMARCATION POINT

A transmitter shall follow the Code to identify the demarcation point of the customer Connection and transmitter's electrical system for which contribution in aid policies apply.

The criteria for contributions in aid of construction for all applicable Transmission System elements shall apply to all customer groups.

The customer Connection and Contribution in Aid Policies shall, as a minimum, include the following:

- (1) Requirements for payment for all, or part, of any required reinforcement of the transmission system components, on the transmitter's side of the demarcation point, using the NPV calculation. This entails a calculation to establish the amounts needed to bring the project NPV to the threshold level of 0. In such calculations all relevant revenues and costs shall be included in the evaluation.
- (2) A listing of the Transmission System components that may need reinforcement, on the transmitter's side of the said demarcation point, including where applicable:
 - (i) Attributable Transmission System Elements of the Network
 - (ii) Line Connection;
 - (iii) Transformer Connection

5. NETWORK INVESTMENTS

Network enhancement driven projects include those designed to enhance and/or expand the transmission system. These could include projects to relieve congestion, to increase transfer capabilities, or to increase the supply capacities. They also include those projects designed to maintain, restore or improve system security (to comply with the criteria, policies, guidelines and practices of the applicable regional reliability councils or IMO); and to bring supply reliability and power quality levels to acceptable guidelines or standards. Network enhancement driven projects may also include those designed to improve system efficiency (e.g. reduce losses) and to upgrade or replace telecommunication systems and special protection systems.

Most enhancement projects on network facilities have multiple purposes (e.g. system security, congestion relief, interconnection capacity increase, compliance of criteria and standards, etc.) and their benefits generally extend to large groups of end-uses in a large geographic area. For this reason, the identification of a beneficiary or a group of beneficiaries is difficult, if not impossible, to do. Where no beneficiaries can be identified, these projects will continue to be funded by and included in the regulated network pool of the transmitter subject to the IMO's consideration and Board approval under section 92 of the Act.

6. CRITERIA FOR ECONOMIC ASSESSMENT

6.1 Establishing the Economic Study Horizon

Each transmitter is expected to create a transparent process for establishing the Economic Study Horizon for transmission

implementation. The report's conclusion is that "bond ratings are the best way to segment potential interconnecting parties into credit risk categories". If obtaining the required data for this approach is impossible, the report suggests that two other methods described in the body of the report can also be used: the Kaplan-Urwitz model and the Altman Z-score model. This involves having the transmitter undertake its own credit review of the interconnection customer. Periods of time greater or lesser than those specified in each of four categories may be used, provided an explanation of the extension of the period is included in seeking approval.

7. REBATE FOR FIRST IN-SERVICE CUSTOMERS

A customer may be required to make a capital contribution or load guarantee. Subsequent customers connecting to the transmission system may be beneficiaries without having to contribute. In such an event, the initial contributor shall then be entitled to a rebate from the transmitter as follows:

For a period of up to the revenue horizon, the initial contributor shall be entitled to a rebate, based on apportioned benefit, for the remaining period on a straight line basis. In determining the apportioned benefit, the relative load level (based on an annual peak value), the relative connection line length (in proportion to the connection line length being shared by both parties), and the proportion of transformation capacity (being used by each party), shall be considered.

For example:

customer A - Initial contribution of \$750K; 1.0 km of line connection with a 10 year revenue horizon. Annual peak is 10MW.

customer B - Subsequent customer connects in year 7 to a point 0.3 km upstream from customer A. The projected annual peak is 5MW.

The shared connection line portion is 0.7 km.

Rebate to customer A

$$\begin{aligned} &= (10-7)\text{years} \times \$750\text{K}/10 \times \text{relative load level } \{5\text{MW}/15\text{MW}\} \times \text{shared connection line portion } \{0.7/1.0\} \\ &= 3 \times \$75,000 \times 0.33333 \times 0.7 \\ &= \$52,500 \end{aligned}$$

Any subsequent customer connecting may similarly trigger a rebate to customer A and to customer B if they paid an applicable financial contribution.

Although the example given is for connection, the concept is equally applicable to network upgrades where specific beneficiaries of the upgrade can be identified.

APPENDIX 5

ASSUMPTION AND METHODOLOGY DETAILS FOR PROJECT ECONOMIC EVALUATION

1. COMMON ELEMENTS OF THE DISCOUNTED CASH FLOW (DCF) MODEL

To achieve consistent business principles for the development of the elements of the financial feasibility test, the following parameters for the DCF approach are to be followed by the transmitters. This shall standardize the elements to be used in the discounted cash flow ("DCF") analysis as well as establish the parameters for the costs and revenues that are the inputs to that analysis.

The DCF calculation for individual projects shall be based on a set of common elements and related assumptions listed below.

2. REVENUE FORECASTING

The common elements for any project shall be calculated for each year of the Economic Study Horizon, as follows:

- (a) total forecasted customer connections over the Economic Study Horizon, for that project. ;
- (b) an estimate of customer's demand per connection facility for all added customers.;
- (c) customer additions shall be reflected in the model for each year during the Economic Study Horizon.
- (d) rates obtained from the rate schedules in effect at the relevant time for the transmitter reflecting the transmission (wires only) rates.

3. CAPITAL COSTS

For the purposes of the DCF analysis, the capital cost shall include the following common elements:

- a) an estimate of all capital costs directly associated with the connection of the forecast customer additions to the transmitter's transmission facilities;
- b) an estimate of incremental overheads applicable to transmission system expansion;
- c) for connections to the Transmission System, costs of the following elements, where applicable, shall be included: Certain Attributable Elements of the Network Pool; Transformer Stations -Connection Pool; Transmission Lines-Connection Pool; Land and Land Rights. Note that the "Ownership Demarcation Point" as specified in the Transmission System Code would define the point of separation between customers' Facilities and transmitter's Facilities;

Note:

In addition to the specific line connection and transformation Facilities associated with load connections, there is often the need for modifying or upgrading the network Facilities. These may include such things as:

- protection & control Facilities and associated telecommunications

4. EXPENSE FORECASTING

The common elements shall be as follows:

- (a) attributable incremental operating and maintenance expenditures: the incremental attributable costs directly associated with the connection of new customers to the transmission system shall be included in the operating and maintenance expenditures.;
- (b) income and capital taxes based on tax rates underpinning the existing rate schedules; and
- (c) municipal property taxes based on projected levels.
- (d) All other attributable costs to the project over the Economic Study Horizon as defined in Appendix 4, such as construction approvals.

5. SPECIFIC PARAMETERS/ASSUMPTIONS

Specific parameters of the common elements include the following:

- (a) an Economic Study Horizon to be chosen as outlined in Appendix 4.;
- (b) a discount rate equal to the project's incremental after-tax cost of capital to the transmitter: this is based on the prospective capital mix, debt and preference share cost rates, and the latest approved rate of return on common equity;
- (c) discounting to reflect the true timing of expenditures: up-front capital expenditures shall be discounted at the beginning of the project year and capital expended throughout the year shall be mid-year discounted, as shall revenue, and operating and maintenance expenditures; and
- (d) wires only charges - transmission specific revenue is to be calculated based on transmission (wires only) rates.

6. DISCOUNTED CASH FLOW (DCF) METHODOLOGY

Net Present Value ("NPV") = Present Value ("PV") of Operating Cash Flow + PV of CCA Tax Shield - PV of Capital

1. PV of Operating Cash Flow = P V of Net Operating Cash (before taxes) - P V of Taxes

1. (a) PV of Net Operating Cash = PV of Net Operating Cash Discounted at the Company's discount rate for the customer's Economic Study Horizon. Mid-year discounting is applied. Incremental after tax weighted average cost of capital shall be used in discounting.

1. (b) PV of Taxes	=	PV of Municipal Taxes + PV of Capital Taxes + PV of Income Taxes (before Interest tax shield)
<i>Annual Municipal Tax</i>	=	Municipal Tax Rate * (Total Capital Cost)
<i>Total Capital Cost</i>	=	All Attributable Costs, according to the Code and Appendices 4 and 5.
<i>Annual Capital Taxes</i>	=	(Capital Tax Rate) * (Closing Undepreciated Capital Cost Balance)
<i>Annual Capital Tax</i>	=	(Capital Tax Rate) * (Net Operating Cash - Annual Municipal Tax – Annual Capital Tax)

The Capital Tax Rate is a combination of the Provincial Capital Tax Rate and the Large Corporation Tax (Grossed up for income tax effect where appropriate).

Note: Above is discounted, using mid-year discounting, over the customer revenue horizon.

2. PV of Capital = P V of Total Annual Capital Expenditures

PV of Total Annual Capital Expenditures

Total Annual Capital Expenditures over the customer's economic study horizon discounted to time zero i.e. the beginning of year one.

Total Annual Capital Expenditure (for New Facilities and/or Reinforcement Investments + customer Specific Capital + Overheads at the project level). This applies for implicated Transmission System elements at the transmitter side of the "Ownership Demarcation Line".

Note: Above is discounted to the beginning of year one over the Economic Study Horizon

3. PV of CCA Tax Shield

P V of the CCA Tax Shield on [Total Annual Capital]

The PV of the perpetual tax shield may be calculated as:

(i) PV at time zero of =
$$\frac{[(\text{Income Tax Rate}) * (\text{CCA Rate}) * \text{Annual Total Capital}]}{(\text{CCA Rate} + \text{Discount Rate})}$$

or,

(ii) Calculated annually and present valued in the PV of Taxes calculation