SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

SCHEDULE 11

PRICES AND PAYMENT

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SCHEDULE 11

PRICES AND PAYMENT

1 INTERPRETATION

1.1 Definitions

In this Schedule 11 [Prices and Payment], in addition to the definitions set out in Schedule 1 [Definitions and Interpretation]:

"**Advance Payment**" has the meaning set out in Section 5.2 of this Schedule 11 [Prices and Payment];

"**Advance Payment Letter of Credit**" has the meaning set out in Section 5.2 of this Schedule 11 [Prices and Payment];

"**Advance Payment Request**" has the meaning set out in Section 5.2 of this Schedule 11 [Prices and Payment];

"**Completion Milestone**" has the meaning set out in Section 9.5 of this Schedule 11 [Prices and Payment];

"**Contractor Duties**" has the meaning set out in Section 6.4 of this Schedule 11 [Prices and Payment];

"**Contractor Taxes**" has the meaning set out in Section 6.4 of this Schedule 11 [Prices and Payment];

"**Contractor's Actual Daily Guest Night Use**" has the meaning set out in Section 5.20(a)(ii) of this Schedule 11 [Prices and Payment];

"**Contractor's Aggregate Guest Night Use**" has the meaning set out in Section 5.20(a)(iii) of this Schedule 11 [Prices and Payment];

"**Contractor's Guest Night Entitlement**" has the meaning set out in Section 5.20(a)(i) of this Schedule 11 [Prices and Payment];

"**Contractor's Guest Night Overage**" has the meaning set out in Section 5.20(c) of this Schedule 11 [Prices and Payment];

"**CTHEA**" has the meaning set out in Section 5.21(c)(i)(A)(I) of this Schedule 11 [Prices and Payment];

"**Deposit Application**" has the meaning set out in Section 4.2 of this Schedule 11 [Prices and Payment];

"**Draft Tube Temporary Enclosure Installed**" means the Installation Work described in Section 4.33 of Appendix 6-3 [Turbine Specifications];

"**Excitation System Technical Data and Information Form**" or "**Exciter TDIF**" means the form set out under Section 5.0 of Appendix 11-6 [Technical Data and Information Forms];

"**General Technical Data and Information Form**" or "**General TDIF**" means the form set out under Section 1.0 of Appendix 11-6 [Technical Data and Information Forms];

"**Generator Technical Data and Information Form**" or "**Generator TDIF**" means the form set out under Section 4.0 of Appendix 11-6 [Technical Data and Information Forms];

"**Governor System Technical Data and Information Form**" or "**Governor TDIF**" means the form set out under Section 3.0 of Appendix 11-6 [Technical Data and Information Forms];

"**Installation Work**" means, for the purposes of this Schedule 11 [Prices and Payment], the Installation Work and the Testing and Commissioning Work;

"**Letter of Credit**" has the meaning set out in Section 3.2(a) of this Schedule 11 [Prices and Payment];

"**Liquidated Damages**" means the amount of damages the parties have agreed will be paid by one party to the other upon the occurrence of a defined event;

"**Low-End Range Performance Bonus**" or "**LEPB**" has the meaning set out in Section 8.1 of this Schedule 11 [Prices and Payment];

"**Milestone**" has the meaning set out in Section 5.3(a) of this Schedule 11 [Prices and Payment];

"**Milestone Payment**" has the meaning set out in Section 5.3 of this Schedule 11 [Prices and Payment];

"**Non-Installation Work**" means, for the purposes of this Schedule 11 [Prices and Payment], the Supply and Delivery Work;

"**Progress Payment Estimate**" has the meaning set out in Section 5.4(a) of this Schedule 11 [Prices and Payment];

"**Single Unit Substantial Completion**" has the meaning set out in Section 5.12(a) of this Schedule 11 [Prices and Payment];

"**Single Unit Total Completion**" has the meaning set out in Section 5.16(a) of this Schedule 11 [Prices and Payment];

"**Spare Parts Payment**" has the meaning set out in Table Note 3 of Appendix 11-7 [Equipment Spare Parts Lists];

"**SPNA**" has the meaning set out in Section 5.21(a) of this Schedule 11 [Prices and Payment];

"**Substantial Completion**" has the meaning set out in Section 5.11 of this Schedule 11 [Prices and Payment];

"**Technical Data and Information Forms**" means the General TDIF, Turbine TDIF, Governor TDIF, Generator TDIF and Exciter TDIF;

"**Third Party Guarantee**" has the meaning set out in Section 3.2(d) of this Schedule 11 [Prices and Payment];

"**Total Completion**" has the meaning set out in Section 5.15 of this Schedule 11 [Prices and Payment];

"**Turbine Technical Data and Information Form**" or "**Turbine TDIF**" means the form set out under Section 2.0 of Appendix 11-6 [Technical Data and Information Forms]; and

"**Unit Assembly Complete**" means the stage of the Work when all of the Equipment associated with a Unit, including all of the associated hardware, software, lubricants and/or auxiliary components required for operation, has been assembled and installed in accordance with the requirements of the Contract Documents, has been inspected and accepted by BC Hydro, and is ready for Commissioning.

2 GENERAL

2.1 Complete Prices

The prices listed in Appendix 11-1 [Payment Schedule], including unit prices, lump sum prices and other forms of pricing, represent the complete price to BC Hydro, excluding only GST, for the performance of the Work. Notwithstanding the generality of the above, the prices listed in Appendix 11-1 [Prices and Payment] (including unit prices, lump sum prices, or other forms of pricing) will be deemed to include sufficient amounts to cover:

(a) the costs of all labour, equipment and materials included in or required for the complete performance of the Work, including all items which, while not specifically listed in Appendix 11-1 [Prices and Payment], are included in the Work expressly in the Contract Documents or by necessary inference in the interpretation of the Contract Documents;

(b) all costs associated with all performance security, including any overhead costs, whether head office or on-site overhead costs, with respect to the performance security;

(c) all insurance costs and overhead costs, including head office and on-site overhead costs, and all amounts for the Contractor's profit; and

(d) all costs required for compliance with all Laws and Permits applicable to the performance of the Work.

For certainty, there will be no escalation of any prices listed in Appendix 11-1 [Payment Schedule] except as otherwise expressly set out in the Contract Documents.

2.2 Costs of Labour

The prices listed in Appendix 11-1 [Payment Schedule] will be deemed to include all costs of labour required for the performance of the Work including the cost of:

(a) compliance with the requirements of the Contract Documents;

(b) all assessments payable with respect to labour as required by any statutory scheme such as Workers' Compensation, unemployment insurance, holiday pay, insurance, CPP and all employee benefits and compliance with all applicable Laws regarding trade or other qualifications of employees performing the Work; and

(c) payment of appropriate wages for labour included in or required for the Work.

3 PERFORMANCE SECURITY

3.1 Delivery of Performance Security

Unless expressly specified otherwise in the Contract Documents, within ten Business Days of the Effective Date, or by such later date as Hydro's Representative may agree to in writing, but in any event prior to the commencement of the Work, in addition to and not in substitution for any security that the Contractor is required to provide to BC Hydro under the Contract for the performance of the Work, and, unless otherwise agreed to in writing by Hydro's Representative, the Contractor will deliver to BC Hydro the performance security specified in Section 3.2 of this Schedule 11 [Prices and Payment].

3.2 Performance Security

Performance Security for Installation Work and Non-Installation Work:

(a) Letter of Credit:

The Contractor will deliver to BC Hydro a letter of credit (the "**Letter of Credit**") in an amount equal to [redacted] of the sum of the Contractor's price for the Installation Work as specified in Appendix 11-1 [Payment Schedule] and the Contractor's price for the Non-Installation Work as specified in Appendix 11-1 [Payment Schedule]. The Letter of Credit will be held by BC Hydro as security for:

(i) the Contractor's performance of all of the Contractor's obligations under the Contract, including:

(A) the Installation Work and the Non-Installation Work, including the payment of Liquidated Damages, if any, as specified in the Contract;

(B) the warranty obligations in respect of the Installation Work and the Non-Installation Work as described in Section 24 of Schedule 2 [Design and Construction Protocols]; and

(C) any obligations under the Contract with respect to the Installation Work and the Non-Installation Work commencing on the fifth anniversary after Total Completion.

(ii) the Contractor's payment obligations with respect to equipment, labour, materials and services under the Contract for:

(A) the Installation Work and the Non-Installation Work; and

(B) the warranty obligations in respect of the Installation Work and the Non-Installation Work described in Section 24 of Schedule 2 [Design and Construction Protocols].

On the first anniversary after Total Completion, the Letter of Credit will be reduced to an amount equal to [redacted] of the sum of the Contractor's price for the Installation Work as specified in Appendix 11-1 [Payment Schedule] and the Contractor's price for the Non-Installation Work as specified in Appendix 11-1 [Payment Schedule].

On the fifth anniversary after Total Completion, the Letter of Credit will be further reduced to an amount equal to [redacted].

(b) *Letter of Credit Form*: Unless otherwise agreed to in writing by BC Hydro, the Letter of Credit will be irrevocable, unconditional and in the form and contain the content as set out in Appendix 11-2 [Form of Letter of Credit].

The Letter of Credit will be issued or confirmed by a branch in Vancouver, British Columbia of a domestic Canadian financial institution having a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). If the issuing financial institution is not a domestic Canadian financial institution, the sovereign country's debt rating will be no less than Standard & Poor's AA, Moody's Aa2 or DBRS AA and the financial institution must have a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). BC Hydro, at its discretion, may accept a sovereign debt rating of Standard & Poor's AA-, Moody's Aa3 or DBRS AA (low) if the issuing bank has a rating of not less than Standard & Poor's A, Moody A2 or DBRS A. If such credit rating agencies publish differing credit ratings for the same financial institution, the lowest credit rating of any of the credit rating agencies will apply for the purposes of this paragraph.

(c) *Letter of Credit Term:* The Letter of Credit will be maintained by the Contractor, and will remain in full force and effect for the benefit of BC Hydro, until the earlier of:

(i) two years from the date on which the Contract is terminated; or

(ii) eight years from Total Completion.

(d) Third Party Guarantee:

The Contractor will deliver to BC Hydro a third party Guarantee (the "**Third Party Guarantee**") executed by an entity acceptable to BC Hydro, in amount equal to [redacted] of the sum of the Contractor's price for the Installation Work as specified in Appendix 11-1 [Payment Schedule] and the Contractor's price for the Non-Installation Work as specified in Appendix 11-1 [Payment Schedule]. The Third Party Guarantee will be held by BC Hydro as security for:

(i) the Contractor's performance of all of the Contractor's obligations under the Contract, including:

(A) the Installation Work and the Non-Installation Work, including the payment of Liquidated Damages, if any, as specified in the Contract;

(B) the warranty obligations in respect of the Installation Work and the Non-Installation Work as described in Section 24 of Schedule 2 [Design and Construction Protocols]; and

(C) any obligations under the Contract with respect to the Installation Work and the Non-Installation Work commencing on the fifth anniversary after Total Completion (as described in Section 5.15 of this Schedule 11 [Prices and Payment]).

(ii) the Contractor's payment obligations with respect to equipment, labour, materials and services under the Contract for:

(A) the Installation Work and the Non-Installation Work; and

(B) the warranty obligations in respect of the Installation and the Non-Installation Work as described in Section 24 of Schedule 2 [Design and Construction Protocols].

On the first anniversary after Total Completion (as described in Section 5.15 of this Schedule 11 [Prices and Payment]), the Third Party Guarantee will be reduced to an amount equal to [redacted] of the sum of the Contractor's price for the Installation Work as specified in Appendix 11-1 [Payment Schedule] and the Contractor's price for the Non-Installation Work as specified in Appendix 11-1 [Payment Schedule].

(e) *Third Party Guarantee Form*: Unless otherwise agreed to by BC Hydro in writing, the Third Party Guarantee will be in the form and contain the content as set out in Appendix 11-3 [Form of Guarantee].

(f) *Third Party Guarantee Term*: The Third Party Guarantee will be maintained by the Contractor, and will remain in full force and effect for the benefit of BC Hydro, until the earlier of:

(i) two years from the date on which the Contract is terminated; or

(ii) eight years from Total Completion.

3.3 Performance Security – BC Hydro's Rights

Upon the occurrence of any of the events specified in Section 13.1 or 13.2 of Schedule 2 [Design and Construction Protocols], or if the Contractor breaches any term of the Contract or fails to perform any obligation under the Contract (including failing to pay any amount owing to BC Hydro under the Contract or failing to provide the required performance security as set out in Section 3.2 of this Schedule 11 [Prices and Payment]), or if the Contractor fails to replace or have re-issued any performance security such that at all times all performance security is issued by an entity meeting the minimum required credit ratings, or if any issuer of a performance security or any guarantor under the Third Party Guarantee becomes unacceptable to BC Hydro, acting reasonably, BC Hydro will have the immediate and absolute right to pursue its remedies under any and all of the performance securities described in Section 3.2 of this Schedule 11 [Prices and Payment]. For greater certainty, BC Hydro will be entitled to pursue its remedies under any of the performance securities described in Section 3.2 of this Schedule 11 [Prices and Payment] simultaneously, as long as there is no double recovery, and will not be required to exhaust its recourse under any one performance security under Section 3.2 of this Schedule 11 [Prices and Payment] before pursuing its remedies under another performance security under Section 3.2 of this Schedule 11 [Prices and Payment], or any other remedy available to it under the Contract or at law.

3.4 Renewal of Letter of Credit

If, in accordance with the terms of the Letter of Credit, the issuing bank gives notice to BC Hydro of its determination not to extend the Letter of Credit and the Contractor fails to provide BC Hydro with acceptable replacement security at least 60 days prior to the expiration date of the Letter of Credit, BC Hydro will have the immediate and absolute right to draw upon the Letter of Credit for the full amount thereof, in which case BC Hydro will hold the proceeds thereof as a cash deposit (without interest) to be drawn on and applied in the same manner as the Letter of Credit. Any unused amount of such cash deposit will be returned to the Contractor at the time prescribed in Section 3.6 for the return of any unused performance security.

3.5 No Limitation on BC Hydro's Remedies

The performance security given by the Contractor to BC Hydro pursuant to Section 3.2 of this Schedule 11 [Prices and Payment] will not in any way limit BC Hydro's other remedies under the Contract or applicable Laws.

3.6 Return of Performance Security

BC Hydro will return to the Contractor any unused performance security held by it under Section 3 of this Schedule 11 [Prices and Payment] after such performance security ceases to be of any force and effect in accordance with Section 3 of this Schedule 11 [Prices and Payment], or at such earlier time as BC Hydro may, in its sole discretion, consider appropriate.

3.7 Change in Performance Security Amounts

At any time and from time to time BC Hydro may, in its sole discretion, require the Contractor to lower the amount of a performance security. If BC Hydro requires the Contractor to lower the amount of a performance security under this Section 3.7, the Contractor will, prior to lowering the amount of that performance security, provide to Hydro's Representative within a reasonable time an estimate of the savings expected to be realized in connection with such lower amount. All cost savings realized by lowering the amount of a performance security will be passed on to BC Hydro by way of a reduction to the Contract Price, implemented by a Change Order, with valuation calculated on the basis of actual savings realized in connection with lowering the amount of that performance security.

4 PAYMENT FORMS

4.1 Breakdown of Contract Price

The Contractor will submit to Hydro's Representative, at least 14 days before the first application for payment, a schedule of values of the various parts of the performance of the Work based on the attached Appendix 11-1 [Payment Schedule], aggregating the total amount of the Contract Price. The schedule of values will be prepared in such form and supported by such evidence as to its correctness as Hydro's Representative may reasonably direct, and, when approved by Hydro's Representative, will be used as the basis for all applications from the Contractor for payment.

4.2 Direct Deposit Application Form

Within ten days of the Effective Date, or such later date as Hydro's Representative may agree to in writing, the Contractor will provide to Hydro's Representative, a completed direct deposit application form in the form provided by Hydro's Representative (the "**Deposit Application**"). The following will apply to the information contained in the Deposit Application:

(a) BC Hydro is entitled to rely on such information without further enquiry or investigation;

(b) BC Hydro reserves the right (but does not have the obligation), in its sole discretion, to require the Contractor's Representative to provide evidence as to the accuracy of such information; and

(c) the Contractor will, at no cost to BC Hydro, promptly provide such evidence to Hydro's Representative.

If, at any time, the Contractor needs to change any information contained in its completed Deposit Application, the Contractor's Representative must submit to Hydro's Representative a revised Deposit Application.

5 PAYMENT

5.1 Participation Payments

All "RFP Participation Payments", as defined under the RFP, paid by BC Hydro to the Contractor pursuant to the RFP are deemed to be payment on account of amounts owed by BC Hydro to the Contractor under the Contract, and accordingly have been deducted from the "Proposal Price", as defined in the RFP, submitted by the Contractor pursuant to the RFP.

5.2 Advance Payment and Advance Payment Security

The Contractor may from time to time request BC Hydro to make one or more interest-free advance payments (each such payment an "**Advance Payment**") on account of design, off-site manufacturing, mobilization to the Site and such other matters as BC Hydro may decide in its sole discretion (each such request an "**Advance Payment Request**"), provided that:

(a) Advance Payment Requests are made in accordance with the Advance Payment timing and amounts set out in [redacted], unless otherwise agreed in writing by Hydro's Representative; and

(b) the aggregate amount of all Advance Payments outstanding at any time will not exceed [redacted] of the Contract Price.

The Contractor will submit an Advance Payment Request not less than 60 days prior to the requested payment date and will include in the Advance Payment Request the amount of the Advance Payment and the period of time that the Contractor anticipates the Advance Payment will remain outstanding.

If an Advance Payment Request is approved by BC Hydro, in its sole discretion, including with respect to any conditions of such approval, then the Contractor will provide to BC Hydro a letter of credit (an "**Advance Payment Letter of Credit**") in the amount equal to [redacted] of the Advance Payment amount.

BC Hydro will within 30 days of receiving an Advance Payment Letter of Credit in respect of an approved Advance Payment Request make the applicable Advance Payment.

The Advance Payment Letter of Credit will be held by BC Hydro as security against the Contractor's obligations under the Contract to perform the work for which the Advance Payment was made and the Contractor's obligations to repay the Advance Payment, as set out in this Section 5.2.

Without limiting BC Hydro's rights under Section 5.9 of this Schedule 11 [Prices and Payment], the Contractor may from time to time reduce the outstanding amount of any Advance Payment:

(c) to the extent that BC Hydro is required to make any payment to the Contractor under Section 5.7 of this Schedule 11 [Prices and Payment], by providing written directions to Hydro's Representative to first apply such payment to that outstanding Advance Payment; or

(d) by repaying to BC Hydro all or any part of that outstanding Advance Payment.

If the outstanding amount of an Advance Payment is reduced in accordance with this Section 5.2, then the Advance Payment Letter of Credit in respect of that Advance Payment will be reduced by the same amount as the reduction of the outstanding amount of that Advance Payment.

BC Hydro may accept an advance payment bond in substitution for an Advance Payment Letter of Credit, such advance payment bond to be in the form and on the terms and conditions and in the amount required by BC Hydro, in its sole discretion.

Letter of Credit Form: Unless otherwise agreed to in writing by BC Hydro, any Advance Payment Letter of Credit will be irrevocable, unconditional and in the form and contain the content as set out in Appendix 11-2 [Form of Letter of Credit].

The Advance Payment Letter of Credit will be issued or confirmed by a branch in Vancouver, British Columbia of a domestic Canadian financial institution having a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). If the issuing financial institution is not a domestic Canadian financial institution, the sovereign country's debt rating will be no less than Standard & Poor's AA, Moody's Aa2 or DBRS AA and the financial institution must have a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). BC Hydro, at its discretion, may accept a sovereign debt rating of Standard & Poor's AA-, Moody's Aa3 or DBRS AA (low) if the issuing bank has a rating of not less than Standard & Poor's A, Moody A2 or DBRS A. If such credit rating agencies publish differing credit ratings for the same financial institution, the lowest credit rating of any of the credit rating agencies will apply for the purposes of this Section 5.2.

Letter of Credit Term: The Advance Payment Letter of Credit will be maintained by the Contractor, and will remain in full force and effect for the benefit of BC Hydro until BC Hydro has made payment on invoices received from the Contractor for Progress Payments equal to the total amount of the Advance Payments made by BC Hydro under this Section 5.2. However, BC Hydro may, in its sole discretion, agree to decrease the amount of an Advance Payment Letter of Credit before such time.

5.3 Milestones

Upon the later of:

(a) the completion of a milestone as set out in Table Appendix 11-1 B of Appendix 11-1 [Payment Schedule] (each a "**Milestone**"); or

(b) the date set out in Table Appendix 11-1 B of Appendix 11-1 [Payment Schedule] for that Milestone,

the Contractor will be entitled to payment of the amount corresponding to such Milestone (each such amount a "**Milestone Payment**") in accordance with the provisions of Section 5 of this Schedule 11 [Prices and Payment].

5.4 Application for Payment

The Contractor will make applications for payment as follows:

(a) when eligible for payment as described under Section 5.3 of this Schedule 11 [Prices and Payment], the Contractor's Representative will submit to Hydro's Representative a payment estimate (the "**Progress Payment Estimate**") in the form provided by Hydro's Representative with:

(i) all supporting documents as expressly required by the Contract Documents;

(ii) a copy of the most recent monthly updated Work Program and Schedule prepared in accordance with Schedule 4 [Work Program and Schedule]; and

(iii) other documents required by Hydro's Representative, acting reasonably;

(b) within seven Business Days after receipt of such material, Hydro's Representative will, in consultation with the Contractor's Representative, review the Progress Payment Estimate and either:

(i) if Hydro's Representative agrees with the amount claimed by the Contractor on a Progress Payment Estimate, then Hydro's Representative will return the Progress Payment Estimate to the Contractor's Representative with a written notice confirming such agreement; or

(ii) if Hydro's Representative disagrees with any amount claimed by the Contractor on a Progress Payment Estimate, then Hydro's Representative will return the Progress Payment Estimate to the Contractor's Representative with a written notice setting out:

(A) the amount, if any, Hydro's Representative agrees is payable; and

(B) the reasons for the disagreement and, if available, the amount disputed; and

(c) within ten Business Days after receipt of the Progress Payment Estimate under Section 5.4(b)(i) or Section 5.4(b)(ii) of this Schedule 11 [Prices and Payment], as the case may be, the

Contractor's Representative will submit to BC Hydro an original invoice in the amount that Hydro's Representative has indicated under Section 5.4(b) of this Schedule 11 [Prices and Payment] is payable dated the date the Progress Payment Estimate was returned by Hydro's Representative under Section 5.4(b) of this Schedule 11 [Prices and Payment], with a copy of the invoice to Hydro's Representative. The original invoice will be submitted by email to BCH-InvoicesforPayment@absu.accenture.com, or by hard copy to BC Hydro Accounts Payable, 6911 Southpoint Drive, Burnaby, BC V3N 4X8, both in accordance with any additional invoicing instructions provided by Hydro's Representative.

The Contractor will show as separate entries on any invoice or Progress Payment Estimate, as the case may be, submitted for payment, the GST payable by BC Hydro and collectable by the Contractor on that portion of Work invoiced or for which a Progress Payment Estimate has been issued. The Contractor will provide to BC Hydro on all invoices and Progress Payment Estimates the Contractor's GST registration number and all other information as may be required pursuant to the *Excise Tax Act* (Canada).

5.5 Materials on Site

Unless otherwise specifically set out in this Schedule 11 [Prices and Payment] or any other Contract Document or otherwise agreed in writing by Hydro's Representative, the Contractor will not be entitled to apply for payment for material delivered to the Site but not yet incorporated into the completed Work.

5.6 Application for Payment Not a Waiver

The Contractor's application for payment under Section 5 of this Schedule 11 [Prices and Payment] will be without prejudice to the Contractor's rights to Dispute under Section 16 of Schedule 2 [Design and Construction Protocols].

5.7 Payment

Payment will be made to the Contractor as follows:

(a) BC Hydro will pay the Contractor the amount of each invoice prepared and submitted in accordance with Section 5.4(c) of this Schedule 11 [Prices and Payment], including the GST as a separate item in addition to the Contract Price, less any holdbacks, 30 days after receipt of the invoice; and

(b) all amounts due and owing as determined in accordance with Section 5.7(a) of this Schedule 11 [Prices and Payment] will be paid:

(i) if the Contractor is a Canadian entity, by direct deposit using an electronic funds transfer to the account the Contractor has designated in its then current Deposit Application; or

(ii) in any other case, either by wire transfer to the account the Contractor has designated in its then current Deposit Application or by cheque or bank draft, in BC Hydro's sole discretion.

Any fees charged by the receiving institution related to accepting or processing an electronic funds transfer or a wire transfer will be the responsibility of the Contractor.

5.8 Payment Not a Waiver

No payment made to the Contractor by BC Hydro will at any time constitute approval or acceptance of any performed Work under the Contract, nor be considered a waiver by BC Hydro of any of the terms of the Contract, nor relieve the Contractor of any of its duties, obligations or responsibilities under the Contract to perform the Work in accordance with the requirements of the Contract Documents.

5.9 Right of Set-off

BC Hydro may set off, as against any amounts due to the Contractor, any amount owing or claimed to be owing from the Contractor to BC Hydro, including Liquidated Damages and other amounts as payable under the Contract.

5.10 Application for Substantial Completion

When the Contractor judges that the Work is sufficiently complete (including with respect to all six Units), the Contractor may apply to Hydro's Representative for a certificate of Substantial Completion. The application will be in writing and will include the following:

(a) a comprehensive list of all items to be completed or corrected, including an estimated cost to complete or correct each item, and a schedule for completion and correction of all such items through to Total Completion, prepared in consultation with Hydro's Representative;

(b) all manufacturer's inspections, certifications, guarantees and warranties specified in the Contract or otherwise applicable to the performed Work;

(c) evidence that all required Permits, except for Project Related Permits, and approvals from testing or inspection agencies, if any, have been obtained;

(d) evidence from the Workers' Compensation Board of British Columbia that the Contractor is in good standing; and

(e) a statement as to the status of amounts owing to first tier Subcontractors and as to any unresolved claims made by Subcontractors against the Contractor or another Subcontractor.

5.11 Substantial Completion

"**Substantial Completion**" means the stage in the progress of the Work, as certified by Hydro's Representative in accordance with this Section 5.11, when:

(a) the Work (including all six Units):

(i) achieves full Commercial Operation; or

(ii) is sufficiently complete in accordance with the requirements of the Contract Documents that BC Hydro can use the Work for its intended purpose,

whichever occurs first;

(b) the Work is capable of completion or correction at a cost of not more than [redacted];

(c) any other conditions specified in the Contract Documents to be satisfied on or before Substantial Completion, including the submission of all information and documents required by Section 5.10 of this Schedule 11 [Prices and Payment], have been satisfied, or waived in writing by BC Hydro; and

(d) Hydro's Representative has issued the certificate of Substantial Completion.

Hydro's Representative will, no later than 14 days after the receipt of an application under Section 5.10 of this Schedule 11 [Prices and Payment], inspect the Work to verify the validity and accuracy of the application. Hydro's Representative will, no later than a further seven days after the inspection, notify the Contractor in writing of approval, or the reasons for refusal, of the application. If the application is refused,

then the Contractor will address the reasons for refusal and may re-apply for a certificate of Substantial Completion pursuant to Section 5.10 of this Schedule 11 [Prices and Payment]. The provisions of this Section 5.11 will apply to any such subsequent application.

When Hydro's Representative, acting reasonably, determines that the requirements for Substantial Completion have been achieved (other than the issuance of the certificate of Substantial Completion), Hydro's Representative will issue a certificate of Substantial Completion that includes the date of Substantial Completion. Concurrently with the issuance of such certificate, Hydro's Representative will prepare a written list of items of the Work to be completed or corrected that were apparent to Hydro's Representative in the inspection of the Work. The issuance of such list will not relieve the Contractor of any of its duties, obligations or responsibilities under the Contract to perform the Work, complete the performance of the Work and correct all defects and deficiencies in the Work, all in accordance with the requirements of the Contract Documents.

5.12 Single Unit Substantial Completion

Notwithstanding Sections 5.10 and 5.11 of this Schedule 11 [Prices and Payment], the Contractor may apply for substantial completion with respect to the individual Units as follows:

(a) "**Single Unit Substantial Completion**" means the stage in the progress of the Work when the Unit:

(i) is put into Commercial Operation under Section 5.4 of Schedule 2 [Design and Construction Protocols]; or

(ii) is sufficiently complete in accordance with the requirements of the Contract Documents so that BC Hydro could put it into Commercial Operation as certified by Hydro's Representative,

whichever occurs first;

(b) the Contractor will include the information required under Section 5.10 of this Schedule 11 [Prices and Payment], as applicable to the individual Unit;

(c) Hydro's Representative will, no later than 14 days after the receipt of an application under Section 5.12 of this Schedule 11 [Prices and Payment], inspect the Unit and the related Work to verify the validity and accuracy of the application. Hydro's Representative will, no later than a further seven days after the inspection, notify the Contractor in writing of approval, or the reasons for refusal, of the application. If the application is refused, then the Contractor will address the reasons for refusal and may re-apply for a certificate of Single Unit Substantial Completion pursuant to Section 5.12 of this Schedule 11 [Prices and Payment]. The provisions of Section 5.12 of this Schedule 11 [Prices and Payment] will apply to any such subsequent application;

(d) when Hydro's Representative, acting reasonably, determines that the requirements for Single Unit Substantial Completion have been achieved for the Unit (other than the issuance of the certificate of Substantial Completion), Hydro's Representative will issue a certificate of Single Unit Substantial Completion that includes the date of the Single Unit Substantial Completion. Concurrently with the issuance of such certificate, Hydro's Representative will prepare a written list of items of the Work to be completed or corrected that were apparent to Hydro's Representative in the inspection of the Work. The issuance of such list will not relieve the Contractor of any of its duties, obligations or responsibilities under the Contract to perform the Work, complete the performance of the Work and correct all defects and deficiencies in the Work, all in accordance with the requirements of the Contract Documents; and

(e) without limiting BC Hydro's right to retain a holdback for deficiencies as described in Section 5.13 of this Schedule 11 [Prices and Payment] or to set off against any amount owing or claimed to be owing from the Contractor to BC Hydro as described in the Contract Documents, upon issuance of a Single Unit Substantial Completion certificate the Contractor may, if applicable, apply for a release of the portion of the letter of credit, that corresponds to the Work covered by the Single Unit Substantial Completion certificate, and upon such application BC Hydro will, if applicable, release such portion of the letter of credit.

5.13 Deficiencies Holdback

BC Hydro may retain, out of the amount due and owing to the Contractor on each Single Unit Substantial Completion and on Substantial Completion, an amount equal to two times the value of the estimated cost to complete or correct the items set out in the list provided pursuant to Section 5.10(a) or Section 5.12(b), as applicable, of this Schedule 11 [Prices and Payment]. If the total amount due and owing to the Contractor upon Single Unit Substantial Completion, or Substantial Completion as applicable, is less than two times the value of the estimated cost to complete or correct the items set out in the list provided pursuant to Section 5.10(a) or Section 5.12(b), as applicable, of this Schedule 11 [Prices and Payment], then such difference will be immediately due and owing by the Contractor to BC Hydro upon receipt of an invoice from BC Hydro for such difference. The amount retained by BC Hydro will be treated as a reduction in the amount payable to the Contractor including a corresponding decrease in the amount of GST payable to the Contractor.

If the Contractor completes or corrects an item set out in the list provided pursuant to Section 5.10(a) or Section 5.12(b), as applicable, of this Schedule 11 [Prices and Payment], then BC Hydro will release to the Contractor the amount held back by BC Hydro under Section 5.13 of this Schedule 11 [Prices and Payment] on account of that item.

If the Contractor fails to complete or correct an item set out in the list provided pursuant to Section 5.10(a) or Section 5.12(b), as applicable, of this Schedule 11 [Prices and Payment], then:

(a) that item will be deemed to be a defect and the provisions of Section 24.7 of Schedule 2 [Design and Construction Protocols] will apply; and

(b) if BC Hydro carries out the work to complete or correct that item as contemplated under Section 24.7(a) of Schedule 2 [Design and Construction Protocols], then:

(i) BC Hydro may deduct the costs incurred by BC Hydro, including the costs of Others, any administrative costs, the cost of BC Hydro's own forces and resources and the cost to BC Hydro of Hydro's Representative, to complete or correct that item against the amount held back by BC Hydro under Section 5.13 of this Schedule 11 [Prices and Payment] on account of that item;

(ii) if the amount held back by BC Hydro under Section 5.13 of this Schedule 11 [Prices and Payment] on account of that item is greater than the costs incurred by BC Hydro to complete or correct that item, then BC Hydro will release to the Contractor the balance of the amount held back on account of that item; and

(iii) if the amount held back by BC Hydro under Section 5.13 of this Schedule 11 [Prices and Payment] on account of that item is less than the costs incurred by BC Hydro to complete or correct that item, then the difference will be immediately due and owing by the Contractor upon receipt of an invoice from BC Hydro.

5.14 Application for Total Completion

When the Contractor judges that all deficiencies have been corrected and that the performance of the Work is fully complete (including with respect to all six Units) except for Contractor's warranty obligations, the Contractor may apply to Hydro's Representative for a certificate of Total Completion. The application will be in writing and will include the following:

(a) evidence that all deficiencies have been corrected and approved by Hydro's Representative;

(b) evidence from the Workers' Compensation Board of British Columbia that the Contractor is in good standing; and

(c) a statement as to the status of amounts owing to first tier Subcontractors and as to any unresolved claims made by Subcontractors against the Contractor or another Subcontractor.

5.15 Total Completion

Hydro's Representative will, as soon as practicable after receipt of an application under Section 5.14 of this Schedule 11 [Prices and Payment], inspect the Work (including all six Units) to verify the validity of the application and, when all Work is complete in accordance with the requirements of the Contract Documents except for the Contractor's warranty obligations ("**Total Completion**"), issue the certificate of Total Completion with respect to all six Units.

5.16 Single Unit Total Completion

Notwithstanding Sections 5.14 and 5.15 of this Schedule 11 [Prices and Payment], the Contractor may apply for total completion with respect to the individual Units as follows:

(a) "**Single Unit Total Completion**" means the stage in the progress of the Work when the Unit is totally complete in accordance with the requirements of the Contract Documents;

(b) the Contractor will include the information required under Section 5.13 of this Schedule 11 [Prices and Payment], as applicable to the individual Unit; and

(c) Hydro's Representative will, as soon as practicable after receipt of an application under Section 5.16 of this Schedule 11 [Prices and Payment], inspect the Unit and the related Work to verify the validity of the application and, when all Work is complete for that Unit in accordance with the requirements of the Contract Documents except for the Contractor's warranty obligations, issue the certificate of Single Unit Total Completion for that Unit.

5.17 Limitation of Certificates

Neither Hydro's Representative nor BC Hydro, by issuing any certificate, including any certificate of Substantial Completion or a certificate of Total Completion, guarantees, or otherwise becomes liable or responsible in any way for, the completeness or correctness of the Work, and no certificate will make Hydro's Representative or BC Hydro in any way responsible or liable for the performance of the Work or relieve the Contractor of its warranty obligations under the Contract.

5.18 Waiver of Claims

As of the dates of the Contractor's application for Substantial Completion and Total Completion, the Contractor expressly waives and releases the Indemnified Parties from any and all Claims which, as of the date of the applicable application, the Contractor has or reasonably ought to have known the Contractor has against the Indemnified Parties, or any one of them, with respect to the performance of the Work or with respect to the Contract, including those that may arise from the negligence of or breach

of the Contract by an Indemnified Party, or any other representative of BC Hydro, except for Claims set out in writing and delivered to Hydro's Representative prior to the delivery by the Contractor of the applicable application and still unsettled.

5.19 Provisional Sums

If BC Hydro has included a provisional sum in this Schedule 11 [Prices and Payment], then BC Hydro will pay any such sum or portion of such sum only pursuant to a Change Order.

5.20 Worker Guest Night Use Overage Adjustment

The Contract Price will be adjusted on account of the Contractor's aggregate number of Guest nights that the Contractor uses to achieve Total Completion of the Work as follows:

(a) for the purposes of Section 5.20 of this Schedule 11 [Prices and Payment]:

(i) "**Contractor's Guest Night Entitlement**" means [redacted], calculated based on the number of Guests specified in [redacted];

(ii) "**Contractor's Actual Daily Guest Night Use**" means for each day during the performance of the Work the greater of:

(A) the Contractor's Daily 72 Hour Confirmation, or

(B) the actual number of Guest nights; and

(iii) "**Contractor's Aggregate Guest Night Use**" means the aggregate, at any time, of all the Contractor's Actual Daily Guest Night Use for all days commencing from the Effective Date;

(b) if the Contractor's Aggregate Guest Night Use is less than or equal to the Contractor's Guest Night Entitlement then there will be no adjustment to the Contract Price; and

(c) if at any time the Contractor's Aggregate Guest Night Use is more than the Contractor's Guest Night Entitlement, then thereafter the Contract Price will be reduced, without duplication, by an amount (the "**Contractor's Guest Night Overage**") calculated as follows:

Contractor's Guest Night Overage =

[Contractor's Aggregate Guest Night Use – Contractor's Guest Night Entitlement] x [[redacted] (as may be adjusted for escalation – see below)],

and in such event the Contractor's Guest Night Overage, as of the end of a month, for additional Guest nights used in that month, in excess of the Contractor's Guest Night Entitlement will be included in the next occurring Progress Payment Estimates and deducted from amounts owing by BC Hydro to the Contractor. GST will be payable on any Contractor's Guest Night Overage.

The Guest night rate of [redacted] is the rate as of the Effective Date, and will be subject to escalation for BC Consumer Price Index (CPI) as follows:

$$Guest\ night\ Rate = [redacted] * \frac{BCCPI_{Year}}{BCCPI_{2015}}$$

5.21 Labour Cost Escalation

The Contract Price will be adjusted on account of labour cost escalation as follows:

(a) the Contractor is one of three 'Proponent' signatories to a collective agreement entitled 'Special Project Needs Agreement' dated for reference June 3, 2015 between:

(i) Construction Labour Relations Association of BC on behalf of: Alstom Renewable Power Canada Inc., Andritz Hydro Canada and Voith Hydro Inc.; and

(ii) the Bargaining Council of British Columbia Building Trade Unions

(the "**SPNA**");

(b) the SPNA identifies:

(i) hourly wage rates and benefits (provided by hourly employer contributions) for the various craft trades that the Contractor intends to employ for the performance of the Installation Work; and

(ii) additional miscellaneous costs for all employer travel and transportation costs, rest breaks, testing and/or qualification costs necessary to obtain certification and all personal protective equipment, which the Contractor is obligated to pay and incurs the cost for, for those employees covered by the SPNA in respect to the employment of the various craft trades identified in Section 5.21(b)(i) of this Schedule 11 [Prices and Payment]. For certainty, no costs other than as listed in this Section 5.21(b)(ii) are included in such additional miscellaneous costs.

For the purposes of Section 5.21 of this Schedule 11 [Prices and Payment] craft trades will be deemed to include apprentices for the applicable craft trade; and

(c) with respect to each application for payment of a Milestone Payment where the associated Milestone is for Installation Work as set out in Appendix 11-1 [Payment Schedule]:

(i) the Contractor will include the actual number of hours worked by each craft tradesperson in the performance of that Milestone and the escalation of straight time hourly wage rates and benefits (provided by hourly employer contributions) described in Section 5.21(b)(i) of this Schedule 11 [Prices and Payment] will be as follows:

(A) the amount of the applicable Milestone Payment will be adjusted (increased or decreased) on account of the increase or decrease in the straight time hourly wage rates and benefits (provided by hourly employer contributions) payable by the Contractor pursuant to the SPNA, calculated as follows:

(I) for each craft trade determine the escalation adjustment as follows:

Craft Trade Hourly Escalation Adjustment ("**CTHEA**") **=**

(straight time hourly wage rate and benefits (provided by hourly employer contributions) for that craft trade payable by the Contractor pursuant to the SPNA for the applicable Installation Work, but excluding "those more advantageous provisions", if any, that the Contractor has agreed to pay under section 3.07 of the SPNA)

minus

(straight time hourly wage rate and benefits (provided by hourly employer contributions) for that craft trade payable by the Contractor pursuant to the SPNA as of the "Closing Time" as defined in the RFP),

which for certainty may be positive or negative depending on whether the straight time hourly wage rate and benefits (provided by hourly employer contributions) increase or decrease between the "Closing Time" as defined in the RFP and the time when the straight time hourly wage rates and benefits (provided by hourly employer contributions) are payable by the Contractor for the applicable Installation Work;

(II) for each craft trade the escalation adjustment will be:

(CTHEA) x (the actual number of hours worked by that craft trade in the performance of that Milestone); and

(III) the total adjustment to the Milestone Payment on account of labour escalation of straight time hourly wage rates and benefits (provided by hourly employer contributions) described in Section 5.21(b)(i) of this Schedule 11 [Price and Payment] will be the aggregate of the escalation adjustments as determined under Section 5.21(c)(i)(A)(II) for all applicable craft trades that performed Installation Work covered by that Milestone;

(ii) the Contractor will include a description and an amount of the aggregate additional miscellaneous costs incurred in the performance of that Milestone and the escalation of additional miscellaneous costs described in Section 5.21(a)(ii) of this Schedule 11 [Prices and Payment] will be as follows:

(A) the amount of the applicable Milestone Payment will be adjusted (increased or decreased) on account of the aggregate increase or decrease in the additional miscellaneous costs payable by the Contractor pursuant to the SPNA, calculated as follows:

Additional Miscellaneous Costs Adjustment =

(aggregate of the additional miscellaneous costs payable by the Contractor pursuant to the SPNA for the applicable Installation Work)

minus

(aggregate additional miscellaneous costs payable by the Contractor pursuant to the SPNA as of the "Closing Time" as defined in the RFP),

which for certainty may be positive or negative depending on whether the aggregate additional miscellaneous costs increase or decrease between the "Closing Time" as defined in the RFP and the time when the aggregate additional miscellaneous costs are payable by the Contractor for the applicable Installation Work; and

(iii) if any of the collective agreements are under negotiation and not finalized as of the time of such calculation, then the calculation will be delayed until such collective agreements are finalized.

6 TAXES

6.1 Tax Included in Contract Price

The Contract Price (and any part of the Contract Price) paid or payable by BC Hydro to the Contractor includes all applicable taxes, PST, duties, levies and charges (excluding only GST) payable in respect of the performance of the Work (or any part of the Work) assessed by any and all Governmental Authorities for Work performed by the Contractor, its Subcontractors, their employees or other Persons engaged by or through them in connection with the Work, and includes all customs duties with respect to all imported equipment and materials.

6.2 GST

GST will be identified as a separate line item on all invoices, and will be payable by BC Hydro to the Contractor as a separate item in addition to the Contract Price.

6.3 Input Tax Credits

Each party will provide to the other party at all times when any GST is required to be paid, such documents and particulars relating to the supply as may be required by either BC Hydro or the Contractor, as the case may be, to substantiate a claim for any input tax credits as may be permitted pursuant to the *Excise Tax Act* (Canada) in respect of GST.

6.4 Payment of Taxes

Except as may be specifically and expressly set out in the Contract Documents, the Contract Price (and any part of the Contract Price) paid or payable by BC Hydro to the Contractor includes all applicable taxes, PST, levies and charges (excluding only GST) payable or assessed on any of the Contractor, Subcontractors, or their employees or other Persons engaged by or through them by any and all Governmental Authorities in connection with the performance of the Work ("**Contractor Taxes**"), and includes all customs duties with respect to all imported equipment and materials regardless of whether such equipment is held in the name of the Contractor, a Subcontractor or BC Hydro at the time of import ("**Contractor Duties**"). The Contractor is solely responsible to incur and bear the Contractor Taxes and Contractor Duties on inputs relating to the Work.

6.5 Tax Indemnity

The Contractor will indemnify and hold harmless the Indemnified Parties, or any one of them, from and against any liability and costs incurred by them in respect of any Contractor Taxes or Contractor Duties, or any other related charges, including any related interest, fines, or penalties and any related reporting obligations and costs incurred as a consequence of such. The Contractor will be registered with all Governmental Authorities in accordance with Laws and will comply with all of its obligations to pay any such Contractor Taxes and Contractor Duties.

Notwithstanding any other provision in the Contract, BC Hydro may, in its sole discretion, withhold from any monies owed to the Contractor, whether such monies are owed under and pursuant to the Contract or otherwise, such amounts as are payable by the Contractor in respect of Contractor Taxes or Contractor Duties for which BC Hydro becomes or may become liable.

6.6 Non-Resident

The Contractor represents and warrants that it is not a non-resident of Canada for purposes of the *Income Tax Act* (Canada). In the event that the Contractor becomes a non-resident of Canada for purposes of the *Income Tax Act* (Canada), the Contractor will provide Hydro's Representative with written notice of such circumstance.

If the Contractor:

(a) becomes a "non-resident person" (as defined in the *Income Tax Act* (Canada));

(b) provides or performs any part of the Work in Canada; and

(c) has not received and provided Hydro's Representative with a copy of a waiver letter from the Canada Revenue Agency,

then BC Hydro may deduct and withhold 15% of the value of the Work performed in Canada, or such other amount as may be specified by the Canada Revenue Agency from time to time, and remit such amount according to Laws. If the Canada Revenue Agency assesses BC Hydro for a failure to deduct non-resident withholding tax, then the Contractor will indemnify the Indemnified Parties against all taxes, penalties, interest and costs resulting from such failure.

If the Contractor hires employees or Subcontractors who are not residents of Canada to perform any portion of the Work, the Contractor will, as part of the Work, be responsible for all income tax compliance and other expenditures relating to non-resident workers.

6.7 Tax Exemptions, Refunds and Compliance

The Contractor will, where applicable, use all commercially reasonable efforts to obtain for the benefit of BC Hydro all available exemptions, deductions, rebates, remissions and refunds for all Contractor Taxes and Contractor Duties, including any other related charges, including any related interest, fines or penalties, and upon receipt of any amount in respect of any such exemption, deduction, rebate, remission or refund, the Contractor will promptly pay such amount to BC Hydro.

The Contractor will show as separate entries on any invoice submitted for payment, each of the GST and, if applicable, the PST, in each case, payable by BC Hydro and collectable by the Contractor on that portion of the Work invoiced or for which a monthly estimate has been provided.

The Contractor will self-assess the PST payable on all taxable equipment and materials that are brought into British Columbia for incorporation into the Work unless an exemption applies (such as the PST exemption for production machinery and equipment). The Contractor will use the landed cost of the equipment or materials in British Columbia as the tax base for the self-assessment.

If the Contractor is required to collect PST from BC Hydro, the Contractor must be registered to do so in the Province of British Columbia.

If the Contractor is required to collect GST from BC Hydro, the Contractor must be registered for GST under the *Excise Tax Act* (Canada) and must provide to BC Hydro on all invoices the Contractor's Canadian federal GST registration number and all other information as may be required pursuant to the *Excise Tax Act* (Canada).

6.8 Tax Change

Where, at any time after the Effective Date:

(a) the rate of any applicable Canadian federal or British Columbia sales tax, excise tax, or duty has been varied;

(b) the application of any Canadian federal or British Columbia sales tax, excise tax, or duty has been changed; or

(c) a new Canadian federal or British Columbia sales tax, excise tax, or duty has been levied,

that causes an increase or decrease to the expenditure for property and services with respect to the Work, either party may before the certificate of Substantial Completion is issued give written notice to the other party that such event is a Change to which Schedule 12 [Changes] applies. The party seeking a Change will provide a detailed analysis of the estimated expenditure on property and services as at the Effective Date, and this estimate will be used to calculate the increase or decrease in expenditure if there is a Change as contemplated in this Section 6.8.

6.9 PST Exemption

The Equipment installed by the Contractor in the Powerhouse that will be used by BC Hydro primarily and directly in the production of electricity is eligible for the PST exemption for production machinery and equipment. For reference, a listing of some qualifying production machinery and equipment is provided in Table Appendix 11-4 B in Appendix 11-4 [PST]. BC Hydro will provide the Contractor with a PST certificate of exemption or other declaration as required to claim the PST exemption on qualifying Equipment and materials only.

6.10 Termination and Modification Payments and Bulk Transactions

If Section 182 of the *Excise Tax Act* (Canada) applies to a termination or modification payment made by BC Hydro under this Contract, the Contractor will remit the applicable GST included in the amount payable on its next GST return for the period the payment is made.

If termination of this Contract qualifies as a “bulk transaction” as contemplated in Section 187 of the *Provincial Sales Tax Act* (British Columbia), the Contractor will request a certificate as required under Subsection 187(3) of the *Provincial Sales Tax Act* (British Columbia) in a timely manner and provide a copy of the certificate to BC Hydro.

6.11 Tax Consequences

For greater certainty: (i) BC Hydro is not responsible or liable for any adverse tax consequences (including additional or increased Contractor Taxes) to Contractor or any Contractor personnel (including a Key Individual) as a result of the personnel performing services for a prolonged period at the Site, which is a location that is different from the personnel’s country of residence; and (ii) the desire to avoid those kinds of adverse tax consequences are not a justification for removal of a Key Individual from, or permission for a Key Individual to cease performance of the Work.

7 FINAL ACCOUNTING AND PAYMENT

7.1 Summary of Payments

After the certificate of Total Completion has been issued, Hydro’s Representative will prepare a summary of all payments due to the Contractor, setting off the total of all:

(a) payments already made by BC Hydro to the Contractor under the Contract;

(b) amounts payable and claimed to be payable by the Contractor to BC Hydro under the Contract, including amounts owing or claimed to be owing from the Contractor to BC Hydro;

(c) amounts payable by the Contractor to BC Hydro in respect of any other matters under the Contract in respect of which the cost is to be borne by the Contractor; and

(d) amounts paid by BC Hydro on behalf of the Contractor or a Subcontractor to a third party.

7.2 Certification

Where satisfied that the Work has been properly performed under the Contract, Hydro's Representative will certify in the summary prepared under Section 7.1 of this Schedule 11 [Prices and Payment] the amount owed by one party to the other and will provide a copy of the summary to the Contractor.

7.3 Payment Due

The party owing any amount certified in the summary in Section 7.2 of this Schedule 11 [Prices and Payment] as payable will pay that amount to the other party within 30 Days:

(a) in the case of BC Hydro, after certification of the summary; and

(b) in the case of the Contractor, after receipt of an invoice from BC Hydro for such amount.

8 LOW-END RANGE PERFORMANCE BONUS

8.1 Low-End Range Performance Bonus

BC Hydro will pay a performance bonus (the "**Low-End Range Performance Bonus**" or "**LEPB**") to the Contractor for Additional Prototype Low-End Operating Range as set out below. The LEPB applies to all Units collectively and will be based on the Generator power output for the one Unit that has the highest Prototype Minimum Turbine Output (i.e. the smallest resultant Additional Prototype Low-End Operating Range).

The LEPB will be calculated as follows:

(a) $AR_L = P_{ref} - P_{min} - P_{mu}$

where:

AR_L = Additional Prototype Low-End Operating Range;

P_{ref} = Generator power output of the Unit in kW (as would be measured at the Generator terminals) as stated in Section 2.4(e) of the Turbine TDIF with Turbine operating at the Reference Minimum Turbine Output;

P_{min} = Generator power output of the Unit in kW (as measured at the Generator terminals during the site acceptance and commissioning tests) with the Turbine operating at the highest Prototype Minimum Turbine Output; and

P_{mu} = Power measurement uncertainty. For the purposes of this Section 8.1(a), an uncertainty allowance of 300 kW will be applied to the measured Generator power output;

(b) the LEPB, if payable, will be a single payment covering all six Units calculated as follows:

$$LEPB = AR_L \times r_L$$

where*:*

r_L = [redacted]/kW ([redacted]/kW/Unit x 6 Units); and

(c) notwithstanding any other provision of Section 8.1 of this Schedule 11 [Prices and Payment], the maximum amount payable for the LEPB is [redacted] in $CAD (in the aggregate, for all six Units).

9 LIQUIDATED DAMAGES

9.1 Liquidated Damages for Defined Events

The parties confirm and agree that the amount of each specified Liquidated Damages as described in Section 9 of this Schedule 11 [Prices and Payment] and in Appendix 4-8 [Interface Requirements] represents a genuine and reasonable pre-estimate of the damages that will be incurred by the party suffering the damages upon the occurrence of the defined event, and each such amount is not a penalty.

9.2 No Duplicate Recovery

Notwithstanding any other provision of this Contract, neither party will be entitled to recover compensation or make a Claim under this Contract or any other agreement in relation to the Work in respect of any damages it has incurred to the extent that the claiming party has already been compensated in respect of that loss.

The parties agree that Liquidated Damages up to the aggregate limits set out in Section 9.16 or Section 9.17, as applicable, with respect to the associated defined event, will be the claiming party's sole remedy with respect to damages incurred as a result of the occurrence of that event.

9.3 Cure Period

Notwithstanding any other provision of this Contract, no Liquidated Damages will be payable pursuant to Sections 9.7 through 9.14 of this Schedule 11 [Prices and Payment] for a period of one year (or such longer period of time as BC Hydro may determine in its sole and absolute discretion) after the date on which such Liquidated Damages would have been payable but for this Section 9.3. If, after such one year period, the circumstances described in Sections 9.7 through 9.14 of this Schedule 11 [Prices and Payment] continue to exist, then Liquidated Damages will be payable by the Contractor in accordance with the applicable provisions.

Notwithstanding the one year cure period, the Contractor will, immediately upon becoming aware of a circumstance that may give rise to the payment of Liquidated Damages, take all necessary action to correct such circumstance.

9.4 Interface Milestones

The parties will pay the Liquidated Damages as described in Appendix 4-8 [Interface Requirements] upon the occurrence of the defined events set out in Appendix 4-8 [Interface Requirements].

9.5 Completion Milestone Liquidated Damages

If the Contractor fails to achieve a completion milestone as described in Appendix 11-5 [Completion Milestone Damages] (each a "**Completion Milestone**") on or before the date specified for the

achievement of that Completion Milestone, as such date may be adjusted in accordance with the Contract Documents, the Contractor will pay BC Hydro Liquidated Damages equal to the amount per day (or portion of a day) as indicated in Appendix 11-5 [Completion Milestone Damages] until that Completion Milestone is achieved.

The following will apply to Liquidated Damages with respect to Completion Milestones:

(a) Multiple Applicable Liquidated Damages for Completion Milestones: If at any time the Contractor has failed to achieve more than one Completion Milestone for a particular Unit, then for the period during which multiple Liquidated Damages are applicable, the Liquidated Damages payable will be the highest applicable daily Liquidated Damage for that Unit as set out in Appendix 11-5 [Completion Milestone Damages] for each day of such period.

(b) Waiver of Completion Milestone Damages: Notwithstanding any Liquidated Damages payable for failure to achieve a Completion Milestone(s) with respect to a single Unit, if the Substantial Completion date for that Unit is achieved as described in the Schedule 4 [Work Program and Schedule], as may be adjusted in accordance with the Contract Documents, then any such Liquidated Damages will be waived by BC Hydro and, if applicable, credited back to the Contractor. For certainty, this Section 9.5(b) does not apply to any Liquidated Damages to which BC Hydro may be entitled under Appendix 4-8 [Interface Requirements].

9.6 Technical Data and Information Forms

The Equipment will fully comply with the information contained in the Technical Data and Information Forms.

9.7 Liquidated Damages for Failure to Achieve Power Outputs for Operating Condition A

For each Unit that is capable of continuous operation at Operating Condition A in accordance with the procedure specified in Appendix 6-2 [General Technical Specifications (SPGT)], the determination of whether a Unit fails to achieve power outputs for Operating Condition A will be determined from the Generator Losses. Where the Generator Losses exceed those losses stated in Section 4.3(b) of the Generator TDIF, coincident with the Turbine power output for Operating Condition A, the Contractor will pay BC Hydro Liquidated Damages for each such Unit calculated as follows:

$$LDP_C = (L_C - L_{CF} - L_{tu}) \times V_C$$

where:

LDP_C = Liquidated Damages for Generator power output not achieved at Operating Condition A for a Unit;

L_C = Generator Losses in kW coincident with the Turbine power output indicated in Section 2.4(e)(v) of the Turbine TDIF for Operating Condition A;

L_{CF} = Generator losses in kW for Operating Condition A as set out in Section 4.3(b) of the Generator TDIF;

L_{tu} = Generator Losses Test Uncertainties as stated in Section 4.3(d) of the Generator TDIF; and

V_C = [redacted]/kW = the value for Generator power output not achieved at Operating Condition A for a Unit.

No bonus or other additional compensation will be paid by BC Hydro to the Contractor for Generator Losses in kW that are less than as stated in Section 4.3(b) of the Generator TDIF for the Turbine operating at Operating Condition A.

9.8 Liquidated Damages for Failure to Achieve Power Outputs for Operation Condition B

For any Unit that fails during the site acceptance and commissioning tests, as specified in Appendix 6-2 [General Technical Specifications (SPGT)], to operate continuously at the Generator power output coincident with the Turbine operating at the Turbine maximum power output for Operating Condition B, the Contractor will pay BC Hydro Liquidated Damages for each such Unit calculated as follows:

$$LDP_H = (P_{HF} – P_H – P_{mu}) \times V_H$$

where:

LDP_H = Liquidated Damages for Generator power output not achieved at Operating Condition B for a Unit;

P_{HF} = Generator power output in kW as stated in Section 2.3(a) of the Turbine TDIF;

P_H = Measured Generator power output in kW coincident with the Turbine operating at the highest power output for Operating Condition B;

P_{mu} = Power measurement uncertainty. For the purposes of this Section 9.8, an uncertainty allowance of 300 kW per Unit will be applied to the measured Generator power output; and

V_H = [redacted]/kW = the value for Generator power output not achieved at Operating Condition B for a Unit.

No bonus or other additional compensation will be paid by BC Hydro to the Contractor for a Generator power output in kW for the Turbine operating at Operating Condition B that is greater than as stated in the Turbine TDIF.

9.9 Liquidated Damages for Failure to Achieve Guaranteed Plant Annual Energy

The Contractor will pay BC Hydro Liquidated Damages if the achieved Plant Annual Energy during testing and commissioning is less than the Guaranteed Plant Annual Energy as stated in Section 2.1(a) of the Turbine TDIF.

The achieved Plant Annual Energy will be calculated using the Plant Annual Energy Calculation methodology with the Generator losses in Section 4.3 of the Generator TDIF updated with the Generator Losses measured during the site acceptance and commissioning tests.

If any prototype Turbine has one or more zones within the Normal Turbine Operating Range that fail to meet the requirements of Schedule 6 [Specifications and Drawings], then at BC Hydro's sole discretion, acting reasonably, the annual operating hours may be reduced proportionally to reflect the achievable operating zones and hours and the achieved Plant Annual Energy will be recalculated accordingly.

If, for any reason, modifications to the prototype Turbine are required, and such modifications are not represented in the Turbine Model Test results, then the Contractor will as part of the Work perform additional performance testing (such as a prototype Turbine index test that compares the relative Turbine efficiency before and after the modifications, or additional Turbine model testing) to determine whether the prototype Turbine efficiency is negatively impacted by such modifications. If the prototype Turbine efficiency is lower than as stated in Table 2.19 – Guaranteed Plant Annual Energy Calculation of

Appendix 11-6 [Technical Data and Information Forms] because of the modifications described in this paragraph, then the Turbine efficiency value used in the Plant Annual Energy Calculation for the nearest applicable Weighting Regime(s) will be adjusted and the achieved Plant Annual Energy will be recalculated.

Liquidated Damages will be assessed on any shortfall in achieved Plant Annual Energy below the Guaranteed Plant Annual Energy calculated as follows:

$$LD_E = (EP_2 – EP_1) \times VP_E$$

where:

LD_E = Liquidated Damages for Plant Annual Energy not achieved;

EP_2 = the guaranteed Plant Annual Energy;

EP_1 = the achieved Plant Annual Energy; and

VP_E = the value for Plant Annual Energy not achieved will be assessed at [redacted] per GWh.

Liquidated Damages for Plant Annual Energy not achieved will be rounded down to the nearest increment of [redacted].

No bonus will be paid for any achieved Plant Annual Energy in excess of the Guaranteed Plant Annual Energy.

9.10 Liquidated Damages for Failure to Achieve Core Buckling Performance

For each Unit where the Generator fails to meet the requirements of Section 2.5.4(f) of Appendix 6-5 [Generator Specifications (SPG)] the Contractor will pay BC Hydro Liquidated Damages calculated as follows:

(a) Step 1 – Determine the significance factor.

Obtain the significance factor from Table 9.10(a) using measurements of the core at the time of the assessment.

Table 9.10(a) – Significance Factor

	Significance Factor – SF_{core}		
Circumferential Length[1]	> 10 m	5 m to 10 m	< 5 m
Magnitude[2]			
5 mm to 9 mm	1	2	2
>9 mm to 12 mm	2	3	3
>12 mm	3	4	4

(b) Step 2 – Determine core stability factor.

Using the significance factor from Step 1 obtain the core stability factor from Table 9.10(b) based on the stability of the core at the time of the assessment.

Table 9.10(b) – Core Stability Factor

	Core Stability Factor – CSF_{core}	
	Core is Not Stable[3]	Core is Stable[3]
SF_{core}		
1	50%	25%
2	65%	40%
3	80%	55%
4	100%	75%

(c) Step 3 – Determine amount of Liquidated Damages.

Using the values obtained for the significance factor and the core stability factor obtained in Steps 1 and 2 above calculate the Liquidated Damages as follows:

Liquidated Damages per Generator = C_{core} x CSF_{core}

where:

Cost Core (C_{core}) = [redacted] per Generator.

Notes:

1 The core wave circumferential length is the circumferential distance on the inside diameter of the core from the point of maximum deviation from a level reference plane to the nearest adjacent reversal in the wave.

2 Core wave magnitude is equivalent to the deviation from level as defined in CEATI Report No. T052700-0329 Part I. However, BC Hydro, in its sole and absolute discretion, may decide to adjust the measured deviation from level to account for any deviations that existed prior to the winding installation but after the core full flux test described in Section 4.5.2 of Appendix 6-5 [Generator Specifications (SPG)]. The datum for this adjustment would be based on elevation measurements at the mid-point of the core.

3 A core will be deemed stable if the rate of increase in magnitude of a core wave is less than 1 mm in 4 years.

9.11 Liquidated Damages for Failure to Achieve Generator Stator Winding and Generator Rotor Winding

For each Generator where the Generator stator or rotor winding fails to meet the requirements of Section 5.4 of Appendix 6-5 [Generator Specifications (SPG)], then the Contractor will pay Liquidated Damages in the amount of [redacted].

9.12 Liquidated Damages for Failure to Achieve Cavitation Warranty

For each Turbine where the Turbine exceeds the Actual Permitted Thresholds for cavitation in the last completed Actual Warranty Assessment Periods in accordance with Section 4.4 of Appendix 6-3 [Turbine Specifications (SPT)], then the Contractor will pay to BC Hydro Liquidated Damages in the amount of [redacted].

9.13 Liquidated Damages for Failure to Achieve Wicket Gate Leakage

For each Turbine where the Turbine Wicket Gate Leakage, as measured during the site acceptance and commissioning tests, is greater than the Wicket Gate Leakage stated in Section 2.12(l) of the Turbine TDIF, then the Contractor will pay BC Hydro Liquidated Damages in the amount of [redacted] per L/s.

9.14 Liquidated Damages for Failure to Achieve Cooling Water Usage

For each Generator where the cooling water flow rate of the Generator air coolers as measured during the site acceptance and commissioning tests is greater than the cooling water flow rate stated in Section 4.7(a) of the Generator TDIF, then the Contractor will pay BC Hydro Liquidated Damages in the amount of [redacted] per L/s.

9.15 Rounding of Liquidated Damages Amount

In each instance where Liquidated Damages are payable by the Contractor pursuant to Section 9.7, 9.8 and 9.10 through Section 9.14 of this Schedule 11 [Prices and Payment], that Liquidated Damage amount will be rounded down to the nearest increment of [redacted].

9.16 Aggregate Limits for Interface Milestone Liquidated Damages and Completion Milestone Liquidated Damages

The aggregate Liquidated Damages payable by the Contractor pursuant to:

(a) Section 9.4 of this Schedule 11 [Prices and Payment] and Appendix 4-8 [Interface Requirements]; plus

(b) the first paragraph of Section 9.5 of this Schedule 11 [Prices and Payment], subject to Section 9.5(a) and Section 9.5(b) of this Schedule 11[Prices and Payment],

will not exceed with respect to all six Units, [redacted] of the Contract Price.

9.17 Aggregate Limits for Performance Liquidated Damages

The aggregate Liquidated Damages payable by the Contractor pursuant to Sections 9.7 through 9.14 of this Schedule 11 [Prices and Payment] will not exceed with respect to all six Units, [redacted] of the Contract Price.

9.18 Schedule 11 Liquidated Damages Aggregate Limit

The aggregate Liquidated Damages payable by the Contractor pursuant to this Schedule 11 [Prices and Payment] plus Appendix 4-8 [Interface Requirements] will not exceed [redacted] of the Contract Price.

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-1

PAYMENT SCHEDULE

Note: Attached to this Appendix 11-1 is an Excel spreadsheet entitled "Appendix 11-1 Payment Schedule" that the parties agree contains the correct Contract prices and which are deemed to be read as part of this Appendix 11-1 (and which will be subject to adjustment for currency fluctuation as provided by Section 12.1 of the Agreement).

Table Appendix 11-1 A: Contract Price Breakdown, by Milestone

				Milestone Payment Amount in $CAD						
Milestone Number	**Milestone**	**Payment Unit**	**PST Status**	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**	**Total**
Design										
1	Group A Submittals complete	Lump Sum for all six Units	PST Exempt	[redacted]						[redacted]
2	Group B Submittals complete	Lump Sum for all six Units	PST Exempt	[redacted]						[redacted]
3	Group C Submittals complete	Lump Sum for all six Units	PST Exempt	[redacted]						[redacted]
4	Group D, E, F Submittals and Group H, I, J preliminary Submittals complete	Lump Sum for all six Units	PST Exempt	[redacted]						[redacted]

Milestone Number	Milestone	Payment Unit	PST Status	Milestone Payment Amount in $CAD						
				Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Total
5	Group M and L Submittals complete	Lump Sum for all six Units	PST Exempt			[redacted]				[redacted]
6	Manuals and Issued for Record Drawings Submittals complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	Final Drawings and Explanatory Documents Submittals complete	Lump sum for all six Units	PST Exempt			[redacted]				[redacted]
			Design Sub-Total							[redacted]
Supply										
	Turbine									
8	1st Stage Concrete anchors, draft tube pier nose cap, draft tube elbow access door	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	Draft tube elbow, draft tube cone, draft tube platform, draft tube temporary closure piece, discharge ring	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]
10	Spiral case, stay ring, bulkheads, flexible coupling, closure section, penstock spool piece, turbine pit liner	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	Bottom ring, headcover, turbine pit walkway and guard rails, turbine pit hoist, turbine pit door	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

				Milestone Payment Amount in $CAD						
Milestone Number	**Milestone**	**Payment Unit**	**PST Status**	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**	**Total**
12	Runner, main shaft	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	Shaft seal, turbine guide bearing, wicket gate operating mechanism, wicket gates, servomotors	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	Air admission system, synchronous condense system	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	Piping, cooling water system, penstock drain valve	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	Turbine terminal panel, instrumentation, lighting, conduit, receptacles	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	Tooling and lifting devices	Lump Sum for all six Units	Taxable			[redacted]				[redacted]
	Generator									
18	Stator frame, stator sole plates, stator core	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

				Milestone Payment Amount in $CAD						
Milestone Number	**Milestone**	**Payment Unit**	**PST Status**	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**	**Total**
19	Stator winding, including circuit rings, winding connections, main and neutral terminals	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	Rotor hub, rotor spider, rotor rim, rotor field poles, field winding, field bus, pole interconnections	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	Generator lower bracket, generator thrust and guide bearing, high-pressure oil injection system, generator brakes, brake dust collection system, rotor jacking system	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	Piping, cooling and ventilation system, fire protection system	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	Brushgear	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	Upper bracket, brushgear housing, generator covers, generator enclosure doors and miscellaneous steelwork	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
25	Generator terminal cabinets, instrumentation, lighting, conduit, receptacles, heaters	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

				Milestone Payment Amount in $CAD						
Milestone Number	**Milestone**	**Payment Unit**	**PST Status**	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**	**Total**
26	Tooling and lifting devices	Lump Sum for all six Units	Taxable			[redacted]				[redacted]
	Exciter									
27	Exciter, including control system, excitation transformer, cabling, connection to generator isophase buswork, protection and monitoring systems, HMI and software	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Governor									
28	Governor, including control cabinet, hydraulic power unit, air make-up compressor, speed signal generator, motor control center, HMI and software	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
			Supply Sub-Total							[redacted]
			Design and Supply Sub-Total							[redacted]
Installation										
29	Draft tube elbows and anchors installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
30	Draft tube cone and anchors installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
31	Stay ring and spiral case installation complete; ready for hydrostatic test	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
32	Spiral case spool piece, flexible coupling and closure piece installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
33	Generator stator assembly and installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Milestone Number	Milestone	Payment Unit	PST Status	Milestone Payment Amount in $CAD						
				Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Total
34	Generator rotor assembly and installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
35	Exciter installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
36	Governor installation complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
37	Unit Assembly Complete	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Installation Sub-Total			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Testing and Commissioning										
38	Single Unit Substantial Completion	Lump Sum per Unit	PST Exempt	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
39	Remaining Testing and Commissioning complete	Lump Sum for all six Units	PST Exempt	[redacted]						[redacted]
	Testing and Commissioning Sub-Total									[redacted]
	Installation and Testing and Commissioning Sub-Total									[redacted]
Committed Spare Parts										
40	Committed Spares	Lump Sum for all six Units	PST Exempt			[redacted]				[redacted]
	Committed Spare Parts Sub-Total									[redacted]
Optional Spare Parts										
41	Optional Spares	Unit Prices	PST Exempt	Refer to Appendix 11-7 [Equipment Spare Parts Lists] for unit prices						
Optional Items										
42	Runner Modal Test in Water complete	Lump Sum for all six Units	PST Exempt	[redacted] (fixed price) (exercisable within 24 months after the Effective Date)						

Milestone Number	Milestone	Payment Unit	PST Status	Milestone Payment Amount in $CAD						Total
				Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	
43A	Alternative Excitation System Cooling System (Option 1 configuration is a straight line rectifier and control panel group with central cooling (separated from the Excitation System transformer))	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (not including costs for the changes to the cooling water system) (exercisable within 12 months after the Effective Date)						
43B	Alternative Excitation System Cooling System (Option 2 configuration adds the Excitation System transformer heat load to Option 1; either for the straight line or back-to-back rectifier an control panel group)	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (not including costs for the changes to the cooling water system) (exercisable within 12 months after the Effective Date)						
44A	Change the configuration of the Excitation System from a configuration where the rectifier and the control panels are arranged in a straight line of panels (i.e. 1 panel deep and 6 panels long) and with an Excitation System transformer that is physically separate from the rectifier and control panels (requiring a cable connection between them) to: - a configuration where the rectifier and control panels are arranged back-to-back (i.e. 2 panels deep and 3 panels long) and/or - a configuration where the Excitation System transformer is located immediately adjacent to the rectifier panels (and utilizes a direct bus connection that passes through the side of the rectifier panel enclosure and the Excitation System transformer enclosure).	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 12 months after the Effective Date)						

Milestone Number	Milestone	Payment Unit	PST Status	Milestone Payment Amount in $CAD						Total
				Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	
44B	Adapt the upper bracket and top covers and change the configuration and length of the Generator neutral leads to fit the octagonal shape of the Generator enclosure.	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 2 months after the Effective Date)						
44C	Not used									
44D	Provide the Generator stator frame with 72 additional (108 total) round openings (225 mm diameter) including covers and hardware. These openings to be located left, middle and right of each frame shelf.	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 6 months after the Effective Date)						
44E	Change the design of the generator thrust block to a design where shrinking or keying to the shaft are not required and where the turbine shaft and generator rotor are independently bolted to the thrust block such that the rotor can be removed without impacting the shaft to thrust block connection.	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 2 months after the Effective Date)						
44F	Change the Governor System distributing valve from a Vortex distributing valve to an to a L&S distributing valve	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 4 months after the Effective Date)						
44G	Update several engineering reports to accommodate the change in the tailwater level (TWL) that has been lowered by 0.2m but remove the vertical access hatch in the spiral case	No cost	PST Exempt	[redacted] (exercisable within 3 months after the Effective Date)	[redacted] (exercisable within 3 months after the Effective Date)	[redacted] (exercisable within 3 months after the Effective Date)	[redacted] (exercisable within 3 months after the Effective Date)	[redacted] (exercisable within 3 months after the Effective Date)	[redacted] (exercisable within 3 months after the Effective Date)	
44H	At the interface point to the penstock, remove the bracing on the penstock side of the interface point and perform the required paint repairs in this location (assume there is only one brace per unit)	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 12 months after the Effective Date)						

Milestone Number	Milestone	Payment Unit	PST Status	Milestone Payment Amount in $CAD						Total
				Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	
44I	Provide concrete Generator top covers that are completely enclosed by steel plates (including seal welding of all seams to keep the concrete dust in).	Lump Sum for all six Units	PST Exempt	[redacted] (fixed price) (exercisable within 3 months after the Effective Date)						
44J	Substitute the Generator top covers provided as part of the base design with Generator top covers that are similar in design to the Revelstoke U05 Generator top covers.	Lump Sum for all six Units	PST Exempt	Not to exceed [redacted] (exercisable within 3 months after the Effective Date)						
44K	Not used									
Deduction Amounts										
45	Compensation for Labour Agreement Cost Participation Payment	Lump Sum	PST Exempt	[redacted]						[redacted]
46	Compensation for Conducting Model Testing	Lump Sum	PST Exempt	[redacted]						[redacted]
	Deduction Amounts Sub-Total									[redacted]
Provisional Sum										
47	Provisional Sum (to be paid in accordance with Section 5.19 of Schedule 11 [Prices and Payment])	Provisional Sum	PST Exempt	[redacted]						[redacted]
	Provisional Sum Sub-Total									[redacted]
	Design and Supply Sub-Total (Non-Installation Work)[1]									[redacted]
	Installation and Testing and Commissioning Sub-Total (Installation Work)[2]									[redacted]
	Committed Spare Parts Sub-Total									[redacted]

[1] For the purposes of this Schedule 11 [Prices and Payment], "Design and Supply Sub-Total" will be the Contractor's price for the Non-Installation Work.

[2] For the purposes of this Schedule 11 [Prices and Payment], "Installation and Testing and Commissioning Sub-Total" will be the Contractor's price for the Installation Work.

				Milestone Payment Amount in $CAD						
Milestone Number	**Milestone**	**Payment Unit**	**PST Status**	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**	**Total**
								Sub Total Before Deduction Amounts		[redacted]
								Deduction Amounts Sub-Total		[redacted]
								Contract Price		[redacted]
								GST		[redacted]
								Provisional Sum Sub-Total		[redacted]

Table Appendix 11-1 B: Milestone Dates, by Unit

Milestone Number	Milestone	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Design[1]							
1	Group A Submittals complete						
2	Group B Submittals complete						
3	Group C Submittals complete						
4	Group D, E, F Submittals and Group H, I, J preliminary Submittals complete						
5	Group M and L Submittals complete						
6	Manuals and Record Issue drawings Submittals complete						
7	Final Drawings and Explanatory Documents Submittals complete						
Supply[2]							
	Turbine						
8	1st Stage Concrete anchors, draft tube pier nose cap, draft tube elbow access door supply complete						
9	Draft tube elbow, draft tube cone, draft tube platform, draft tube temporary closure piece, discharge ring supply complete						
10	Spiral case, stay ring, bulkheads, flexible coupling, closure section, penstock spool piece, turbine pit liner supply complete						

Milestone Number	Milestone	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
11	Bottom ring, headcover, turbine pit walkway and guard rails, turbine pit hoist, turbine pit door supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
12	Runner, main shaft supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	Shaft seal, turbine guide bearing, wicket gate operating mechanism, wicket gates, servomotors supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	Air admission system, synchronous condense system supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	Piping, cooling water system, penstock drain valve supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	Turbine terminal panel, instrumentation, lighting, conduit, receptacles supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	Tooling and lifting devices supply complete	[redacted]					
	Generator						
18	Stator frame, stator sole plates, stator core supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	Stator winding, including circuit rings, winding connections, main and neutral terminals supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	Rotor hub, rotor spider, rotor rim, rotor field poles, field winding, field bus, pole interconnections supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	Generator lower bracket, generator thrust and guide bearing, high-pressure oil injection system, generator brakes, brake dust collection system, rotor jacking system supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	Piping, cooling and ventilation system, fire protection system supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	Brushgear supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Milestone Number	Milestone	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
24	Upper bracket, brushgear housing, generator covers, generator enclosure doors and miscellaneous steelwork supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
25	Generator terminal cabinets, instrumentation, lighting, conduit, receptacles, heaters supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
26	Tooling and lifting devices supply complete	[redacted]					
	Exciter						
27	Exciter, including control system, excitation transformer, cabling, connection to generator isophase buswork, protection and monitoring systems, HMI and software supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Governor						
28	Governor, including control cabinet, hydraulic power unit, air make-up compressor, speed signal generator, motor control center, HMI and software supply complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Installation[3]							
29	Draft tube elbows and anchors installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
30	Draft tube cone and anchors installation complete	3[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
31	Stay ring and spiral case installation complete; ready for hydrostatic test	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
32	Spiral case spool piece, flexible coupling and closure piece installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
33	Generator stator assembly and installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
34	Generator rotor assembly and installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Milestone Number	Milestone	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
35	Exciter installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
36	Governor installation complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
37	Unit Assembly Complete	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Testing and Commissioning							
38	Single Unit Substantial Completion[4]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
39	Remaining Testing and Commissioning complete[5]			[redacted]			
Committed Spare Parts							
40	Committed Spares[6]			[redacted]			
Optional Spare Parts							
41	Optional Spares			[redacted]			
Optional Items							
42	Runner Modal Test in Water complete			[redacted]			
43	Alternate Excitation System Cooling System	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Notes:

[1] A design Milestone is complete when all calculations, reports, drawings and supporting information associated with that Milestone have been submitted by the Contractor to BC Hydro in accordance with the requirements of the Contract Documents and have been endorsed "Accepted" or deemed to have been endorsed "Accepted" by Hydro's Representative in accordance with Schedule 5 [Submittals Procedure].

[2] A supply Milestone is complete when the equipment described in the description of that milestone event, including all of the associated anchors, fittings, hardware and auxiliary components required for handling, assembly and installation, has been factory assembled and/or tested and delivered to the designated storage or laydown area at the Site in accordance with the requirements of the Contract Documents and has been inspected and accepted by BC Hydro.

[3] An installation Milestone is complete when the equipment described in the description of that milestone event, including all of the associated hardware, software, lubricants and/or auxiliary components required for operation, has been assembled and installed in accordance with the requirements of Contract Documents and has been inspected and accepted by BC Hydro.

[4] Milestone 38, with respect to an individual Unit, is complete when all of the testing and commissioning activities as required by the Contract Documents have been completed by the Contractor, the results accepted by BC Hydro, and the Unit is ready for Commercial Operation.

[5] Milestone 39 is complete when the following tests have been completed by the Contractor, in accordance with the Contract Documents, and the results accepted by BC Hydro: Generator Loss Measurement, Generator Three-Phase Sudden Short Circuit Test, Runner Strain Gauge Measurement and Runaway Test.

[6] Milestone 40 is complete when all of the spare parts identified as “Committed Spares” in Table Appendix 11-7 A have been delivered to Site and have been deemed by Hydro’s Representative to meet the requirements for spare parts in accordance with Appendix 6-2 [General Technical Specifications (SPGT)].

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-2

FORM OF LETTER OF CREDIT

[*Issuing Bank Name & Address*]	**Date of Issue**: [*Date*]
	Irrevocable Standby Letter of Credit
	No. [*Number*]
Applicant:	**Beneficiary:**
[*Customer Name and Address*]	British Columbia Hydro and Power Authority
	[*Address*]
	Amount:
	[*Currency and Amount both in letters and numbers*]

At the request of and for the account of the Applicant, we, [*Bank Name*], hereby establish in favour of the Beneficiary our irrevocable standby Letter Of Credit No. [*Number*] (hereinafter called the "**Letter of Credit**") for an amount not exceeding [*Currency and Amount both in letters and numbers*].

We, [*Bank Name and Address*], hereby unconditionally and irrevocably undertake and bind ourselves, and our successors and assigns, to pay British Columbia Hydro and Power Authority ("**you**") immediately, the sum, which you claim upon receipt of the following documents:

(1) your written demand specifying the amount claimed, the number of this Letter of Credit, and the date of issue of this Letter of Credit; and

(2) this original Letter of Credit, including any amendments, must be presented with your demand for payment for endorsement purposes.

This Letter of Credit may be presented for payment at the above issuing address or at [*alternate Vancouver (B.C.) branch location if letter of credit is not issued in Vancouver*].

It is understood that we are obligated under this Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment, on or before the expiry date or any future expiry date, without enquiring whether you have a right as between yourself and the Applicant to make such demand and without recognizing any claim of the Applicant.

Partial drawings and multiple presentations are allowed. The amount of this Letter of Credit shall be automatically reduced by the amount of any drawing paid hereunder.

This Letter of Credit takes effect from the Date of Issue set forth above, and shall remain valid until [*Date*]. However, it is a condition of this Letter of Credit that it will be automatically extended without notice for a further one year period from the present or any future expiry date unless at least ninety (90) days prior to such expiry date we notify you in writing at your address and the Site C Department or Personnel at the address below by courier or registered mail that we elect not to consider this Letter of Credit to be extended for any additional period. If we give you notice of our election not to extend for an additional period, you shall be entitled to immediately demand payment of the full amount of this Letter of Credit.

Site C Department or Personnel:
[*insert address*]

This Letter of Credit is subject to the International Standby Practices 1998 ("**ISP98**"). All matters not covered by ISP98 will be governed by the laws applicable in the Province of British Columbia. The parties hereby irrevocably attorn to the exclusive jurisdiction of the courts of British Columbia. The number of this Letter of Credit must be quoted on all documents required hereby.

_____	_____
Authorized Signing Officer	Authorized Signing Officer
[Bank Name]	[Bank Name]

Letter of Credit Requirements
(wording contained in this box does not form part of the issued LoC)

(a) issued or confirmed by a branch of a domestic Canadian financial institution having a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or Dominion Bond Rating Service A (low). If the issuing financial institution is not a domestic Canadian financial institution, the sovereign country's debt rating will be no less than Standard & Poor's AA, Moody's Aa2 or DBRS AA and the financial institution must have a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). BC Hydro, at its discretion, may accept a sovereign debt rating of Standard & Poor's AA-, Moody's Aa3 or DBRS AA (low) if the issuing bank has a rating of not less than Standard & Poor's A, Moody's A2 or DBRS A. If such credit rating agencies publish differing credit ratings for the same financial institution, the lowest credit rating of any of the credit rating agencies shall apply for purposes of this section;

(b) available for presentation in Vancouver (B.C.) Canada; and

(c) for a term of not less than one year and providing that it is renewed automatically, unless the issuing or confirming financial institution advises otherwise as specified in the letter of credit.

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-3

FORM OF GUARANTEE

THIS GUARANTEE is made as of the _____ day of _____, 20__.

BETWEEN:

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY, having its head office at 333 Dunsmuir Street, Vancouver, B.C., V6B 5R3, Canada

(the "**Beneficiary**")

AND:

[ ]

(the "**Guarantor**")

WHEREAS:

(A) The Beneficiary and [ ] ("**Contractor**") entered into a contract entitled "BC Hydro Site C Clean Energy Project Supply and Installation of Turbines and Generators Contract, (BC Hydro Reference **#**_____)" (the "**Contract**").

(B) At the request of the Beneficiary, and as a condition of the Contract, the Guarantor has agreed to guarantee the punctual and complete performance of any and all of the present and future obligations and liabilities of Contractor under or arising out of the Contract, including, without limitation, Contractor's obligations to pay Liquidated Damages (as defined in the Contract) as specified in the Contract (the "**Guaranteed Obligations**").

THEREFORE IN CONSIDERATION OF THE PAYMENT of ten ($10.00) dollars by the Beneficiary to the Guarantor and other good and valuable consideration (the receipt and sufficiency of which is hereby acknowledged and agreed), including the Beneficiary entering into the Contract with Contractor, the parties agree as follows:

(1) The Guarantor absolutely, irrevocably and unconditionally guarantees to the Beneficiary the punctual and complete performance and observance of all of the Guaranteed Obligations whenever, however or wherever incurred. If at any time Contractor defaults in the performance of any of the Guaranteed Obligations in accordance with the Contract, the Guarantor shall, immediately upon the Beneficiary's written demand, remedy the default, including perform (or procure the performance of) Contractor's Guaranteed Obligations and pay any and all sums, including, without limitation, Liquidated Damages, that may be payable under the Contract in consequence of the non-performance by Contractor of such Guaranteed Obligations.

(2) Subject to clause (6) below, the Guarantor agrees to pay the Beneficiary, forthwith upon demand, all reasonable out of pocket costs and expenses, including, without limitation, legal fees on a solicitor and client basis, incurred by or on behalf of the Beneficiary to realize the benefit of any of its rights:

(a) against the Contractor (but solely to the extent the Contractor would have been responsible for such costs and expenses under the Contract); and

(b) against the Guarantor,

in respect of the Guaranteed Obligations.

(3) Any obligation of the Guarantor hereunder that is not paid when due will bear interest at a rate that is equal to the annual rate of interest declared by the Bank of Montreal from time to time as the rate of interest charged to its most creditworthy commercial borrowers for loans in Canadian dollars payable on demand and commonly referred to as its "prime rate", plus [redacted], from the date it becomes due to the date of payment, due and payable on demand.

(4) This Guarantee is a continuing guarantee and shall apply to all of the Guaranteed Obligations and remain in place until the earlier of: 1) two years from the date on which the Contract is terminated; or 2) eight years from Total Completion as described in Section 5.15 of Schedule 11 [Prices and Payment] of the Contract.

(5) The Beneficiary shall not be bound to seek or exhaust its recourse against Contractor or any other persons or to realize on any security (including, without limitation, any letters of credit it may hold in respect of the Guaranteed Obligations) before being entitled to exercise its rights under this Guarantee. However, the Beneficiary shall not be entitled to enforce its rights and claims under this Guarantee with respect to a Guaranteed Obligation to the extent such Guaranteed Obligation has already been satisfied through other security held by the Beneficiary in respect of such Guaranteed Obligation.

(6) Subject to clauses (3) and (12), nothing herein shall be construed as imposing greater obligations and liabilities on the Guarantor than are imposed on Contractor under the Contract. The Guarantor shall be entitled to all defences, limitations and exclusions available to Contractor under the Contract. In no event shall the Guarantor's aggregate liability under this Guarantee exceed an amount equal to [redacted] of the sum of the Contractor's price for the Installation Work as specified in Appendix 11-1 [Payment Schedule] of the Contract and the Contractor's price for the Non-Installation Work as specified in Appendix 11-1 [Payment Schedule] of the Contract.

(7) This Guarantee shall extend to any variation of or amendment to the Contract and to any agreement supplemental thereto agreed between the Beneficiary and Contractor.

(8) The Beneficiary may, at its election, exercise or decline to exercise any right or remedy it may have against Contractor or any other person liable on or in respect of the Guaranteed Obligations, or any security held from Contractor or any other person in respect of the Guaranteed Obligations, without affecting or impairing the liability of the Guarantor, and the Guarantor hereby waives any defence arising out of the absence, impairment or loss of any such security or right of reimbursement, contribution or subrogation.

(9) The Beneficiary will have the right, in its discretion, to proceed directly against the Guarantor for any and all remedies provided by law, equity or in the Contract whether by legal proceedings or otherwise, to have the Guarantor fulfil the Guaranteed Obligations.

(10) Until the Guaranteed Obligations have been fully and completely performed, and subject to fulfilment of the requirements of this Guarantee, the Guarantor will not be released or discharged from its obligations hereunder by any matter or thing whatsoever that would otherwise release or discharge a guarantor. Without limiting the generality of the foregoing, the Guarantor expressly agrees that none of the following circumstances or actions, whether taken by or occurring in respect of Contractor, the Beneficiary, the Guarantor or any other person or entity, will in any way release, affect or impair the obligations and liabilities of the Guarantor hereunder:

(a) voluntary or involuntary liquidation, dissolution, consolidation or merger (or the sale or other disposition of all or part of a party or its assets);

(b) bankruptcy, receivership, insolvency, assignment for the benefit of creditors, reorganization, arrangement, composition or readjustment of debt, or other similar proceeding affecting a party or any of its assets;

(c) the invalidity or unenforceability of the Contract or any security, bond, third party guarantees, or other assurances intended to be granted or provided by Contractor or any other party to the Beneficiary or any other party under the Contract;

(d) the failure of the Beneficiary or any other party to take, protect or preserve any rights, security or similar assurance in relation to the Contract, from Contractor or any other party, or the loss, diminution or unenforceability or impossibility to realize or abstention from realization of any such right, security or similar assurance, whether or not caused or resulting from any act or omission of the Beneficiary or any person acting for the Beneficiary;

(e) any other occurrence or circumstance whatsoever, whether similar or dissimilar to the foregoing, any other circumstance that might otherwise constitute any legal or equitable defence or discharge of the obligations and/or liabilities of Contractor or the Guarantor or that might otherwise limit recourse against the Guarantor; and

(f) if, with or without the Guarantor's knowledge or consent, any one or more of the following occur:

(1) any modifications of the Contract, made by agreement of Contractor and the Beneficiary;

(2) any waivers by the Beneficiary or Contractor of any terms, provisions, conditions or obligations under the Contract;

(3) any assignment or the making of any assignment of the Contract as may be permitted under the Contract;

(4) any failure by the Beneficiary to enforce any provision of the Contract against Contractor; or

(5) any other granting of extensions or time, renewals, indulgences, waivers, releases or discharges, or the making of any compromises or transactions or arrangements, regarding the Contract.

(11) Until the Guaranteed Obligations have been fully and completely performed, the Guarantor shall not be subrogated in any manner to any right of the Beneficiary.

(12) If the Guarantor or any other person is required by law to make any deduction or withholding on account of any tax or other amount from any sum paid or payable by the Guarantor under this Guarantee, the sum payable by the Guarantor in respect of which the relevant deduction, withholding or payment is required shall (except, in the case of any such payment, to the extent that its amount is not ascertainable when that sum is paid) be increased to the extent necessary to ensure that, after the making of that deduction, withholding or payment, the Beneficiary receives on the due date and retains (free from any liability in respect of any such deduction, withholding or payment) a net sum equal to what it would have received and so retained had no such deduction, withholding or payment been required or made.

(13) Neither the Guarantor's obligations under this guarantee nor any right or remedy for the enforcement thereof will be impaired, stayed, modified, changed or released in any manner whatsoever by any order, stay, modification, release or limitation in regard to Contractor or the

Guarantor resulting from the operation or effect of any provision of the *Bankruptcy and Insolvency Act* (Canada), the *Companies' Creditors Arrangement Act* (Canada), the *Winding-up and Restructuring Act* (Canada) or other statute, code or laws of any jurisdiction relating to debtor relief or relating to the release of the obligations of the Guarantor hereunder, or from the decision of any court or authority interpreting any of the same, and the Guarantor will be obligated under this guarantee as if no such order, stay, modification, release or limitation had occurred.

(14) This Guarantee constitutes the entire agreement of the Guarantor with the Beneficiary relating to the subject matter hereof and supersedes all prior contracts or agreements, whether oral or written. There are no representations, agreements, arrangements or undertakings, oral or written, between the Guarantor and the Beneficiary relating to the subject matter of this Guarantee which are not fully expressed herein.

(15) No amendment to this Guarantee will be valid or binding unless set forth in writing and duly executed by each of the Beneficiary and the Guarantor. No waiver of any breach by the Guarantor of any provision of this Guarantee will be effective or binding unless made in writing and signed by the Beneficiary and, unless otherwise provided, will be limited to the specific breach waived.

(16) This Guarantee is in addition to and not in substitution for any other undertakings, securities and guarantees held or which may be held by or for the benefit of the Beneficiary, including without limitation any performance bonds, letters of credit, financial holdbacks under the Contract, and guarantees from any other parties.

(17) The Guarantor shall promptly and with all due diligence perform its obligations under this Guarantee.

(18) All notices or other communications in connection with this Guarantee shall be served:

(a) Upon the Beneficiary, at 333 Dunsmuir Street, Vancouver, British Columbia, V6B 5R3. Attention: [_____]; and Attention: [_____] at **[insert Site C Address]**; and

(b) Upon the Guarantor, at [_____] Attention: [_____].

Notice given by personal delivery or mail shall be effective upon actual receipt. Notice given by facsimile transmission shall be effective upon actual receipt if received during the recipient's normal business hours, or at the beginning of the recipient's next business day after receipt if not received during the recipient's normal business hours. All Notices by facsimile transmission shall be confirmed promptly after transmission in writing by certified or registered mail or personal delivery.

(19) The Beneficiary and the Guarantor may change their respective nominated addresses for service of communications to another address but only by prior written notice to each other. All such communications must be in writing.

(20) This Guarantee shall enure to the benefit of and be binding upon the parties and their respective heirs, legal representatives, successors and permitted assigns (as permitted under the Contract, the "**Permitted Assigns**"). Other than an assignment to a Permitted Assign, neither party may assign this Guarantee without the express written consent of the other party.

(21) Whenever possible, each provision of this Guarantee shall be interpreted in such manner as to be effective, enforceable and valid under British Columbia law, and Canadian law to the extent applicable, but if any provision of this Guarantee shall be found to be illegal, ineffective, invalid or unenforceable under such law, it shall be deemed severed from this Guarantee to the extent of

such illegality, ineffectiveness, invalidity or unenforceability without effect on any of the remaining provisions of this Guarantee.

(22) This Guarantee shall be governed by and construed in accordance with the laws of the Province of British Columbia and the laws of Canada applicable in British Columbia.

(23) Any dispute arising from, connected with, or relating to this Guarantee will be resolved by the courts of British Columbia sitting in the City of Vancouver, and the Guarantor hereby irrevocably submits and attorns to the original and exclusive jurisdiction of the courts of British Columbia sitting in the City of Vancouver for those purposes.

(24) The Guarantor represents and warrants that:

(a) it is duly organized and validly existing under the laws of its jurisdiction of organization;

(b) it has the power, authority and legal right to execute and deliver, and to perform its obligations under, this Guarantee, and has taken all necessary action to authorize its execution, delivery and performance of this Guarantee, and this Guarantee has been duly executed by it;

(c) this Guarantee constitutes a legal, valid and binding obligation of the Guarantor;

(d) the execution, delivery and performance of this Guarantee will not violate or result in default under any applicable law, rule or regulation or any judgement, order, decree, agreement, instrument or undertaking applicable to the Guarantor;

(e) it is related to Contractor and directly or indirectly derives a benefit from the Beneficiary entering into the Contract with Contractor;[3]

(f) it has the financial equity and the ability and capacity as described in (a) and (b) above to carry out its obligations under this Guarantee.

(25) The Beneficiary may at any time during the term of this Guarantee request, by written notice, reasonable financial assurances of the Guarantor's continued ability to carry out its obligations under this Guarantee and the Guarantor shall provide such reasonable assurances to the Beneficiary in writing within ten (10) Days of the Beneficiary's notice.

[3] If the Guarantor is not an affiliate of the Contractor, clause (e) will be deleted from the Guarantee before it is delivered.

IN WITNESS WHEREOF the Guarantor has executed this Guarantee as of the day and year first above written.

[GUARANTOR]

By: _____
(Signature)

_____
(Print Name)

Title: _____

Date: _____

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-4

PST

Table Appendix 11-4 A

Production Machinery and Equipment PST Exemption (PME)

Exclusions (not a complete list)

Item	PME	Components
1.	No PST Exemption	Bases and foundations Buildings Equipment that is located away from the generation facility Equipment used to heat, ventilate and cool the powerhouse – HVAC Gantry cranes Gates/security Overhead cranes Walkways and catwalks Tooling and lifting devices

Table Appendix 11-4 B

Production Machinery and Equipment PST Exemption (PME)

Qualifying PME used at the Powerhouse primarily and directly in the production of electricity for sale by BC Hydro (not a complete list)

Item	PME	Components
1.	Turbine	Air admission system (all components) Air head Air piping Embedded casings (spiral case) Francis turbine (all components) Head cover Head cover drainage pump Instrumentation Kaplan (all components) Operating ring Operating ring bushings Operating ring locks Pelton (all components) Piping (air & water) Shaft Shaft seal cooling water piping Shaft seals

Item	PME	Components
		Shear pins Shift ring Synchronous condense equipment (all components) Stationary ring seals Stay ring Turbine seals Unwatering systems (see Auxiliary Equipment) Wicket gate arms Wicket gate bushings (lower, upper middle) Wicket gate thrust collars Wicket gates
2.	Generator	Air-water coolers Bearing cooling systems Bearing oil systems Bearings Brakes (including brake pads) Cooling water system (piping, instrumentation & controls) Covers Current transformers (main, neutral, split phase) Deluge ring Fire protection system Guide bearing Instrumentation Lift pump Lower bracket Neutral cubicle Partial discharge monitoring system Partial discharge System Resistance Temperature Detector (RTD) cabinet Rotor (all components) Sole plates Stator (all components) Thrust bearing Upper bracket

Item	PME	Components
3.	Governor, HPU, Servomotors	Controls High pressure gas compressors High pressure oil and gas tanks High pressure oil pumps High pressure piping (oil and air) Instrumentation Jockey pump Oil sump Servo-motor connecting rods Servo-motor connecting rod bushings Servo-motor leakage pump Servo-motor locks Servo-motors
4.	Excitation System	Automatic voltage regulator Brush rigging Brushgear (with the exception of the brushes) Collector (slip ring) brush holders Collector ring (slip ring) Cooling and ventilation system Exciter brush holders Exciter leads Exciter transformer Field bus Field leads Rotary exciter (and all sub components) Static exciter (and all sub components)
5	Protection & Control, And Switchgear	Air gap monitoring system Alarm panels Bus work Capacitors Circuit breakers Current transformers DC batteries DC battery charger Disconnects Enclosures, DIN rail, terminal blocks, and other misc. equipment Gas insulated switchgear (GIS) Instrumentation Insulators Isolated phase bus Line Traps (if used for P&C) Load breaking resistors Metal clad switchgear Metering equipment Networking equipment (plant LAN) OI (Operational Information) equipment

Item	PME	Components
		PLC's (Power Line Carrier) and associated equipment Reactors Relays Surge arresters Unit Control Board (UCB) Vibration monitoring systems Voltage transformers Water contamination detector Wire and cabling
6.	Auxiliary Equipment	Draft tube drainage system (pumps, piping & controls) Draft tube gate lifting device Draft tube gates Equipment heaters Hydraulic cylinders Hydraulic hoists Motors & motor control centers (MCCs) Piping (air systems) Piping (oil systems) Piping (water cooling systems) Screens (cooling systems) Station service panels (only panels used for production equipment) Station service transformers Stationary air compressors, dryer and air Thermal insulation & linings Unwatering systems Valves (cooling systems)

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-5

COMPLETION MILESTONE DAMAGES

Completion Milestone	2022 In-Service			
	Milestone Date	Liquidated Damages / day (or portion of a day)		
		1–30 day delay	31-120 day delay	Delay > 120 days
Units 1 to 6 **Draft Tube Temporary Closure Installed**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 1 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 1 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 2 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 2 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 3 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 3 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 4 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 4 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 5 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 5 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 6 – **Unit Assembly Complete**	[redacted]	[redacted]	[redacted]	[redacted]
Unit 6 **Single Unit Substantial Completion**	[redacted]	[redacted]	[redacted]	[redacted]

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-6

TECHNICAL DATA AND INFORMATION FORMS

1.0 GENERAL TECHNICAL DATA AND INFORMATION FORM

			Value	Units
1.1	**Mechanical Design Information**			
(a)	Speed			
	(i)	Rated speed	[redacted]	rpm
	(ii)	Runaway speed	[redacted]	rpm
	(iii)	Shaft critical speed	[redacted]	rpm
(b)	Unit Inertia			
	(i)	Unit Moment of Inertia, J_{GT} (Generator + Turbine)	[redacted]	$kg•m^2$
	(ii)	Unit Inertia Constant, H_{GT} (Generator + Turbine)	[redacted]	MW•s/MVA
1.2	**Cooling Water System**			
(a)	Spiral case supply pipe diameter at first valve		[redacted]	in
(b)	Raw water interface pipe diameter		[redacted]	in
(c)	Basket strainer make and model		[redacted]	
(d)	Shut off control valve diameter		[redacted]	in
(e)	Shut off control valve make and model		[redacted]	
(f)	Shut off control valve actuator make and model		[redacted]	
(g)	Return line diameter at interface		[redacted]	in
(h)	Maximum total cooling water flow at the Maximum Cooling Water Supply Temperature (assuming zero flow in raw water header)		[redacted]	L/s
(i)	Pressure drop from the spiral case to the return line interface at the above design flow		[redacted]	kPa
1.3	**Station Service Compressed Air Requirements**			
(a)	Maximum simultaneous air flow at 690 kPa (excluding synchronous condenser air depression requirements)		[redacted]	L/min
1.4	**Shaft Coupling**			
(a)	Bolt tensioning method for turbine shaft to runner		[redacted]	
(b)	Bolt tensioning method for turbine shaft to rotor/thrust block		[redacted]	

		Value	Units
1.5	**Hoists/Cranes**		
(a)	Turbine pit hoist capacity	[redacted]	tonnes
(b)	Heaviest component that turbine pit hoist will lift	[redacted]	
(c)	Mass of the heaviest component to be lifted in the penstock coupling chamber during site erection (penstock coupling chamber crane to be provided by Others)		
(d)	Description, capacity, and the heaviest component to be lifted, for all other hoists/cranes to be provided		
	[redacted]		
	[redacted]		
1.6	**Lifting Devices**		
(a)	Description, capacity, and the heaviest component to be lifted, for all lifting devices with ratings over 25 tonnes		
	[redacted]		
	[redacted];		
	Rotor lifting device, 565 tonnes, complete rotor with poles, rim and		
	[redacted]		
1.7	**Key Powerhouse and Equipment Dimensions and Values**		
(a)	Turbine Center Line Elevation (TCL EL)	[redacted]	m
(b)	Draft tube base elevation (DTB EL)	[redacted]	m
(c)	Main floor elevation (MFL EL)	[redacted]	m
(d)	Draft tube gate sill elevation (DGS EL)	[redacted]	m
(e)	Turbine Bay Length & service bay length (TBL)	[redacted]	m
(f)	Offset between Turbine centerline and draft tube centerline (TDO)	[redacted]	m
(g)	Offset between penstock centerline and Turbine centerline (TPO)	[redacted]	m
(h)	Turbine Bay Width (TBW)	[redacted]	m
(i)	Turbine Centerline to end of spiral case inlet at the coupling (TE)	[redacted]	m
(j)	Generator centerline elevation (GCL EL)	[redacted]	m

		Value	Units
(k)	Maximum extent of Generator enclosure (X Direction & Y Direction) (GA)	[redacted]	m
(l)	Height of Generator enclosure (GB)	[redacted]	m

2.0 TURBINE TECHNICAL DATA AND INFORMATION FORM

Line items in the Turbine TDIF that are shown in a box are the critical TDIF values (refer to Section 12.2 of the Agreement).

		Value	Units
2.1	**Plant Annual Energy**		
(a)	Guaranteed Plant Annual Energy (as calculated using the Plant Annual Energy Calculation set out under with the Independent Laboratory Turbine Model test result) – see Table 2.19 in this Appendix 11-6 [Technical Data and Information Forms]:	[redacted]	GW-h
2.2	**Generator Power Output for Operating Condition A**		
(a)	The Generator power output measured at the Generator terminals with the Generator operating at: 0.95 power factor (over-excited), rated voltage, rated frequency, and Generator Rated Operating Conditions, and with the Turbine operating at the Turbine discharge and the NSHE for Operating Condition A will not be less than:	[redacted]	kW
2.3	**Generator Power Output for Operating Condition B**		
(a)	The Generator power output measured at the Generator terminals with the Generator operating at: 0.95 power factor (over-excited), rated voltage, rated frequency, and Generator Rated Operating Conditions, and with the Turbine operating at the Turbine discharge and the NSHE for Operating Condition B will not be less than:	[redacted]	kW
2.4	**Turbine Performance Parameters**		
(a)	Turbine Rated Output	[redacted]	kW
(b)	Minimum NSHE (Calculated with minimum penstock diameter of 9.8 m and using definition of "(d) Other Operating Conditions, (i) Low Head, High Flow" (refer to Appendix 6-3 [Turbine Specifications (SPT)], SPT 3.2.2))	[redacted]	m^2/s^2
(c)	Maximum NSHE (Calculated with maximum penstock diameter of 10.5 m and using definition of "(d) Other Operating Conditions, (iv) High Head, Low Flow" (refer to Appendix 6-3 [Turbine Specifications (SPT)], SPT 3.2.2))	[redacted]	m^2/s^2
(d)	Rotational speed	[redacted]	r/min

(e) Operating Conditions[1] (filled in by BC Hydro using data from the Independent Lab)		Operating Condition A	Operating Condition B	Reference Minimum Turbine Output[2]	
(i)	NSHE	[redacted]	[redacted]	[redacted]	m^2/s^2
(ii)	Wicket gate position	[redacted]	[redacted]	[redacted]	°
(iii)	Turbine discharge	[redacted]	[redacted]	[redacted]	m^3/s
(iv)	Scaled up Turbine efficiency	[redacted]	[redacted]	[redacted]	%
(v)	Turbine power	[redacted]	[redacted]	[redacted]	kW

			Value	Units
	(vi)	Unit power, at the Generator terminals at 0.95 power factor	[redacted]	kW

Note:

(1) Determined using the tailwater levels indicated in SPT3.1.4, and intake losses associated with a penstock diameter of 10.2 m.

(2) A Turbine operating at the discharge associated with the Reference Minimum Turbine Output and the reservoir, tailwater and power factor as defined for Operating Condition C.

(f)	Maximum runaway speed of Prototype turbine:		[redacted]	r/min
(g)	Conditions under which maximum runaway speed of the Prototype turbine occurs:			
	(i)	NSHE	[redacted]	m^2/s^2
	(ii)	Turbine Discharge	[redacted]	m^3/s
(h)	Axial hydraulic thrust of Prototype turbine			
	(i)	Maximum hydraulic downthrust at steady-state operating regimes:	[redacted]	kN
	(ii)	Conditions under which maximum thrust occurs:		
		(A) Turbine power	[redacted]	kW
		(B) NSHE	[redacted]	m^2/s^2
	(iii)	Maximum hydraulic upthrust at steady-state operating regimes:	[redacted]	kN
	(iv)	Conditions under which maximum thrust occurs:		
		(A) Turbine power	[redacted]	kW
		(B) NSHE	[redacted]	m^2/s^2
	(v)	Maximum downthrust at transient conditions:	[redacted]	kN
		(A) (transient conditions to be specified)	[redacted]	
	(vi)	Maximum upthrust at transient conditions:	[redacted]	kN
		(A) (transient conditions to be specified)	[redacted]	
(i)	Spiral Case Design Pressure (equal to or greater than)		[redacted]	kPa
(j)	Maximum total indicated shaft runout of Prototype turbine referenced to turbine guide bearing as specified in SPT4.3.2, for the full operating range of NSHE's:			
	(i)	Operating Zone 1	[redacted]	mm
	(ii)	Operating Zone 2	[redacted]	mm
	(iii)	Operating Zone 3	[redacted]	mm
(k)	Moment of inertia, J_T of runner and shaft		[redacted]	$kg•m^2$

			Value	Units
2.5	**Spiral Case, Flexible Coupling Section, Closure Section, Penstock Spool Piece, and Draft Tube**			
(a)	Plate thickness at:			
	(i)	Spiral case inlet	[redacted]	mm
	(ii)	Closure section	[redacted]	mm
	(iii)	Flexible coupling section	[redacted]	mm
	(iv)	Penstock Spool Piece	[redacted]	mm
	(v)	Draft Tube steel liner	[redacted]	mm
2.6	**Stay Ring**			
(a)	Outside diameter of stay ring		[redacted]	mm
(b)	Number of stay vanes		[redacted]	
(c)	Number of sections		[redacted]	
2.7	**Turbine Pit Liner**			
(a)	Pit diameter		[redacted]	mm
2.8	**Main Shaft**			
(a)	Minimum shaft outside diameter		[redacted]	mm
(b)	Shaft inside diameter		[redacted]	mm
(c)	Shaft length face to face of flanges (not to exceed)		[redacted]	mm
(d)	Mass of shaft complete with coupling bolts and nuts, nut guard and shaft sleeve or runner plate		[redacted]	kg
(e)	Height of shaft/runner lifting device from device flange to center of pin (not to exceed)		[redacted]	mm
2.9	**Shaft Seal**			
(a)	Stainless steel shaft seal wear face finish		[redacted]	µm
(b)	Cooling water flow rate for main shaft water seal			
	(i)	design rate of flow in generation or synchronous condense mode:		
		(A) Maximum	[redacted]	L/s
		(B) Minimum	[redacted]	L/s
	(ii)	when Turbine is not running:		
		(A) Minimum	[redacted]	L/s

			Value	Units
(iii)	required pressure differential between seal pressure and pressure outside the seal:			
	(A)	Maximum		kPa
	(B)	Minimum		kPa
(iv)	Seal Water Filtration System			
	(A)	Filtration system provided?		Y/N
	(B)	Filtration level		µm
	(C)	Design pressure rating of filtration unit		kPa
	(D)	Maximum flow capacity of filtration system		L/s

2.10 Guide Bearing

(a)	Shaft journal:			
	(i)	diameter		mm
	(ii)	length		mm
	(iii)	surface finish		µm
(b)	Centreline elevation			m
(c)	Radial clearance			mm
(d)	Number of pads			
(e)	Babbitt material			
(f)	Babbitt temperature:			
	(i)	design, at Maximum Cooling Water Supply Temperature		°C
	(ii)	maximum allowable temperature for continuous operation (not to exceed) Note: guide bearing sensors located 20 mm below Babbitt surface, 50% in circumferential direction and 50% in height.		°C
(g)	Maximum cooling water flow rate:			
	(i)	at Minimum Cooling Water Supply Temperature		L/s
	(ii)	at Maximum Cooling Water Supply Temperature		L/s
(h)	Pressure drop across cooling coils at maximum flow rate			kPa
(i)	Cooler tube material			
(j)	Cooler fin material			

			Value	Units
(k)	Quantity of bearing oil		[redacted]	L
(l)	Oil temperature at Maximum Cooling Water Supply Temperature:			
	(i)	design	[redacted]	°C
	(ii)	maximum allowable temperature for continuous operation (not to exceed)		
	Note: temperature based on average of all oil bath RTDs.		[redacted]	°C
2.11	**Runner**			
(a)	Runner diameter at throat		[redacted]	mm
(b)	Runner outlet diameter at bottom of runner band		[redacted]	mm
(c)	Runner height		[redacted]	mm
(d)	Maximum runner diameter		[redacted]	mm
(e)	Distance from centreline of distributor to the runner outlet		[redacted]	mm
(f)	Number of blades		[redacted]	
(g)	Finish of prototype hydraulic surfaces			
	(i)	Spiral case (not to exceed, as installed)	[redacted]	µm
	(ii)	Stay vane channels (not to exceed, as installed)	[redacted]	µm
	(iii)	Wicket gate channels (not to exceed, as installed)	[redacted]	µm
	(iv)	Runner blade, crown, and band (inner surfaces) (not to exceed, as installed)	[redacted]	µm
	(v)	Runner band and crown (outer surfaces) (not to exceed, as installed)	[redacted]	µm
	(vi)	Draft tube (not to exceed, as installed)	[redacted]	µm
	(vii)	Stationary parts (headcover, discharge ring/bottom ring) facing the runner outer surfaces (not to exceed, as installed)	[redacted]	µm
(h)	Mass of assembled runner and cone		[redacted]	kg
	(i)	Mass of crown	[redacted]	kg
	(ii)	Mass of band	[redacted]	kg
	(iii)	Mass of one blade	[redacted]	kg

		Value	Units
(i)	Base material	[redacted]	
(j)	Weld material	[redacted]	
2.12	**Wicket Gates**		
(a)	Wicket gate circle diameter	[redacted]	mm
(b)	Wicket gate height	[redacted]	mm
(c)	Number of wicket gates	[redacted]	
(d)	Wicket gate end clearance (dewatered)		
	(i) top	[redacted]	mm
	(ii) bottom	[redacted]	mm
(e)	Wicket gate end seal material	[redacted]	
(f)	Maximum wicket gate movement	[redacted]	°
(g)	Wicket gate upthrust bearing mechanism required?	[redacted]	Y/N
	(i) If yes, design clearance in bearing	[redacted]	mm
(h)	The speed-no-load position of the wicket gates from the fully closed position	[redacted]	°
(i)	Wicket Gate stem diameters		
	(i) upper	[redacted]	mm
	(ii) intermediate	[redacted]	mm
	(iii) lower	[redacted]	mm
(j)	Mass of one wicket gate	[redacted]	kg
(k)	Wicket gate material	[redacted]	
(l)	Wicket Gate Leakage for one Turbine	[redacted]	L/s
2.13	**Servomotors for Wicket Gates**		
(a)	Number of cylinders	[redacted]	
(b)	Cylinder bore diameter	[redacted]	mm
(c)	Piston rod diameter	[redacted]	mm
(d)	Piston ring material	[redacted]	

			Value	Units
(e)	Length of travel from 0% to 100% stroke			mm
(f)	Stroke at speed-no-load position			mm
(g)	Total net volume of piston displacement on pressure side			
	(i)	opening		mm^3
	(ii)	closing		mm^3
(h)	Governor capacity required			J
(i)	Cushioning			
	(i)	time (closing)		s
	(ii)	stroke		mm
(j)	Mass of a complete servomotor (heaviest one)			kg

2.14 <u>Governing Characteristics</u>

(a)	Wicket gate time settings as defined in SPGOV6.9			
	(i)	opening		s
	(ii)	closing		s
(b)	Maximum transient pressure at turbine inlet and in spiral case and speed rise on load rejection for the most adverse combination of NSHE and power output corresponding to the gate closing time in Item (a)(ii) above			
	(i)	maximum pressure at turbine inlet		kPa
	(ii)	maximum pressure in spiral case		kPa
	(iii)	speed rise		%

2.15 <u>Synchronous Condenser System</u>

(a)	Cooling water for runner seals			
	(i)	crown seal design rate of flow		
		(A) at Maximum Cooling Water Supply Temperature		L/s
		(B) at Minimum Cooling Water Supply Temperature		L/s
	(ii)	band seal design rate of flow		
		(A) at Maximum Cooling Water Supply Temperature		L/s
		(B) at Minimum Cooling Water Supply Temperature		L/s
	(iii)	filtration level		µm

		Value	Units
(b)	Time required for water depression at 620 kPa starting air pressure in the air tanks		
	(i) to just below the runner	[redacted]	s
	(ii) to final water level	[redacted]	s
(c)	Volume of compressed air required for initial full water depression, with the compressed air starting at a pressure of 620 kPa	[redacted]	m^3
(d)	Residual pressure in air system after full water depression, with the compressed air starting at a pressure of 620 kPa	[redacted]	kPa
(e)	Residual pressure in air system after full water depression, with the compressed air starting at a pressure of 690 kPa	[redacted]	kPa
(f)	Rate of compressed air make-up at a minimum pressure of 620 kPa required to maintain a depressed water level	[redacted]	L/s
(g)	Distance below bottom of runner to water surface after initial air depression	[redacted]	mm
(h)	Acceptable water level increase before initiating a maintenance air depression cycle	[redacted]	mm
(i)	Internal diameter of depression air piping at interface point	[redacted]	in
(j)	Internal diameter of exhaust air piping at interface point	[redacted]	in
(k)	Total air receiver volume required to meet the requirements of SPT4.28 (not to exceed)	[redacted]	m^3

2.16 Air Admission System

(a)	Internal diameter of air admission piping at interface point	[redacted]	in
(b)	Expected maximum air flow (standard conditions)	[redacted]	m^3/s

2.17 Penstock Drain

(a)	Large penstock drain diameter	[redacted]	mm
(b)	Small penstock drain diameter	[redacted]	mm

2.18 Miscellaneous Masses

(a)	Fully assembled headcover	[redacted]	kg
(b)	Fully assembled operating ring	[redacted]	kg

2.19 Guaranteed Plant Annual Energy Calculation

Table 2.19 – Guaranteed Plant Annual Energy Calculation (Filled in by BC Hydro after the Independent Turbine Model Tests)

Constants and operating conditions to be used in performance calculations:

Reservoir Level (H_{res}) $461.7\ m$ Local gravitational acceleration (g) $9.8149\ {}^{m}/_{s^2}$ Gross Head $(H_g = H_{res} - H_{tr})$ $51.2\ m$

Tailwater Level (H_{tr}) $410.5m$ Density of water (p) $1000\ {}^{kg}/_{m^3}$ Frequency (f) 60 Hz

Weighting Regime	Turbine Discharge	Head Losses	Net Head	NSHE	Scaled up Prototype Turbine Efficiency	Turbine Output	Generator Losses[1,2,3]	Generator Output	Operating Hours (annual, 6 units)	Energy (annual, 6 units)
	$\left({}^{m^3}/_{s}\right)$	(m)	(m)	$\left({}^{m^2}/_{s^2}\right)$	(%)	(kW)	(kW)	(kW)	(h)	(GWh)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		$(k + ko) \cdot (1)^2$	$H_g - (2)$	$(3) \cdot g$		$\frac{(1) \cdot (4) \cdot (5) \cdot p}{10^3}$		$(6) - (7)$		$\frac{(8) \cdot (9)}{10^6}$
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
Synchronous Condenser Operation[4]						[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
									Guaranteed Plant Annual Energy (GWh):	[redacted]

Notes:

1 Generator losses for this calculation are for the Generator operating at a power factor of 0.95.

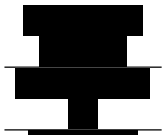
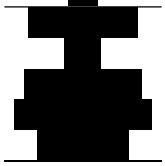
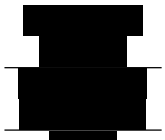
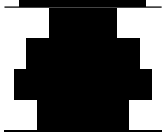
2 Generator losses for this calculation are to include Generator thrust bearing losses, including hydraulic thrust from the Turbine, Generator guide bearing losses, and Turbine guide bearing losses.

3 For this Table 2.19, the Generator losses to be entered into this column by BC Hydro will be the Generator losses without any test uncertainties applied.

4 Synchronous condenser operation losses are for the Generator operating under-excited with a reactive power output in kVAr measured at the Generator terminals equal to [redacted] of the Generator Rated Output (kVA) excluding Turbine runner windage losses.

3.0 GOVERNOR SYSTEM TECHNICAL DATA AND INFORMATION FORM

		Value	Units
3.1	**Manufacturer Information**		
(a)	Manufacturer		
(b)	Make and Model		
3.2	**Motor Starters**		
(a)	High-pressure oil pump motor starters – main pumps		
	(i) Manufacturer		
	(ii) Model		
	(iii) NEMA size		
	(iv) Rated voltage (3 phase)		V
	(v) Overload relay manufacturer		
	(vi) Overload relay model		
(b)	High-pressure oil pump motor starter – jockey pump		
	(i) Manufacturer		
	(ii) Model		
	(iii) NEMA size		
	(iv) Rated voltage (3 phase)		V
	(v) Overload relay manufacturer		
	(vi) Overload relay model		
(c)	Air compressor motor starters		
	(i) Manufacturer		
	(ii) Model		
	(iii) NEMA size		
	(iv) Rated voltage (3 phase)		V
	(v) Overload relay manufacturer		
	(vi) Overload relay model		

			Value	Units
3.3	**Governor Control Cabinet**			
(a)	Governor PLC			
	(i)	Manufacturer		
	(ii)	Model		
	(iii)	Configuration tool software model		
	(iv)	Configuration tool software version number		
	(v)	Communications Links: protocol and physical layer		
		(A) protocol		
		(B) physical layer		
(b)	Governor HMI			
	(i)	Manufacturer		
	(ii)	Model		
	(iii)	Configuration tool software model		
	(iv)	Configuration tool software version number		
3.4	**Instrumentation**			
(a)	Speed sensing systems			
	(i)	Generator VT Speed Sensing System and Running Bus Speed Sensing System		
		(A) Signal conditioner manufacturer		
		(B) Signal conditioner model		
		(C) High-speed counter PLC module manufacturer		
		(D) High-speed counter PLC module model		
	(ii)	Toothed-wheel sensing system		
		(A) ZVPU Probe manufacturer		
		(B) ZVPU Probe model		

			Value	Units
	(C)	ZVPU Probe signal conditioner manufacturer		
	(D)	ZVPU Probe signal conditioner model		
	(E)	High-speed counter PLC module manufacturer		
	(F)	High-speed counter PLC module model		
(b)	Wicket Gate position transducers			
	(i)	Manufacturer		
	(ii)	Model		
(c)	Governor MW transducer			
	(i)	Manufacturer		
	(ii)	Model		
(d)	Accumulator pressure sensing devices			
	(i)	Pressure switches manufacturer		
	(ii)	Pressure switches model		
	(iii)	Pressure transducers manufacturer		
	(iv)	Pressure transducers model		
(e)	Accumulator oil level sensing devices			
	(i)	Magnetic float transducer manufacturer		
	(ii)	Magnetic float transducer model		
	(iii)	Guided wave radar level transducer manufacturer		
	(iv)	Guided wave radar level transducer model		
	(v)	Magnetic semaphore indicators manufacturer		
	(vi)	Magnetic semaphore indicators model		
(f)	Oil sump instrumentation			
	(i)	Oil level transducer manufacturer		
	(ii)	Oil level transducer model		
	(iii)	Oil level sight glass manufacturer		
	(iv)	Oil level sight glass model		

			Value	Units
	(v)	Oil temperature transducer manufacturer	[redacted]	
	(vi)	Oil temperature transducer model	[redacted]	
3.5	**Governor Hydraulic System**			
(a)	Governor high-pressure oil system			
	(i)	Nominal (maximum) operating pressure	[redacted]	kPa
	(ii)	Design pressure	[redacted]	kPa
	(iii)	Minimum operating pressure (when trip initiated)		kPa
	(iv)	Minimum operating pressure (when float valve closes)	[redacted]	kPa
	(v)	Normal minimum oil pressure (lead pump cut-in pressure)	[redacted]	kPa
	(vi)	Normal maximum oil pressure (lead pump cut-out pressure)	[redacted]	kPa
(b)	Oil volumes			
	(i)	Servomotors (total)	[redacted]	L
	(ii)	Accumulator tank(s) – at normal (maximum) operating level	[redacted]	L
	(iii)	Sump tank – at normal operating level	[redacted]	L
	(iv)	Pressure piping	[redacted]	L
	(v)	Total volume of oil in governor oil system	[redacted]	L
(c)	Accumulator tank			
	(i)	Number of accumulator tanks	[redacted]	
	(ii)	Inside diameter	[redacted]	mm
	(iii)	Inside height	[redacted]	mm
	(iv)	Maximum overall height	[redacted]	mm
	(v)	Total volume (each tank)	[redacted]	L
	(vi)	Oil level (inside) at normal operating conditions	[redacted]	mm
	(vii)	Shape of access hatch	[redacted]	
	(viii)	Size of access hatch [redacted] mm high by	[redacted]	mm wide
	(ix)	Mass (empty, but fully assembled – each tank)	[redacted]	kg
	(x)	Description of system if more than one tank		

[redacted]

			Value	Units
(d)	Sump tank			
	(i)	Length	[redacted]	mm
	(ii)	Width	[redacted]	mm
	(iii)	Height	[redacted]	mm
	(iv)	Total volume	[redacted]	L
	(v)	Oil level (inside) at normal operating conditions	[redacted]	mm
	(vi)	Mass (empty, but fully assembled)	[redacted]	kg
(e)	Oil piping			
	(i)	Servomotor pressure piping diameter	[redacted]	
	(ii)	Accumulator tank pressure piping diameter	[redacted]	
	(iii)	Maximum oil velocity in the pressure piping system	[redacted]	m/s
(f)	Distributing valve			
	(i)	Supplier	[redacted]	
	(ii)	Model	[redacted]	
	(iii)	Maximum flow rate valve is capable of		L/s
	(iv)	Maximum flow rate required to operate servomotors	[redacted]	L/s
	(v)	Pressure drop across valve at maximum flow rate required to operate servomotors	[redacted]	kPa
	(vi)	Frequency response	[redacted]	Hz
(g)	Pilot valve			
	(i)	Name of supplier	[redacted]	
	(ii)	Model	[redacted]	
	(iii)	Maximum flow rate valve is capable of	[redacted]	L/s @ 10 bars
	(iv)	Frequency response	[redacted]	Hz
(h)	Oil pumps			
	(i)	Main pumps		
		(A) Make	[redacted]	

			Value	Units
	(B)	Type/model		
	(C)	Flow		L/s
(ii)	Main pump motors			
	(A)	Output power (mechanical, per pump)		kW
	(B)	Rated voltage and number of phases	V,	
	(C)	Service factor		
	(D)	Power factor		
	(E)	Speed		rpm
(iii)	Jockey pump			
	(A)	Make		
	(B)	Type/Model		
	(C)	Flow		L/s
(iv)	Jockey pump motor			
	(A)	Output power (mechanical)		kW
	(B)	Rated voltage and number of phases	V,	
	(C)	Service factor		
	(D)	Power factor		
	(E)	Speed		rpm
(i)	Cooling water for HPU, if required			
	(i)	Flow at maximum water temperature		L/s
	(ii)	Flow at minimum water temperature		L/s
	(iii)	Minimum supply pressure		kPa
	(iv)	Pressure drop between the inlet and outlet		kPa
(j)	Filtration levels			
	(i)	Pilot oil		
	(ii)	Kidney loop		
	(iii)	Compressed air		
	(iv)	Sump venting		

			Value	Units
(k)	Compressed air system			
	(i)	Nominal operating pressure	[redacted]	kPa
	(ii)	Design pressure	[redacted]	kPa
	(iii)	Number of air compressors	[redacted]	
	(iv)	Compressor(s) make	[redacted]	
	(v)	Compressor type/model	[redacted]	
	(vi)	Compressor capacity (each) at nominal operating pressure	[redacted]	L/min
	(vii)	Number of compressor receivers	[redacted]	
	(viii)	Volume of compressor receivers (each)	[redacted]	L
	(ix)	Volume of make-up air receivers (each)	[redacted]	L
	(x)	Motor power	[redacted]	kW
	(xi)	Rated voltage and number of phases	[redacted] V, [redacted]	
	(xii)	Service factor	[redacted]	
	(xiii)	Power factor	[redacted]	
	(xiv)	Speed	[redacted]	rpm
(l)	Miscellaneous operating data			
	(i)	Estimated steady-state oil consumption	[redacted]	L/min
	(ii)	Governor oil temperature		
		(A) Target range	[redacted] °C to [redacted]	°C
		(B) Maximum allowable	[redacted]	°C

4.0 GENERATOR TECHNICAL DATA AND INFORMATION FORM

Line items in the Generator TDIF that are shown in a box are the critical TDIF values (refer to Section 12.2 of the Agreement).

			Value	Units
4.1	**Generator Information**			
(a)	Rated Output at Generator Rated Operating Conditions			
	(i)	Generator Rated Output		kVA
	(ii)	Rated power		kW
	(iii)	Reactive power capability over-excited)		kVAr
	(iv)	Rated power factor		pf
	(v)	Rated voltage		kV
	(vi)	Rated frequency		Hz
	(vii)	Number of phases		
	(viii)	Rated armature current		A
	(ix)	Rated Field Current		A±10%
	(x)	Number of poles		
(b)	Rated Operating Conditions			
	(i)	Maximum cold air temperature		°C
	(ii)	Regulated Cold Air Temperature		°C
	(iii)	Stator winding temperature rise		°C
	(iv)	Stator circuit-ring and end-winding surface temperature rise		°C
	(v)	Rotor and field bus temperature rise		°C
4.2	**Calculated Electrical Characteristics**			
(a)	Synchronous Reactances (calculated)			
	(i)	Direct axis, saturated, $X_{d,\ sat}$		pu
	(ii)	Direct axis, unsaturated, $X_{d,\ unsat}$		pu
	(iii)	Quadrature axis, unsaturated $X_{q,\ unsat}$		pu
(b)	Transient Reactances (calculated)			
	(i)	Direct axis, saturated (rated-voltage), $X'_{d,\ sat}$		pu
	(ii)	Direct axis, unsaturated (rated-current), $X'_{d,\ unsat}$		pu
	(iii)	Quadrature axis, unsaturated $X'_{q,\ unsat}$		pu

			Value	Units
(c)	Sub-transient Reactances (calculated)			
	(i)	Direct axis, saturated, X_d'', $_{sat}$		pu
	(ii)	Direct axis, unsaturated, X_d'', $_{unsat}$		pu
(d)	Ratio of quadrature to direct axis reactance, X_q''/X_{d}''			pu
(e)	Negative sequence reactance, X_2			pu
(f)	Zero sequence reactance, X_0			pu
(g)	Short circuit ratio, SCR			
(h)	Resistances[4] (calculated @ 95°C)			
	(i)	Stator winding per phase, R_A		mohm
	(ii)	Field winding, R_F		mohm
	(iii)	Negative sequence resistance, R_2		mohm
(i)	Time Constants			
	(i)	Direct axis transient open circuit (T'_{do})		s
	(ii)	Direct axis sub-transient open circuit (T''_{do})		s
	(iii)	Quadrature axis transient open circuit (T'_{qo})		s
	(iv)	Quadrature axis sub-transient open circuit (T''_{qo})		s
	(v)	Direct axis transient short circuit (T'_{d})		s
	(vi)	Armature short circuit (T_a)		s
	(vii)	Deviation factor of the open circuit terminal voltage		
(j)	Telephone Interference Factor			
	(i)	Balanced		
	(ii)	Residual		
(k)	Zero sequence capacitance per phase			microF
(l)	Field Characteristics			
	(i)	Field voltage on the airgap line at 1.00 pu terminal voltage (at 100°C)		V
	(ii)	Field current on the airgap line at 1.00 pu terminal voltage		A±10%
	(iii)	Field current at 1.00 pu terminal voltage open circuit		A±10%
	(iv)	Field current at 1.00 pu phase current on short circuit line		A±10%

[4] The resistance will be stated at the "reference temperature for use in determining I^2R losses" specified in IEEE C50.12.

			Value	Units
	(v)	Field current at Generator Rated Output and Generator Rated Operating Conditions	[redacted]	A±10%
	(vi)	Field voltage at Generator Rated Output and Generator Rated Operating Conditions	[redacted]	V
	(vii)	Field temperature at Generator Rated Output and Generator Rated Operating Conditions	[redacted]	°C
	(viii)	Field current at Generator Rated Operating Conditions, rated kVA and speed, 1.05 pu terminal voltage, and the minimum overexcited power factor	[redacted]	A±10%
	(ix)	Field current at Generator Rated Operating Conditions, rated kVA and speed, 1.10 pu terminal voltage, and at the minimum overexcited power factor	[redacted]	A±10%
	(x)	Field current at Generator Rated Output, Generator Rated Operating Conditions, and 105% of design average airgap	[redacted]	A
(m)	Synchronous Condenser Operation			
	(i)	Power required to operate the Generator as a synchronous condenser operating under-excited with a reactive power output in kVAr measured at the Generator terminals equal to 50% of the Generator Rated Output (kVA) excluding Turbine runner windage losses (with test uncertainties applied).	[redacted]	kW

4.3 Generator Losses

(a) Generator Losses for Specified Generator Outputs

Table 4.3(a) – Generator Losses[1] for Specified Generator Outputs

	Generator Rated Output (%)	[redacted]							
(z)	Generator Output (kW)	[redacted]							
	Power Factor	[redacted]							
	Fixed Losses (kW)								
(a)	Core	[redacted]							
(b)	Field I^2R (open circuit, rated voltage)	[redacted]							
(c)	Windage	[redacted]							
(d)	Friction – Generator guide bearing(s)[2]	[redacted]							
(e)	Friction – Turbine guide bearing	[redacted]							
(f)	Friction – thrust bearing[3]	[redacted]							
(g)	Subtotal (sum a to f)	[redacted]							
	Variable Losses (kW)								
(h)	Armature I^2R[(4)]	[redacted]							
(i)	Field I^2R (loaded, increase over no load)	[redacted]							
(j)	Stray load	[redacted]							
(k)	Friction – hydraulic thrust[5]	[redacted]							
(l)	Subtotal (sum h to k)	[redacted]							
(j)	**Total Losses (kW)** (g + l)	[redacted]							
	Efficiency (%) ((z / (z + j) x 100)	[redacted]							

Notes:

1 With the temperature of the air leaving the Generator air coolers regulated to the Regulated Cold Air Temperature.

2 Standalone guide bearing if applicable.

3 Standalone thrust bearing or combined thrust/guide bearing as applicable, and includes mass of all rotating components for the Turbine and Generator.

4 For the reference temperature refer to Section 4.2(h) of this Appendix 11-6 [Technical Data and Information Forms].

5 Incremental losses due to hydraulic thrust.

(b) Generator Losses for Specified Turbine Discharges

Table 4.3(b) – Generator Losses[1,2] for Specified Turbine Discharges (Filled in by BC Hydro using data from the Independent Lab)

	Turbine Weighting Regime	A	B	C	D	E	F	G	H	I	J	K	L	Operating Condition A	S/C[7]
	Turbine Discharge (m^3/s)														
	Fixed Losses (kW)														
(a)	Core														
(b)	Field I^2R (open circuit, rated voltage)														
(c)	Windage														
(d)	Friction - Generator guide bearing(s)[3]														
(e)	Friction - Turbine guide bearing														
(f)	Friction – thrust bearing[4]														
(g)	Subtotal (sum a to f)														
	Variable Losses (kW)														
(h)	Armature I^2R[(5)]														
(i)	Field I^2R (loaded, increase over no load)														
(j)	Stray load														
(k)	Friction - hydraulic thrust[6]														
(l)	Subtotal (sum h to k)														
(j)	**Total Losses (kW)** (g + l)														

Notes:

1 With the temperature of the air leaving the Generator air coolers regulated to the Regulated Cold Air Temperature.

2 The Generator losses entered into this Table 4.3(b) will be the Generator losses without any test uncertainties applied.

3 Standalone guide bearing if applicable.

4 Standalone thrust bearing or combined thrust/guide bearing as applicable and includes mass of all rotating components for the Turbine and Generator.

5 For the reference temperature refer to Section 4.2(h) of this Appendix 11-6 [Technical Data and Information Forms].

6 Incremental losses due to hydraulic thrust.

7 Synchronous condenser operation - Losses are for the Generator operating under-excited with a reactive power output in kVAr measured at the Generator terminals equal to of the Generator Rated Output (kVA) excluding Turbine runner windage losses.

(c) Generator Losses Test Uncertainties for Specified Generator Outputs

Table 4.3(c) – Generator Losses Test Uncertainties[1] for Specified Generator Outputs

	Generator Rated Output (%)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Power Factor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Fixed Loss Uncertainties (kW)								
(a)	Core	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(b)	Field I^2R (open circuit, rated voltage)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(c)	Windage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(d)	Friction – Generator guide bearing(s)[2]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(e)	Friction – Turbine guide bearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(f)	Friction – thrust bearing[3]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(g)	Subtotal (sum a to f)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Variable Loss Uncertainties (kW)								
(h)	Armature I^2R[(4)]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(i)	Field I^2R (loaded, increase over no load)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(j)	Stray load	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(k)	Friction – hydraulic thrust[5]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(l)	Subtotal (sum h to k)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(j)	**Total Uncertainties (kW)** (g + l)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Notes:

1 With the temperature of the air leaving the Generator air coolers regulated to the Regulated Cold Air Temperature.

2 Standalone guide bearing if applicable.

3 Standalone thrust bearing or combined thrust/guide bearing as applicable and includes mass of all rotating components for the Turbine and Generator.

4 For the reference temperature refer to Section 4.2(h) of this Appendix 11-6 [Technical Data and Information Forms].

5 Incremental losses due to hydraulic thrust.

(d) Generator Losses Test Uncertainties for Specified Turbine Discharges

Table 4.3(d) – Generator Losses Test Uncertainties[1] for Specified Turbine Discharges

	Turbine Weighting Regime	A	B	C	D	E	F	G	H	I	J	K	L	Operating Condition A	S/C[6]
	Turbine Discharge (m^3/s)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Fixed Loss Uncertainties (kW)														
(a)	Core	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(b)	Field I^2R (open circuit, rated voltage)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(c)	Windage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(d)	Friction – Generator guide bearing(s)[2]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(e)	Friction – Turbine guide bearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(f)	Friction – thrust bearing[3]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(g)	Subtotal (sum a to f)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Variable Loss Uncertainties (kW)														
(h)	Armature I^2R[(4)]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(i)	Field I^2R (loaded, increase over no load)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(j)	Stray load	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(k)	Friction – hydraulic thrust[5]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(l)	Subtotal (sum h to k)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(j)	**Total Uncertainties (kW)** (g + l)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Notes:

1 With the temperature of the air leaving the Generator air coolers regulated to the Regulated Cold Air Temperature.
2 Standalone guide bearing if applicable.
3 Standalone thrust bearing or combined thrust/guide bearing as applicable and includes mass of all rotating components for the Turbine and Generator.
4 For the reference temperature refer to Section 4.2(h) of this Appendix 11-6 [Technical Data and Information Forms].
5 Incremental losses due to hydraulic thrust.
6 Synchronous condenser operation - Losses are for the Generator operating under-excited with a reactive power output in kVAr measured at the Generator terminals equal to [redacted] of the Generator Rated Output (kVA) excluding Turbine runner windage losses.

			Value	Units
4.4	**Mechanical Design Information**			
(a)	Inertia Constant (Flywheel Effect)			
	(i)	Moment of Inertia, J_G (Generator only)		$kg•m^2$
	(ii)	Inertia Constant, H_G (Generator only)		MW•s/ MVA
(b)	Airgap			
	(i)	Nominal airgap		mm
	(ii)	Nominal airgap as a function of rotor diameter		%
	(iii)	Measured average airgap tolerance (Generator Rated Output and Generator Rated Operating Conditions)		mm
	(iv)	Airgap variation due to maximum rotor unbalance		mm
(c)	Dimensions			
	(i)	Stator bore diameter		mm
	(ii)	Stator bore height (including air ducts)		mm
	(iii)	Stator outside diameter		mm
	(iv)	Rotor rim diameter (ID)		mm
	(v)	Rotor rim diameter (OD)		mm
	(vi)	Rotor diameter (to pole face) (in operation)		mm
	(vii)	Pole body width (tangential, including pole shoe and excluding coil)		mm
	(i)	Pole body shoe width		mm
	(ii)	Pole body height (axial, including pole shoe and excluding coil)		mm
	(iii)	Pole depth (radial, rim to pole face)		mm
	(iv)	Number of different (unique) Generator field pole coils		
(d)	Masses			
	(i)	Stator frame (including sole plates and core clamping/attachment system)		kg
	(ii)	Stator core		kg
	(iii)	Stator winding		kg
	(iv)	Fully wound stator		kg
	(v)	Rotor pole coil (one)		kg
	(vi)	Rotor pole (complete) (one)		kg

			Value	Units
	(vii)	Rotor rim (including clamping plates, bolts and keys)	[redacted]	kg
	(viii)	Rotor spider and hub (including brake ring)	[redacted]	kg
	(ix)	Rotor (complete) (including poles, rim and spider/hub)	[redacted]	kg
	(x)	Rotating parts (for Generator only) (including thrust runner, connections, stub shaft, hub, spider, rim, poles, and slip rings)	[redacted]	kg
	(xi)	Upper bracket	[redacted]	kg
	(xii)	Lower bracket (including sole plates)	[redacted]	kg
	(xiii)	Complete Generator (including lower combined bearing, covers, air guides and accessories)	[redacted]	kg
	(xiv)	Heaviest crane lift for assembly or disassembly (including lifting devices), not to exceed	[redacted]	kg
	(xv)	Component(s) included in the heaviest crane lift for assembly or disassembly	[redacted]	

4.5 Generator Temperatures

(a) The temperatures in the table below will be stated for operation at Generator Rated Output with the cooling water at the minimum and maximum operating temperatures.

			Minimum Operating Temperature	Maximum Operating Temperature	
(b)		Temperatures at the specified Cooling Water Supply Temperature			
	(i)	Stator winding	[redacted]	[redacted]	°C
	(ii)	Stator circuit-ring and end-winding surface temperature	[redacted]	[redacted]	°C
	(iii)	Stator circuit-ring and end-winding copper temperature (calculated)	[redacted]	[redacted]	°C
	(iv)	Stator core - yoke	[redacted]	[redacted]	°C
	(v)	Stator core – finger	[redacted]	[redacted]	°C
	(vi)	Rotor winding and field bus	[redacted]	[redacted]	°C
	(vii)	Rotor amortisseur winding	[redacted]	[redacted]	°C

4.6 Generator Air Coolers

(a) The data for the Generator air coolers will be stated with heat recovery system inactive (all Generator air coolers functioning but with no heat being removed by the heat recovery system)

(b)		Number of Generator air coolers	[redacted]	--

		Value	Units
		Percentage of Generator Rated Output	
		[redacted] [redacted] [redacted]	
(c)	Cooling water flow rate through air coolers		
	(i) at Minimum Cooling Water Supply Temperature		
	* Minimum flow to keep water velocity within acceptable range	[redacted] [redacted] [redacted]	L/s
	(ii) at 6 °C cooling water supply temperature	[redacted] [redacted] [redacted]	L/s
	(iii) at 12 °C cooling water supply temperature	[redacted] [redacted] [redacted]	L/s
	(iv) at Maximum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	L/s
(d)	Temperature of air entering air coolers at maximum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	°C
(e)	Temperature rise of cooling water in air coolers		
	(i) at Minimum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	°C
	(ii) at Maximum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	°C
(f)	Temperature drop of Generator cooling air passing through the coolers		
	(i) at Minimum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	°C
	(ii) at Maximum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	°C
(g)	Pressure drop of cooling water through Generator air coolers at Generator Rated Output		
	(i) at Minimum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	kPa
	(ii) at Maximum Cooling Water Supply Temperature	[redacted] [redacted] [redacted]	kPa

(h) If the heat recovery coolers and the Generator air coolers are not independent, and the heat recovery coolers serve the dual purpose of cooling and heat recovery and cooling functions, then provide an explanation for what restrictions, if any, would be imposed on Unit operation if the heat recovery coolers were not functional.

[redacted]

		Value	Units

4.7 Cooling Water Flow Rate

(a) Cooling water flow rate for the Generator air coolers of one Unit operating at the Generator Rated Output at Generator Rated Operating Conditions with a penstock water temperature of 6 degrees C and the Generator heat recovery system inactive (all Generator air coolers fully functioning but with no heat being removed from the Generator by the heat recovery system). [redacted] L/s

4.8 Generator Heat Recovery System Heat Exchangers

(a) Heat Recovery System Water

Provide values under the following conditions:

- Water temperature entering heat recovery system heat exchangers = 25°C; and
- Heat removed by the heat recovery system heat exchangers = 500 kW.

		Percent of Generator Rated Output		
		[redacted]	[redacted]	
(i)	Flow rate through heat recovery system heat exchangers * Heat recovery at 50% of generator rated output is 332 kW.	[redacted]	[redacted]	L/s
(ii)	Water temperature leaving the heat recovery system heat exchangers * Heat recovery at 50% of generator rated output is 332 kW.	[redacted]	[redacted]	°C
(iii)	Pressure drop for the heat exchangers and piping (inside Generator Enclosure)	[redacted]	[redacted]	kPa

4.9 Cooling Water Regulating Valve

(a) Regulating valve diameter [redacted] in

(b) Regulating valve make and model [redacted]

(c) Regulating valve actuator make and model [redacted]

4.10 Brake System

(a) Stopping time to bring the Unit to rest

(i) From 50% rated speed [redacted] min

(ii) From 15% rated speed [redacted] min

			Value	Units
	(iii)	From 10% rated speed * Due to turbine water leakage, brakes are applied for a minimum speed of 12.5% of rated speed.	[redacted]	min
(b)		Volume of compressed air at 690 kPa required for one Generator brake application	[redacted]	m^3
(c)		Volume of Generator brake air receiver	[redacted]	m^3
(d)		Make-up air required when brakes continuously applied (at specified pressure) (i.e., to account for leakage)		L/min
(e)		Minimum allowable pressure without reduction in brake capability	[redacted]	kPa
(f)		Number of brake cylinders		
4.11		**Brake Dust Collection System**		
(a)		Number of dust collectors	[redacted]	--
(b)		For each motor		
	(i)	output power (mechanical)	[redacted]	kW
	(ii)	rated voltage	[redacted]	V
	(iii)	number of phases	[redacted]	--
	(iv)	service factor	[redacted]	%
	(v)	power factor	[redacted]	--
	(vi)	speed	[redacted]	rpm
	(vii)	insulation class	[redacted]	--
4.12		**Bearing – Thrust and Guide**		
(a)		Thrust Bearing Details		
	(i)	Design capacity (steady state)	[redacted]	MN
	(ii)	Design capacity (maximum)		NM
	(iii)	Average pressure on babbitt at design capacity	[redacted]	MPa
	(iv)	Inside diameter of thrust runner	[redacted]	mm
	(v)	Outside diameter of thrust runner	[redacted]	mm
	(vi)	Thrust runner surface finish		µm
	(vii)	Number of thrust pads	[redacted]	
	(viii)	Babbitt material	[redacted]	

			Value	Units
(ix)	Babbitt temperature with cooling water at Maximum Cooling Water Supply Temperature:			
	(A)	design at Generator Rated Output		°C
	(B)	maximum at runaway speed		°C
	(C)	maximum temperature that Unit can operate continuously (not to exceed) Note: thrust bearing sensors located 20 mm below the babbitt surface, 50% in the circumferential direction and 55% to 75% in the radial direction (from ID)		°C
(x)	Time the Unit can be operated with cooling water at Maximum Cooling Water Supply Temperature:			
	(A)	at 10 rpm without cooling water and with lift pump operating		min
	(B)	at 10 rpm with cooling water and with lift pump operating		min
	(C)	at Generator Rated Output without cooling water		min
	(D)	at runaway speed with cooling water at Maximum Cooling Water Supply Temperature		min
(xi)	Lowest speed Unit can be operated at continuously without lift pump			rpm
(xii)	Distance that rotor must be jacked to remove thrust bearing pads			mm
(b)	Guide Bearing Details			
(i)	Thrust block journal			
	(A)	diameter		mm
	(B)	length		mm
	(C)	width		mm
	(D)	surface finish		µm
(ii)	Centreline elevation			m
(iii)	Radial clearance			mm
(iv)	Number of pads			--
(v)	Babbitt material			
(vi)	Babbitt temperature at Generator Rated Output at Maximum Cooling Water Supply Temperature:			
	(A)	design at Generator Rated Output		°C

			Value	Units
	(B)	maximum temperature that Unit can operate continuously (not to exceed) Note: guide bearing sensors located 20 mm below the babbitt surface, 50% in the circumferential direction and 50% in height.	[redacted]	°C

(c) Additional Information for Upper Guide Bearing

(i) Description of electrical isolation

[redacted]

(d) Cooling System

(i)	Cooler tube material		[redacted]	
(ii)	Cooler fin material		[redacted]	
(iii)	Cooler design pressure		[redacted]	kPa
(iv)	Cooling water flow rate at Generator Rated Output:			
	(A)	at Minimum Cooling Water Supply Temperature	[redacted]	L/s
	(B)	at 6° C cooling water supply temperature	[redacted]	L/s
	(C)	at Maximum Cooling Water Supply Temperature	[redacted]	L/s
(v)	Pressure drop across cooling coils at maximum flow rate		[redacted]	kPa
(vi)	Power dissipated at Generator Rated Output		[redacted]	kW
(vii)	Power dissipated at runaway speed		[redacted]	kW

(e) Oil Reservoir

(i)	Oil quantity		[redacted]	L
(ii)	Oil temperature with cooling water at Maximum Cooling Water Supply Temperature:			
	(A)	design at Generator Rated Output	[redacted]	°C
	(B)	maximum at runaway speed	[redacted]	°C
	(C)	maximum temperature that Unit can operate continuously (not to exceed) Note: temperature based on average of all oil bath RTDs.	[redacted]	°C

4.13 <u>Bearing High-Pressure Oil Injection System (Lift Pump)</u>

(a) Pump make/model [redacted]

			Value	Units
(b)	Pump flow rate			L/min
(c)	Expected steady-state operating pressure			kPa
(d)	Maximum start-up pressure			kPa
(e)	Lift pump motor			
	(i)	rated output		kW
	(ii)	rated voltage		V
	(iii)	number of phases		--
	(iv)	service factor		pu
	(v)	rated speed		rpm
	(vi)	insulation class		--
(f)	Minimum acceptable rotational speed of Unit during acceleration for pump operation to stop (with bearing either cold, i.e. at ambient temperature, or at normal operating temperature, whichever is the limiting case)			rpm
(g)	Minimum acceptable rotational speed of Unit during deceleration for pump operation to start (with bearing temperature at the maximum allowable operating value)			rpm
(h)	If failure of the lift pump occurs during a Unit starting or stopping sequence, will the bearing design permit, without damage:			
	(i)	either sequence to be completed without detrimental effects (with the bearing babbitt at the maximum allowable temperature)	☒	☐
	(ii)	a starting sequence to be initiated or completed provided the babbitt temperature determined by embedded detector in thrust pad, is less than a specified temperature	☒	☐
		(A) Specified thrust bearing pad babbitt temperature for above condition		°C
	(iii)	a stopping sequence to be completed regardless of the bearing babbitt temperature value (with the brakes applied at normal speed)	☒	☐

4.14 <u>Rotor Jacking System Oil Pump</u>

(a)	Oil pressure of portable jacking system oil pump			kPa
(b)	Portable jacking system oil pump			
	(i)	rated output		kW
	(ii)	rated voltage		V
	(iii)	number of phases		--
	(iv)	service factor		pu

			Value	Units
	(v)	rated speed	[redacted]	rpm
	(vi)	insulation class	[redacted]	--
4.15	**Fire Protection System**			
(a)	Water pressure required		[redacted]	kPa
(b)	Water flow rate required		[redacted]	L/s
(c)	Air pressure required (if any)		[redacted]	kPa
(d)	Air pressure flow rate required (if any)		[redacted]	
4.16	**Protection Information**			
(a)	Current Transformers			
	(i)	CSA accuracy class (for the protection CTs)	[redacted]	--
	(ii)	Ratio	[redacted]	A
	(iii)	Rated primary current	[redacted]	A
	(iv)	Voltage class	[redacted]	kV
	(v)	Mechanical short-time rating (crest)	[redacted]	kA/s
	(vi)	Thermal short-time rating (rms symmetrical)	[redacted]	kA/s
	(vii)	Secondary resistance	[redacted]	ohms
	(viii)	Core area	[redacted]	mm^2
	(ix)	Core length	[redacted]	mm
	(x)	Number of secondary turns	[redacted]	--
	(xi)	Flux density of saturation (saturation point being defined as where a 10% increase i.e. voltage produces a 50% increase in excitation current)	[redacted]	T
(b)	Current Unbalance Protection			
	(i)	Expected current unbalance under normal operation	[redacted]	A
	(ii)	Current unbalance transformer ratio	[redacted]	--
4.17	**Other Data**			
(a)	Stator Frame			
	(i)	Number of shelves including top and bottom shelves	[redacted]	--
(b)	Keybars			
	(i)	Number	[redacted]	--

			Value	Units
	(ii)	Circularity tolerance		±mm
	(iii)	Verticality tolerance		±mm
(c)	Core Studs			
	(i)	Number		--
	(ii)	Diameter		mm
	(iii)	Material		--
	(iv)	Yield strength		MPa
	(v)	Nominal clamping pressure of the stator core		MPa
(d)	Laminations			
	(i)	Slot width (tangential) (punched)		mm
	(ii)	Slot depth (radial) (punched)		mm
	(iii)	Number of packets (in axial height)		
	(iv)	Packet height (axial)		mm
	(v)	Lamination material type and grade		--
(e)	Clamping Finger Material			
	(i)	Type		--
	(ii)	Grade		--
	(iii)	Yield strength		MPa
(f)	Air Duct Spacer Material			
	(i)	Type		
	(ii)	Grade		
(g)	Air Ducts			
	(i)	Number in core length		--
	(ii)	Thickness		mm

			Value	Units
(h)	Magnetic Flux Density (at Generator Rated Output)			
	(i)	Teeth		T
	(ii)	Yoke		T
	(iii)	Back		T
(i)	Flux Test			
	(i)	Maximum power		kVA
	(ii)	Voltage		V
(j)	Stator Winding Details			
	(i)	Circuits per phase		--
	(ii)	Number of slots		--
	(iii)	Pitch		--
	(iv)	Insulation class		--
(k)	Strand Copper			
	(i)	Number of strands		--
	(ii)	Strand width (tangential, in slot section)		mm
	(iii)	Strand depth (radial, in slot section)		mm
	(iv)	Degrees of Roebel transposition in slot portion		o
(l)	Ground Insulation			
	(i)	Insulation type		
	(ii)	Insulation thickness		mm
	(iii)	Voltage stress level		kV/mm
(m)	Stator Bar			
	(i)	Bar overall width (tangential, in slot section)		mm
	(ii)	Bar overall depth (radial, in slot section)		mm
	(iii)	Bar overall length (axial end-to-end)		mm
(n)	Bar Dimensional Tolerances (between bar and slot)			
	(i)	Maximum width (tangential)		mm
	(ii)	Minimum width (tangential)		mm
	(iii)	Maximum depth (radial)		mm
	(iv)	Minimum depth (radial)		mm

			Value	Units
	(v)	Mean side clearance of bar in slot	[redacted]	mm
(o)	Stator End-Turns and Circuit Rings			
	(i)	End-turn spacing (T-spacing)	[redacted]	mm
	(ii)	End-turn connection end span tolerances (tangential)	[redacted]	mm
	(iii)	End-turn connection end drop tolerances (radial)	[redacted]	mm
	(iv)	End-turn spacing between front and back bars at slot exit	[redacted]	mm
	(v)	End-turn maximum temperature differential surface temperature to copper temperature	[redacted]	ºC
	(vi)	Circuit ring maximum temperature differential surface temperature to copper temperature	[redacted]	ºC
(p)	Bar Surface Contact Resistance			
	(i)	Mean surface contact resistance to ground	[redacted]	kohm
	(ii)	Deviation from mean	[redacted]	kohm
(q)	Toothed-Wheel Speed Sensing System			
	(i)	Location of toothed wheel system	[redacted]	

5.0 EXCITATION SYSTEM TECHNICAL DATA AND INFORMATION FORM

		Value	Units
5.1	**Manufacturer Information**		
(a)	Manufacturer	[redacted]	
(b)	Make and Model	[redacted]	
5.2	**Excitation System**		
(a)	Excitation System Rated Current:		
	(i) with all bridges in service (voltage obtained by multiplication with the field resistance R (110°C) = 107.17 mΩ)	[redacted] Adc at [redacted]	V
	(ii) with one bridge out of service	[redacted] Adc at [redacted]	V
(b)	Maximum 30 second output rating, immediately preceded by continuous operation at Excitation System Rated Current, and immediately followed by continuous operation at Excitation System Rated Current:		
	(i) All bridges in service (Excitation System 30 Second Rating):	[redacted] Adc at [redacted]	V
	(ii) One bridge out of service:	[redacted] Adc at [redacted]	V
(c)	Excitation System ambient temperature rating	[redacted]	°C
(d)	Ceiling Voltage while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	Vdc
	(i) Expressed in per unit, where 1 pu is equal to the Generator field voltage at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	pu
	(ii) Expressed in per unit, where 1 pu is equal to the air-gap field voltage as defined in IEEE Std.421.1:	[redacted]	pu
(e)	Response time (time to reach 95% of Ceiling Voltage while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	msec
(f)	Maximum negative field forcing voltage while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	Vdc
	(i) Expressed in per unit, where 1 pu is equal to the Generator field voltage at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	pu
	(ii) Expressed in per unit, where 1 pu is equal to the air-gap field voltage as defined in IEEE Std.421.1:	[redacted]	pu

		Value	Units
(g)	Setpoint adjustment ranges:		
	(i) Automatic voltage regulation mode: Generator terminal voltage setpoint adjustment range (where 1 pu is equal to rated Generator terminal voltage):	[redacted] pu to [redacted]	pu
	(ii) Manual field current regulation mode: Field current setpoint adjustment range (where 1 pu is equal to Excitation System Rated Current):	[redacted] pu to [redacted]	pu
	(iii) Manual field voltage regulation mode: Setpoint adjustment range (where 1 pu is equal to Generator rated field voltage):	[redacted] pu to [redacted]	pu
(h)	Minimum ac supply voltage required for the Excitation System to supply rated Generator field current at rated Generator field voltage:	[redacted]	kV
	(i) Ceiling voltage at the minimum ac supply voltage above:	[redacted]	Vdc
	(A) = [redacted] pu (where 1 pu is equal to the Generator field voltage at Generator Rated Output)		
	(B) = [redacted] pu (where 1 pu is equal to the air-gap field voltage as defined in IEEE Std.421.1		
(i)	Minimum Generator terminal voltage error required to drive the Excitation System to Ceiling Voltage while supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions:	[redacted]	pu
(j)	Current required by the Excitation System while configured in open-loop operation and supplying the Generator operating at 120% of rated Generator terminal voltage during an open circuit saturation test:		
	(i) with a Generator Rated Voltage supply connected to the Exciter transformer:	[redacted]	A_{rms} at Generator Rated Voltage
	(ii) with a 600V supply connected to the Power Rectifier:	[redacted]	A_{rms} at 600V
(k)	Excitation System auxiliary equipment power required while the Excitation System is supplying the Generator operating at Generator Rated Output and Rated Operating Conditions:	[redacted]	kW
(l)	Excitation System total heat rejected while the Excitation System is supplying the Generator operating at Generator Rated Output and Rated Operating Conditions:	[redacted]	kW
(m)	Excitation System losses while it is supplying the Generator operating at Generator Rated Output and Rated Operating Conditions:		
	(i) Exciter Transformer losses	[redacted]	kW
	(ii) Power Rectifier losses	[redacted]	kW
	(iii) Other losses (snubbers, auxiliary equipment, buswork, etc.)	[redacted]	kW

			Value	Units
	(iv)	Total losses	[redacted]	kW
(n)	Maximum audible noise level while the Excitation System is supplying the Generator operating at Generator Rated Output and Rated Operating Conditions, measured at:			
	(i)	1 m from the Exciter Transformer	[redacted]	dBA
	(ii)	1 m from the Power Rectifier	[redacted]	dBA
(o)	Exciter Software and communications:			
	(i)	ExcPCE/ExcRCE:		
		(A) Configuration tool software model	[redacted]	
		(B) Configuration tool software version number	[redacted]	
		(C) Communications link protocol and physical layer:		
		(I) Protocol	[redacted]	
		(II) Physical	[redacted]	
	(ii)	Exciter HMI:		
		(A) Configuration tool software model	[redacted]	
		(B) Configuration tool software version number	[redacted]	
		(C) Communications link protocol and physical layer:		
		(I) Protocol	[redacted]	
		(II) Physical	[redacted]	
(p)	Excitation System total mass (not including Excitation Transformer)		[redacted]	kg
(q)	Excitation System Design Life		[redacted]	years

			Value	Units

5.3 Power Rectifier

(a) Power Rectifier dimensions

(i) overall height ____ mm

(ii) overall width ____ mm

(iii) overall length ____ mm

(b) Power Rectifier mass ____ kg

(c) Number of SCR bridges used ____

(d) Number of SCRs/bridge:

____ consisting of ____ in series, ____ in parallel

(e) Maximum continuous output rating of each bridge:

(i) all bridges in service

(A) ____ V, ____ Adc at Tj = ____ ^{o}C

(f) Cooling:

(i) All bridges in service: ☒ ☐

(ii) One bridge out of service: ☒ ☐

(iii) Fans (if any):

(A) Number: ____

(B) Total Flow: ____ m^3/s

(C) Motors: ☒ ☐

(I) ____ Vac

(II) ____ VA

(g) Silicon Controlled Rectifiers (SCRs):

(i) SCR Manufacturer: ____

(ii) SCR Type: ____

(iii) Rated maximum operating junction temperature (Tjm): ____ ^{o}C

(iv) Repetitive forward blocking voltage: ____ Vdc at Tjm = ____

(v) Repetitive reverse blocking voltage: ____ Vdc at Tjm = ____

(vi) Non-repetitive reverse blocking voltage: ____ V_{peak} at Tjm = ____

			Value	Units
(h)	Maximum SCR junction temperature rise above ambient while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions:			
	(i)	with all bridges in service		^{o}C
	(ii)	with one bridge out of service		^{o}C
(i)	Total SCR losses with all bridges in service while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions			kW
(j)	Surge arresters:			
	(i)	breakover voltage		Vdc
	(ii)	energy rating		kW

5.4 <u>Exciter Transformer</u>

(a)	Ratings			
	(i)	Primary voltage		kV
	(ii)	Secondary voltage		V
	(iii)	Basic impulse level (BIL) of primary insulation		kV
	(iv)	Voltage class of secondary		V
	(v)	Type of cooling		
	(vi)	Number of phases	☒	☐
	(vii)	Frequency		Hz
	(viii)	Insulation system class		
	(ix)	kVA rating for rated winding temperature rise		kVA
	(x)	Winding temperature rise		^{o}C
	(xi)	Taps (if provided)		%
	(xii)	K-factor		
	(xiii)	High-Voltage current transformer class		
(b)	Losses in accordance with CSA C9 M			
	(i)	No load losses		kW
	(ii)	Total losses while the Excitation System is supplying the Generator operating at Generator Rated Output and Generator Rated Operating Conditions		kW

			Value	Units
(c)	Efficiencies at 1.0 power factor			
	(i)	¼ load		%
	(ii)	½ load		%
	(iii)	Full load		%
(d)	Excitation current at			
	(i)	Rated primary voltage		%
	(ii)	110% of rated primary voltage		%
(e)	Impedance and fault current			
	(i)	Impedance		%
	(ii)	Maximum secondary symmetrical fault current assuming an infinite source:		kA_{rms}
(f)	Physical characteristics			
	(i)	Overall height		mm
	(ii)	Overall width		mm
	(iii)	Overall length		mm
	(iv)	Mass of core and coil		kg
	(v)	Total mass		kg
(g)	Test values for primary winding			
	(i)	Applied test voltage		kV
	(ii)	Induced test voltage		kV
(h)	Terminals and terminal connectors			
	(i)	HV terminal type		
	(ii)	LV phase terminal type		
	(iii)	LV neutral terminal type		

5.5 <u>Field Breaker</u>

(a)	Type		☐	☒
(b)	Manufacturer and type/series			
(c)	Manufacturer's part number			
(d)	Rated maximum interruption voltage	V	☐	☒
(e)	Rated maximum steady-state current	A	☐	☒

			Value	Units
(f)	Rated maximum interrupting current of main contacts	A	☐	☒
	(i) at	V	☐	☒
(g)	Closing time of main contacts			msec
(h)	Opening time of main contacts			msec
(i)	Duty cycle			
(j)	Number and type of auxiliary contacts:			
	(i) Quantity of form A contacts:			
	(ii) Quantity of form B contacts:			
	(iii) Quantity of form C contacts:			
(k)	Rated interrupting current of auxiliary contacts	A (inductive) at		Vdc
(l)	Charging mechanism			
5.6	**Field Flashing**			
(a)	Field flashing current limiting			type
(b)	Field flashing contact			
	(i) maximum continuous current rating	Adc at		Vdc
	(ii) maximum interrupting current rating	Adc (inductive) at		Vdc
(c)	Series resistor (if applicable)			
	(i) continuous power rating			kW
	(ii) 30 second power rating			kW
	(iii) Type			
	(iv) Resistance adjusting range:	ohms to		ohms
5.7	**Field Discharge Equipment**			
(a)	De-excitation equipment			
	(i) Type (e.g. SCR)			
	(ii) Discharge capacity			kW
	(iii) Peak voltage capability			Vdc
(b)	Crowbar circuit equipment			
	(i) Type (e.g. SCR)			

			Value	Units
	(ii)	Breakover voltage		Vdc
	(iii)	I^2t rating	MA^2 for	sec
	(iv)	Bi-directional	☒	☐
	(v)	Breakover voltage adjustment range	Vdc to	Vdc
(c)	Field Discharge Resistor (FDR)			
	(i)	Type		
	(ii)	Energy rating		kW
	(iii)	Number of resistors		
	(iv)	Connection method (parallel or series)		
	(v)	Calculated total field suppression time after a three phase short circuit at the stator terminals		s
5.8	**Surge Suppression Devices**			
(a)	Type			
(b)	Rating			kV
(c)	Maximum surge voltage		kV for	s
(d)	Maximum steady state voltage			kV
5.9	**AC Bus Duct**			
(a)	Manufacturer			
(b)	Manufacturer's model (if applicable)			
(c)	Rated continuous current			A
(d)	Rated voltage			kV

		Value	Units
(e)	Power frequency withstand	[redacted]	kV
(f)	Basic impulse level (BIL)	[redacted]	kV
(g)	Insulation type (e.g. tape, fluidized epoxy, etc.)	[redacted]	

5.10 DC Bus Duct

(a)	Manufacturer	[redacted]	
(b)	Manufacturer's Model (if applicable)	[redacted]	
(c)	Rated continuous current	[redacted]	A
(d)	Rated voltage	[redacted]	kV
(e)	Power frequency withstand	[redacted]	kV
(f)	Basic impulse level (BIL)	[redacted]	kV
(g)	Insulation type (e.g. tape, fluidized epoxy, etc.)	[redacted]	

6.0 NOT USED

SUPPLY AND INSTALLATION OF TURBINES AND GENERATORS CONTRACT

APPENDIX 11-7

EQUIPMENT SPARE PARTS LISTS

Note: Attached to this Appendix 11-7 is an Excel spreadsheet entitled "Appendix 11-7 Equipment Spare Parts Lists" that the parties agree contains the correct Contract prices and which are deemed to be read as part of this Appendix 11-7 (and which will be subject to adjustment for currency fluctuation as provided by Section 12.1 of the Agreement).

Spare Parts Quantity Key

N Total number of items/components installed on one Unit
M1 One spare part required where there are four or less items/components installed on one Unit
M2 Two spare parts required where there are five to eight items/components installed on one Unit
M3 Three spare parts required where there more than eight items/components installed on one Unit
Y Quantity expected to be needed for the operation of one Unit for one year (but cannot be less than a quantity of one)

Table Notes:

[1] Where not already specified elsewhere in the Contract Documents, the Contractor will provide all spare parts identified as "Committed Spares" in this Appendix 11-7 [Equipment Spare Parts Lists], in the corresponding quantities set out under the column entitled "Total Quantity".

[2] BC Hydro may, at its option, issue one or more Change Orders requiring the Contractor to provide spare parts identified as "Optional Spares" in this Appendix 11-7 [Equipment Spare Parts Lists]. The price to provide one unit of each such spare part will be deemed to be equal to the corresponding Spare Parts Payment for that spare part. For certainty, BC Hydro may pay all or part of a provisional sum identified in this Schedule 11 [Prices and Payment] pursuant to such Change Orders.

[3] For spare parts identified as "Committed Spares" in this Appendix 11-7 [Equipment Spare Parts Lists], these prices (each a "**Spare Parts Payment**") are each for the total quantity specified in the column entitled "Total Quantity".

[4] Valve(s) includes all types of valves such as isolating, regulating, control, pressure relief, solenoid, etc.

[5] BC Hydro may, at its option, order up to four additional complete Excitation Systems.

Interpretations:

1 Unless otherwise expressly stated, each spare part described in a line item will be interpreted as meaning a complete assembly of such part, including all of the sub-components that make up the part, and the spare part will come fully assembled.

2 Where the Contract Documents describe more than one type for a part referred to in a spare part line item, then the quantity required will be interpreted as the quantity required for each type.

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]		Spare Parts Payment[3]
Table Appendix 11-7 A – Common Spare Parts[1]						
A 1	M1	power supply, converter, and inverter of each type	Yes			[redacted]
A 2	M2	relay of each type	Yes			[redacted]
A 3	M1	contactor of each type	Yes			[redacted]
A 4	M1	holding coils and main and auxiliary contacts for each type and size of motor starter or contactor used	Yes			[redacted]
A 5	M1	moulded case circuit breaker	Yes			[redacted]
A 6	M1	control and instrument transformer of each type	Yes			[redacted]
A 7	M1	printed circuit board complete with components of each type	Yes			[redacted]
A 8	M1	coil for each type of solenoid valve or mechanism, including all parts required to replace each type of coil	Yes			[redacted]
A 9	M1	pressure transducer of each type	Yes			[redacted]
A 10	M1	pressure switch of each type	Yes			[redacted]
A 11	M1	pressure gauge of each type	Yes			[redacted]
A 12	M1	level transducer of each type	Yes			[redacted]
A 13	M1	level switch of each type	Yes			[redacted]
A 14	M1	flow transducer of each type	Yes			[redacted]
A 15	M1	flow switch of each type	Yes			[redacted]
A 16	M1	displacement transducers of each type	Yes			[redacted]
A 17	M1	limit switches of each type	Yes			[redacted]
A 18	M1	temperature transducer of each type	Yes			[redacted]
A 19	M1	RTD of each type	Yes			[redacted]
A 20	M1	temperature switch of each type	Yes			[redacted]
A 21	M1	temperature gauge of each type	Yes			[redacted]
A 22	M1	thermowell of each type	Yes			[redacted]
A 23	M1	oil contamination monitor detector of each type	Yes			[redacted]
A 24	M1	valve of each type for valves 250 mm (10") and smaller including any seals/gaskets required for installation[3]	Yes			[redacted]
A 25	M1	repair kit for each type of valve over 250 mm (10") including any seals/gaskets required for installation[4]	Yes			[redacted]
A 26	M1	valve actuator and controller of each type	Yes			[redacted]

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	[redacted]
A 27	M1	repair kit for each type of pneumatic actuator	Yes			[redacted]
A 28	1	Generator cooling water flow regulating valve and actuator if not provided in A 24, A 25, A 26 and A 27	Yes			[redacted]
A 29	18 x Y	oil filters or cartridges of all types	Yes			[redacted]
A 30	3 x Y	air filters or cartridges of all types	Yes			[redacted]
A 31	3 x Y	water filters or cartridges of all types	Yes			[redacted]
A 32	1	strainer baskets of each type	Yes			[redacted]
A 33	M1	vibration monitoring system eddy current probe and drivers	Yes			[redacted]
A 34	M2	terminal blocks and accessories of each type	Yes			[redacted]
A 35	M1	oil mist collector assembly	Yes			[redacted]
Table Appendix 11-7 B – Turbine Spare Parts						
		For the Turbine runner seals:				
B 1	1	headcover renewable runner seal ring		Yes		[redacted]
B 2	1	headcover renewable runner inner seal ring, if applicable		Yes		[redacted]
B 3	1	bottom ring renewable runner seal ring		Yes		[redacted]
		For the Turbine shaft seal:				
B 4	1	replaceable seal wear face	Yes			[redacted]
B 5	2 x N	replaceable carbon rings	Yes			[redacted]
B 6	1 x N	packing, gaskets, O-rings and seals	Yes			[redacted]
		For the Turbine guide bearing:				
B 7	1 x N	bearing pads	Yes			[redacted]
B 8	1 x N	bearing pad accessories such as sealing strips, adjustment mechanism wearable components, locking tabs etc. (as applicable to the design)	Yes			[redacted]
B 9	1	bearing cooler of each type	Yes			[redacted]
B 10	1 x N	bearing cover shaft oil seal if subject to wear	Yes			[redacted]
B 11	1 x N	bearing packing, gaskets, O-rings and seals (except for top cover and inspection covers/hatches)	Yes			[redacted]
B 12	3 x N	gaskets, O-rings and seals for top cover and inspection covers/hatches	Yes			[redacted]
		For the Turbine wicket gates:				

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	
B 13	2 x N	shear pins	Yes			[redacted]
B 14	6	self-lubricated bushing of each type for the headcover and bottom ring	Yes			[redacted]
B 15	6	operating mechanism self-lubricated bushing of each type for the gate links	Yes			[redacted]
B 16	6	self-lubricated thrust bearing of each type	Yes			[redacted]
B 17	1 x N	stem seals or packing of each type including any seals required for removable housings	Yes			[redacted]
B 18	1 x N	end seal segments of each type	Yes			[redacted]
B 19	4	end seal segment clamp bars and all hardware necessary to install	Yes			[redacted]
		For the Turbine operating ring and servomotors:				
B 20	0.5 x N	Servomotor connecting rod bushing of each type including thrust washer	Yes			[redacted]
B 21	1 x N	Servomotor bushing, piston rings, rod seal, gaskets etc. required to overhaul servomotors	Yes			[redacted]
B 22	1 x N	Servomotor gate lock piston rings, rod seal, gaskets etc. required to overhaul gate lock	Yes			[redacted]
B 23	0.5 x N	operating ring self-lubricated thrust and radial wear strips of each type	Yes			[redacted]
		Other:				
B 24	1	headcover pumped drainage system including pump, motor, strainers, check valves, level instrumentation, etc.	Yes			[redacted]
B 25	1	flexible coupling seal ring including two seal clamp ring segments	Yes			[redacted]
B 26	2 x N	spiral case, draft tube, and draft tube elbow door O-rings	Yes			[redacted]
B 27	1 x N	air admission airhead packing, gaskets, O-rings, seals if applicable and all required electrical isolation	Yes			[redacted]
Table Appendix 11-7 C – Governor System Spare Parts						
C 1	1	pump and motor assembly of each type including unloader, coupling, and housing and including any seals/gaskets required for installation	Yes			[redacted]

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	
C 2	1	distributing valve including feedback displacement transducer and any seals/gaskets required for installation	Yes			[redacted]
C 3	1	pilot valve including feedback displacement transducer and any seals/gaskets required for installation	Yes			[redacted]
C 4	1	accumulator float valve including any seals/gaskets required for installation	Yes			[redacted]
C 5	1	accumulator sight glass assembly including any seals/gaskets required for installation	Yes			[redacted]
C 6	1	high pressure air compressor and motor assembly	Yes			[redacted]
C 7	1	Governor PLC	Yes			[redacted]
C 8	1	Governor HMI	Yes			[redacted]
C 9	2	Toothed-Wheel speed detector ZVPU Probe, including signal conditioner of each type	Yes			[redacted]
C 10	1	Fully assembled Toothed Wheel Speed Sensing System if the system is installed above the Generator rotor	Yes			[redacted]
Table Appendix 11-7 D – Generator Spare Parts						
		For the Generator stator core:				
D 1	1	laminations, including all different types, to pile one-eighth of one Generator	Yes			[redacted]
D 2	1	pressure plates and pressure fingers for one quarter circumference of one Generator	Yes			[redacted]
D 3	8	clamping studs complete with washers and nuts (and insulation if applicable)	Yes			[redacted]
		For the Generator stator winding:				
D 4	80	front bars	Yes			[redacted]
D 5	20	back bars	Yes			[redacted]
D 6	8	group jumpers of each type and associated hardware	Yes			[redacted]
D 7	80	series connections and associated hardware including end-caps	Yes			[redacted]
D 8	3	circuit ring tap connections of each type or three universal equivalents	Yes			[redacted]

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	
D 9	1	circuit-ring section of each type	Yes			[redacted]
D 10	4	circuit-ring supports of each type or four universal equivalents	Yes			[redacted]
D 11	1	support ring section of each type	Yes			[redacted]
D 12	1	depth and side packing required to install 80 front bars and 20 back bars	Yes			[redacted]
D 13	1	wedges required to install 80 front bars	Yes			[redacted]
D 14	1	blocking, lashing, and epoxy sufficient for replacement of 80 front bars and 20 back bars	Yes			[redacted]
D 15	1 x N	flex connectors for the Generator main and neutral lead connections	Yes			[redacted]
		For the Generator rotor:				
D 16	6	pole field windings	Yes			[redacted]
D 17	2	pole field ground insulation kits including all necessary ground insulation components	Yes			[redacted]
D 18	1	field bus assembly for one Generator (field bus from rotor poles to brushgear and brushgear to Excitation System)	Yes			[redacted]
D 19	6 x N	pole keys required for one pole	Yes			[redacted]
D 20	6	inter-polar jumpers of each type (if there are more than one type)	Yes			[redacted]
D 21	2	pole inter-polar baffles (if used)	Yes			[redacted]
		For the Generator bearings:				
D 22	1 x N	thrust bearing pads	Yes			[redacted]
D 23	1 x N	thrust bearing supporting springs (or equivalent)	Yes			[redacted]
D 24	1 x N	thrust bearing pad accessories including check valves, orifices, flexible pipe or tubing connections	Yes			[redacted]
D 25	1 x N	guide bearing pads	Yes			[redacted]
D 26	1 x N	guide bearing pad accessories such as sealing strips, adjustment mechanism wearable components, locking tabs etc. (as applicable to the design)	Yes			[redacted]
D 27	1 x N	guide and/or thrust bearing electrical insulation if applicable	Yes			[redacted]
D 28	1	thrust bearing thrust runner	Yes			[redacted]
D 29	1	guide/thrust bearing cooler of each type	Yes			[redacted]
D 30	1 x N	bearing cover shaft oil seal if subject to wear	Yes			[redacted]

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	
D 31	1	thrust bearing lift pump and motor assembly	Yes			[redacted]
D 32	1 x N	bearing packing, gaskets, O-rings and seals (except for top cover and inspection covers/hatches)	Yes			[redacted]
D 33	3 x N	gaskets, O-rings and seals for top cover and inspection covers/hatches	Yes			[redacted]
		For the Generator brakes:				
D 34	2 x N	brake pads	Yes			[redacted]
D 35	1	brake/jack assembly (excluding pad)	Yes			[redacted]
D 36	1	brake solenoid valve assembly (including manual valve and all limit switches)	Yes			[redacted]
D 37	1 x N	seal between brake and brake track for dust collector	Yes			[redacted]
		For the Generator cooling system:				
D 38	1	stator air cooler and heat recovery cooler of each type	Yes			[redacted]
		For the Generator brushgear:				
D 39	2 x N	Brushes	Yes			[redacted]
D 40	1 x N	brush holders	Yes			[redacted]
D 41	1	collector ring assembly fully assembled including both collector rings, insulators, mounting hardware, and all other components required for installation	Yes			[redacted]
		For the Generator instrumentation:				
D 42	1	partial discharge monitoring system coupling capacitor and surge arrestor including Enclosure	Yes			[redacted]
D 43	4	stator winding RTD of each type	Yes			[redacted]
D 44	2	stator core RTD of each type	Yes			[redacted]
D 45	2	stator frame RTD of each type	Yes			[redacted]
D 46	2	air coolers RTD of each type	Yes			[redacted]
D 47	4	airgap monitoring system proximity probe and signal conditioner of each type	Yes			[redacted]
D 48	1	CT of each type	Yes			[redacted]
D 49	1	airgap monitoring system instrument slip-ring	Yes			[redacted]
D 50	1	fire detection system sensor of each type	Yes			[redacted]
D 51	1	fire protection deluge nozzle of each type	Yes			[redacted]

Item Number	Total Quantity	Description	Committed Spares[1]	Optional Spares[2]	Spare Parts Payment[3]	
Table Appendix 11-7 E – Excitation System Spare Parts						
E 1	1	Exciter Transformer	Yes			[redacted]
E 2	1	SCR bridge assembly	Yes			[redacted]
E 3	1	SCR bridge assembly		Yes		[redacted]
E 4	1	fan module (if fans are used for cooling within the Excitation System)	Yes			[redacted]
E 5	1	Field Breaker	Yes			[redacted]
E 6	1	field discharge equipment (including Field Discharge Resistor, de-excitation SCR assembly, and field shorting crowbar SCR assembly)	Yes			[redacted]
E 7	1	field flashing equipment assembly	Yes			[redacted]
E 8	1	ExcPCE equipment assembly, including power supplies, communications devices, main and daughter printed circuit boards or modules, and I/O printed circuit boards or modules	Yes			[redacted]
E 9	1	ExcRCE equipment assembly, including power supplies, communications devices, main and daughter printed circuit boards or modules, and I/O printed circuit boards or modules	Yes			[redacted]
E 10	1 x N	fuses of each type	Yes			[redacted]
E 11	1	field ground detector equipment assembly	Yes			[redacted]
E 12	1	conduction monitoring equipment assembly (if not provided with the spare SCR bridge assembly)	Yes			[redacted]
E 13	1	Exciter HMI	Yes			[redacted]
E 14	1	each type of component used in the Exciter Hardwired Controls	Yes			[redacted]
E 15	1	SEL 351 Exciter Transformer protective relay		Yes		[redacted]
E 16	1[5]	Complete Excitation System		Yes		[redacted]
Committed Spares Sub-Total	[redacted]					
Optional Spares Sub-Total (assume one of each)	[redacted]					