

JOHN HART GENERATING STATION REPLACEMENT PROJECT

SCHEDULE 7

SERVICES

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TABLE OF CONTENTS

1. GENERAL REQUIREMENTS	1
1.1 INTENT	1
1.2 SUBMITTALS	1
2. ADMINISTRATION	3
2.1 SERVICES DIRECTOR.....	3
2.2 SERVICES PERIOD JOINT COMMITTEE	4
2.3 BC HYDRO NOT RESPONSIBLE FOR SERVICES	7
3. OPERATIONS.....	7
3.1 GENERAL	7
3.2 NO INTERFERENCE WITH BC HYDRO ACTIVITIES	7
3.3 PROJECT CO RESPONSIBILITIES	8
3.4 BC HYDRO OPERATING RESPONSIBILITIES	8
3.5 OPERATING ORDERS	8
4. ASSET MAINTENANCE AND MANAGEMENT.....	9
4.1 GENERAL	9
4.2 GUIDING PRINCIPLES	10
4.3 PROJECT CO RESPONSIBILITIES	11
4.4 BC HYDRO LABOUR POOL RESPONSIBILITIES	13
4.5 BC HYDRO LABOUR POOL.....	15
4.6 ASSET MANAGEMENT PLAN	18
5. OUTAGES AND REQUESTS FOR SERVICES	25
5.1 GENERAL	25
5.2 PRINCIPLES	25
5.3 OUTAGE PLANNING	25
5.4 IMMEDIATE CALLOUTS AND FORCED OUTAGES	27
5.5 PROJECT CO RESPONSIBILITIES	28
5.6 BC HYDRO RESPONSIBILITIES	28
5.7 IMMEDIATE CALLOUT AND FORCED OUTAGE RESPONSE PLAN	28
5.8 RECTIFICATION PLANS	29
6. DOCUMENTATION AND REPORTING	29
6.1 GENERAL	29

6.2	MANDATORY RELIABILITY STANDARDS.....	30
6.3	REPORT CONTENT	31

APPENDIX 7A – ROLES AND RESPONSIBILITIES

APPENDIX 7B – FACILITY SERVICES

APPENDIX 7C - NOTIFICATION OF FAILURE OR REQUEST FOR SERVICE

APPENDIX 7D - CONDITION ASSESSMENT

APPENDIX 7E - CONDITION ASSESSMENT EVALUATION

APPENDIX 7F – HANDBACK REQUIREMENTS

APPENDIX 7G – IMMEDIATE CALLOUT SEQUENCE OF EVENTS

APPENDIX 7H - OUTAGES AND CONSTRAINTS NOTIFICATION FORM

APPENDIX 7I - STANDARD SCHEDULE OF RATES FOR THE BC HYDRO LABOUR POOL

APPENDIX 7J - RETURN TO SERVICE CERTIFICATE

APPENDIX 7K – NOT USED

1. GENERAL REQUIREMENTS

1.1 INTENT

This Schedule sets out: (a) the scope and requirements for the performance by Project Co of the Services during the Services Period; and (b) the Handback Work requirements for the End of Term. The Services commence at Service Commencement and end on the Termination Date.

1.2 SUBMITTALS

- (a) Project Co shall prepare and submit all documents and deliverables as and when required pursuant to this Schedule 7 [Services], including the following:

Table 1.3.1 Schedule of Submittals

Deliverable Name	Due Date	Specification Reference	Review Procedure or Consent Procedure
Local Operating Orders	Final: when revisions are necessary.	3.5	Consent Procedure
Asset Management Plan	Final: not less than sixty (60) days prior to the scheduled date for Service Commencement and updated annually on the anniversary date of Service Commencement	4.6(b)	Consent Procedure
Maintenance Plan and Schedule	Included in the Asset Management Plan	4.6(c)	Included in the Asset Management Plan
Immediate Callout and Forced Outage Response Plan	Final: not less than thirty (30) days prior to Services Commencement and updated annually on the anniversary date of Service Commencement	5.7	Consent Procedure
Rectification Plan Outline	Not less than 30 days prior to Services Commencement	4.6(b)(vii)	Review Procedure

Deliverable Name	Due Date	Specification Reference	Review Procedure or Consent Procedure
Facility Condition Assessment Plan	Final: not less than two (2) months prior to the scheduled submittal of the Commissioning Test Report.	Appendix 7D	Consent Procedure
4-year Condition Assessment Report	Final: due 10 years prior to the Expiry Date.	6.3(e) & Appendix 7D	Consent Procedure
8-year Condition Assessment Report	Final: due 6 years prior to the Expiry Date.	6.3(e) & Appendix 7D	Consent Procedure
12-year Condition Assessment Report	Final: due 2 years prior to the Expiry Date.	6.3(f) & Appendix 7D	Consent Procedure
All Outage Requests		5.3	Consent Procedure
Weekly Facility Activity Report	On the day of the weekly meeting between technical managers.	6.3(a)	N/A
Monthly Facility Performance Scorecard	On the seventh workday of the month.	6.3(b)	N/A
Mandatory Reliability Standards (MRS) Reports Data	Ten (10) days prior to due date in applicable MRS	6.2	N/A
Annual Asset Management Report	Final: by October 1 of each year starting one year after submittal of the final Commissioning Test Report.	6.3(c)	Consent Procedure
Handback Plan	Final: within 60 days of the completion of the 12-year Condition Assessment Report	Appendix 7F	Review Procedure
Handback Report	Final: eight (8) months prior to the Expiry Date	6.3(g) & Appendix 7F	Consent Procedure
Handback Certificate	On Expiry Date	Appendix 7F	Consent Procedure
Work Completion Certificate	Upon completion of work	4.3(y)	N/A
Return to Service Certificate	Upon completion of work	4.3(z) & 5.4	Consent Procedure

2. ADMINISTRATION

2.1 SERVICES DIRECTOR

- (a) Not less than 365 days prior to placing the first Generating Unit into Commercial Operation, Project Co shall designate in writing a person to be Services Director. The Services Director shall have documented qualifications demonstrating competency and a minimum of fifteen (15) years' experience in the operation, maintenance, contracting and asset management of equipment, systems and facilities of comparable size, nature and complexity to those provided as part of the Services. At least five (5) years' experience shall be in a role with responsibilities comparable to those required for the Services Director for this Project.
- (b) During the Services, the Services Director shall:
 - (1) Serve as Project Co's technical manager on the Services Period Joint Committee;
 - (2) Attend the Liaison Committee meetings pursuant to the requirements of Schedule 11 [*Communication and Consultation*];
 - (3) Ensure that Project Co in accordance with the requirements of Schedule 3 [*Roles and Responsibilities*] has appointed and has in place during the Services Period the applicable Key Individuals and related staff and resources to fulfill its obligations as specified in Schedules 8 [*Environmental Obligations*], 11 [*Communication and Consultation*], 12 [*Safety and Security*], 9 [*Quality*] and 23 [*Public Safety and Public Use*];
 - (4) Coordinate preparation of the Weekly Facility Activity Report, Monthly Facility Performance Scorecard, and Annual Asset Management Report; and
 - (5) Coordinate preparation and implementation of the Facility Condition Assessment Plan.
- (c) The Services Director may also serve in the role of Project Co's Representative or the roles of other Key Individuals as provided for in Section 2.3 [Key Individuals] of Schedule 3 [Roles and Responsibilities].
- (d) To the extent the Services Director role is combined with the role and responsibilities of another Key Individual for Project Co as provided for in subparagraph (c) above and Section 2.3 [*Key Individuals*] of Schedule 3 [*Roles and Responsibilities*], the individual serving in this combined role must ensure that he or she will have the qualifications required of each role or alternatively has direct and timely access to other individuals who are Project Co Persons who do possess those qualifications.

2.2 SERVICES PERIOD JOINT COMMITTEE

- (a) Not less than 6 months prior to placing the first Generating Unit into Commercial Operation, BC Hydro and Project Co will establish, a joint liaison committee (the "Services Period Joint Committee") consisting of the Services Director, the Project Co Representative (if different than the Services Director), the BC Hydro Representative and BC Hydro's Operations Manager who will serve as BC Hydro's technical manager, and such other members as the parties may agree from time to time.
- (b) The purpose of the Services Period Joint Committee is to provide a formal forum for the parties to consult and cooperate in all matters relating to the Facility and the Services and any member appointed to the Services Period Joint Committee will not have any duties or obligations arising out of such appointment independent of such member's duties or obligations to the party making such appointment.
- (c) The Services Period Joint Committee must at all times be guided by the terms of the Agreement, and will have no authority to act, or to delegate to others the authority to act in a manner that conflicts with or is inconsistent with the Agreement. The Services Period Joint Committee is intended to be a consultative forum that facilitates active timely communication between the parties regarding matters relating to the performance of the Services and the interfacing of the Services with Operation. Subject to the foregoing, the Services Period Joint Committee:
 - (1) will only have the authority as expressly delegated to them by BC Hydro and Project Co at the time the committee is established and thereafter, and both parties will give consideration to delegating, at their sole discretion, appropriate authority to permit efficient and timely coordination and interaction between BC Hydro and Project Co decision making with respect to the performance of the Services;
 - (2) may strike, establish terms of reference for, delegate authority and appoint members having the necessary experience and qualifications to such subcommittees as the Services Period Joint Committee may determine are necessary from time to time and all such sub-committees will report to the Services Period Joint Committee;
 - (3) will establish protocols and procedures for undertaking the tasks and responsibilities delegated to it, including a co-operative and consultative process to review and comment on all Service Plans and Service Reports submitted to it;
 - (4) may make recommendations to the parties on matters relating to the Facility, Services and the interfacing of the Services with Operations, including providing oversight guidance and direction, and the recommended adoption of further administrative protocols, which the parties may accept or reject in their complete discretion;

- (5) will be responsible for coordinating the Change process from initiation of request for a Change through satisfactory completion of the Change work in accordance with the issued Change Certificate. Changes shall be made pursuant to the requirements of Schedule 14 [*Changes*];
 - (6) will plan and coordinate the work necessary to evaluate the condition assessments of the Facility utilizing the reports required under Section 6 [*Documentation and Reporting*] of this Schedule and the implementation of necessary remedial work prior to Handback;
 - (7) will assess the maintenance performance for the period between the current meeting and the previous meeting and the need for Condition-based Maintenance identified therefrom;
 - (8) will review the maintenance activities planned for the period between the current meeting and the next scheduled meeting;
 - (9) will review the Monthly Facility Performance Scorecard;
 - (10) will coordinate all activities of the BC Hydro Labour Pool with BC Hydro according to the protocols set out in this Agreement and the Asset Management Plan, including the Maintenance Plan and Schedule and the Energy Management Plan;
 - (11) will identify and discuss with the appropriate Key Individuals any issues that may arise regarding safety, environmental protection, First Nations and community relations;
 - (12) will rotate chairing the committee between BC Hydro and Project Co on a 6 month rolling basis or as otherwise agreed by the Parties;
 - (13) will discuss and develop an action plan with respect to any BC Hydro Labour Pool personnel who Project Co recommends disciplinary or corrective action for as a consequence of identified performance, productivity or other behaviour concerns or issues arising in relation to the performance of the Services;
 - (14) will refer any Dispute that may arise with or be identified by the Services Period Joint Committee to their respective Representatives in relation to the Services or the interfacing of the Services with Operations for resolution pursuant to Schedule 19 [*Dispute Resolution Procedure*]; and
 - (15) will finalize the form of Return to Service Certificate in a timely manner consistent with the requirements of this Agreement.
- (d) Subject to the provisions of the Agreement, the members of the Services Joint Committee may adopt such procedures and practices for the conduct of the activities of

the Services Period Joint Committee as they consider appropriate from time to time and may:

- (1) invite to any meeting of the Services Period Joint Committee such other Persons as a member may decide and such other Persons shall be bound by the confidentiality obligations in accordance with Section 17.1 [*Confidentiality*] of this Project Agreement; and
 - (2) receive and review a report from any Person agreed by the members of the Services Period Joint Committee.
- (e) The Services Period Joint Committee will, unless otherwise agreed by its members, meet:
- (1) monthly, starting six months prior to placing the first Generating Unit into Commercial Operation and continuing for three years;
 - (2) quarterly thereafter, subject to agreement by both parties; and
 - (3) from time to time as necessary. Any member of the Services Joint Committee may convene a non-regularly scheduled meeting of the Services Period Joint Committee on not less than 10 Business Days' notice (which will also identify the agenda items to be discussed at the meeting) provided that in an emergency a meeting may be called at any time on such notice as may be reasonable in the circumstances.
- (f) The Services Director and the BC Hydro Operations Manager will, as required, meet or communicate by telephone:
- (1) to review the Weekly Facility Activity Report; and
 - (2) to identify the person and back-up person for each of Project Co and BC Hydro who are the primary contacts for that week, responsible for responding to NFRS and other daily issues regarding the Services.
- (g) [Not used]
- (h) Meetings shall be scheduled at a mutually acceptable time, and may be held on-site or at another mutually acceptable location, or may be by conference call depending on the nature of the discussion.
- (i) Minutes of all meetings of the Services Period Joint Committee:
- (1) will be kept by Project Co and copies circulated promptly to the parties within five Business Days of the meeting;

- (2) will note any disputed items; and
 - (3) will be maintained in Project Co's maintenance management records.
- (j) The Services Period Joint Committee shall meet yearly to conduct an asset management review. The meeting shall include:
- (1) a presentation by Project Co of its evaluation of the Asset Management Plan over the past year;
 - (2) a review of the Annual Asset Management Plan, including an assessment of how well Reliability Centred Maintenance Principles have been applied to each of the Generating Systems elements and the results achieved;
 - (3) a discussion of any proposed revisions to the Asset Management Plan, including the 1-year and 3-year look-a-heads, that may be necessary based on the experiences, performance and budgeted versus actual expenditures of the previous year; and
 - (4) the annual Services Quality Management Plan review as specified in Schedule 9 [*Quality Management*].

2.3 BC HYDRO NOT RESPONSIBLE FOR SERVICES

- (a) BC Hydro's rights of review, acceptance, approval, consent or confirmation of compliance with respect to any aspect of the Services will be for BC Hydro's benefit only, and no acceptance, approval or confirmation of compliance by BC Hydro's Representative or other representative of BC Hydro will in any way relieve Project Co of its obligation for the performance of all aspects of the Services except as may be expressly set out in the Agreement.

3. OPERATIONS

3.1 GENERAL

- (a) Operating Responsibility and Operating Authority for the Facility shall remain solely with BC Hydro.

3.2 NO INTERFERENCE WITH BC HYDRO ACTIVITIES

- (a) All Services performed by Project Co must not interfere with, conflict with, nor prohibit BC Hydro from fulfilling its BC Hydro Activities and Legal Obligations, except as may be necessary due to constraints resulting from Forced Outages, Planned Outages and Project Co Operating Constraints.

3.3 PROJECT CO RESPONSIBILITIES

Project Co shall perform all Services during the Service Period in accordance with the requirements of this Agreement and with a view to facilitating or supporting BC Hydro:

- (a) complying with prescribed flow requirements in the Campbell River System as established by the BC Hydro Legal Obligations; and
- (b) mitigating to the extent reasonably possible damage to fish habitat downstream of the Facility associated with Operations.

In performing the Services, Project Co shall also:

- (1) comply with the requirements of Schedule 8 [*Environmental Obligations*] and other environmental obligations as specified in this Schedule; and
- (2) comply with the applicable requirements of the Local Operating Orders and Generation Operating Orders issued specifically for this Project.

3.4 BC HYDRO OPERATING RESPONSIBILITIES

BC Hydro will:

- (a) plan the Operations in compliance with Water Licence and Campbell River System requirements;
- (b) carry out the Operations through BC Hydro's Planning, Scheduling, Operation, Shift Engineers [PSOSE] and the Remote Control Centre in accordance with Water Licence requirements, applicable Permits, and system operating plans developed by BC Hydro;
- (c) carry out the Operations according to the Project Co requirements provided for pursuant to Appendix 7H to the extent communicated to BC Hydro by Project Co.;
- (d) make available and retain responsibility for the BC Hydro Labour Pool in accordance with Section 4.5 [BC Hydro Labour Pool] of this Schedule; and
- (e) carry out the Operations according to GOO-4G-44.

3.5 OPERATING ORDERS

- (a) Project Co shall perform the Services in accordance with the applicable requirements of Generation Operating Orders (GOOs) and Local Operating Order (LOOs) recognizing that:
 - (1) GOOs are prepared based on the directions, requirements and practices of the Water Comptroller and BC Hydro Policies;

- (2) LOOs are prepared according to a prescribed format as set out below in subparagraph (b) based strictly on the requirements of this Agreement and cannot contain any terms that are inconsistent with or that otherwise conflict with the terms of this Agreement;
 - (3) the terms of GOOs may only be changed by the direction or instruction of the Water Comptroller based on a Change in Law or by a change in BC Hydro Policies;
 - (4) the terms of existing LOOs may only be changed by reason of a change to a GOO, a change in BC Hydro Policies, or a change initiated and requested by Project Co based on experience with the performance of the Services and their interfacing with Operations; and
 - (5) new LOOs can and shall be created by Project Co as a consequence of the foregoing developments or as otherwise required for the performance of the Services or interfacing with Operations and new LOOs must be consistent with the GOOs and the requirements of this Agreement, including Appendix 5L [*Operating Order Requirements*] of Schedule 5 [*Design and Construction Protocols*].
- (b) Project Co shall be responsible for the annual review of all applicable Local Operating Orders (LOOs) incorporating any updates or changes that are required from changes to the GOOs, BC Hydro Policy or a Project Co initiated and requested change. If revisions to LOOs become necessary, Project Co shall generate the revised LOOs following the procedures specified for generating the LOOs pursuant to the requirements of Appendix 5L [*Operating Order Requirements*] of Schedule 5 [*Design and Construction Protocols*] and shall be subject to the Consent Procedure as outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*]. Irrespective of whether revisions to LOOs become necessary or not, Project Co shall prepare and execute a new LOO every two years.

4. ASSET MAINTENANCE AND MANAGEMENT

4.1 GENERAL

- (a) Maintenance strategy, technical direction and oversight and asset management planning in respect of the Facility assets shall be the responsibility of Project Co who shall determine the type and frequency of the maintenance and asset management requirements for the Facility as further specified in this Schedule 7 and provide this technical direction and oversight to:
 - (1) BC Hydro through the preparation and delivery of the Asset Management Plan to BC Hydro and the performance of the Services; and

- (2) BC Hydro Labour Pool personnel from time to time through the communication of technical requirements or activities that are to be performed or completed in accordance with the Asset Management Plan and this Schedule 7.
- (b) Project Co shall develop and implement an Asset Management Plan that plans for the performance and scheduling of the Services necessary to:
 - (1) address the requirements and objectives set out in Section 4.6(b)(4) of this Schedule;
 - (2) maintain the Facility in accordance with the Project Requirements including the requirements of this Schedule 7, and by having due regard to the Handback Requirements;
 - (3) repair or rectify by appropriate measures any Defects, deficiencies, damage to or malfunction of the Facility including pursuant to a Response or Rectification;
 - (4) provide all necessary information to BC Hydro to enable BC Hydro to enforce or make warranty claims with respect to any Defects, deficiencies, damage to or malfunctions of the Facility; and
 - (5) initiate emergency procurement to enable timely replacement and response to the unexpected failure of elements of the Facility.

4.2 GUIDING PRINCIPLES

- (a) Project Co shall perform all Services under this Schedule:
 - (1) to ensure that the Handback Requirements specified herein will be met; and
 - (2) in accordance with the asset management principles in the Asset Management Plan, including the Reliability Centered Maintenance Principles. Project Co confirms that the Asset Management Plan implemented by Project Co will achieve the Service performance obligations set out in this Project Agreement and such performance will be monitored using the Monthly Facility Performance Scorecard.
- (b) Project Co shall use the Reliability Centered Maintenance Principles and the reliability assessments and mitigation plans provided for in Section 4.2.1 [*Preparation*] of Schedule 5 [*Design and Construction Protocols*] to create maintenance programs that form part of the Asset Management Plan.

4.3 PROJECT CO RESPONSIBILITIES

Project Co shall:

- (a) create the program for Planned Maintenance and be responsible for technical direction and oversight for the Facility assets and for quality control in respect of the implementation of such program;
- (b) be responsible for planning and implementing all maintenance and rehabilitation work provided for in the Asset Management Plan and as otherwise required by this Schedule 7;
- (c) be responsible for the rectification of Defects utilizing Project Co Persons or the BC Hydro Labour Pool personnel;
- (d) be responsible for ensuring that the Facility meets the Handback Requirements;
- (e) be accountable for Generating Unit Outages and proper functionality of the Bypass System;
- (f) perform its responsibilities as described in Appendix 7A [*Roles and Responsibilities*];
- (g) perform the Facility Services described in Appendix 7B [*Facility Services*];
- (h) (not used)
- (i) (not used)
- (j) provide technical direction and manage the maintenance, and rehabilitation programs forming part of the Asset Management Plan for the Facility, satisfy the Handback Requirements and to minimize Non-Availability Events due to Forced Outages resulting from Defects, deficiencies, damage to or malfunctions with the Facility;
- (k) prepare and update as required the Service Plans described in Section 4.6 [Asset Management Plan] of this Schedule;
- (l) prepare the Service Reports described in Section 6.3 [Report Content] of this Schedule;
- (m) ensure that maintenance is completed in accordance with the Maintenance Plan and Schedule included in the Asset Management Plan;
- (n) (not used);
- (o) provide all consumables (including fuels and other energy inputs) needed to fulfil its obligations under this Schedule;

- (p) provide, store, service and replenish any tools, maintenance equipment and vehicles that are needed to fulfil its obligations under this Schedule;
- (q) make available to the BC Hydro Labour Pool and provide additional training for applicable BC Hydro maintenance personnel necessitated by equipment or system changes for the Generation Systems and the scope of such training shall be similar to the training support described in Schedule 5 [Design and Construction Protocols] having regard to the nature and scope of the equipment or systems change in question. Project Co shall, make arrangements for and provide the instructor(s) for such training. BC Hydro will coordinate with Project Co in arranging the time(s) and location for such training and pay the costs for BC Hydro personnel attending such training. The hours for BC Hydro personnel attending such additional training are not included in the allocated hours in Section 4.5 [BC Hydro Labour Pool] of this Schedule;
- (r) make available to the BC Hydro Labour Pool and provide Handback related training for applicable BC Hydro maintenance engineering personnel prior to commencement of Handback Work. The general scope and requirements for this training are included in Appendix 7F [Handback Requirements] to this Schedule;
- (s) comply with any additional training requirements pursuant to the SPRs for its people working at the Facility;
- (t) prepare and maintain an inventory of all safety equipment required to be established in accordance with the Project Requirements, and securely store and maintain the equipment including conducting and certifying inspections and tests pursuant to the requirements of Schedule 12 [Safety and Security];
- (u) provide all necessary personal protective equipment (PPE) for its own employees working at the Facility and ensure that any of its subcontractors working at the Facility provide the appropriate PPE for their employees;
- (v) provide sufficient spare parts and consumables for timely response to Service requirements, foreseeable failures or high-risk Outage events in accordance with the Maintenance Plan or Schedule. Spare parts shall be stored in a secure area in accordance with the OEMs' written requirements for storage. Spare parts inventory shall be updated by Project Co as necessary to replace those spare parts that have been utilized or that have exceeded their shelf life per OEM recommendations. Requirements for spare parts at Handback are included in Appendix 7F [Handback Requirements] to this Schedule;
- (w) notify the BC Hydro Representative promptly if Project Co receives notification from an OEM that it's equipment or any component thereof will become obsolete so that BC Hydro may take timely action, which may include at its option the purchase of additional spare parts or other components;

- (x) deliver an effective and efficient digital platform for collecting, trending and presenting inspection and maintenance results recorded. Samples of existing manually completed maintenance instruction forms used by BC Hydro are included as Disclosed Data;
- (y) following completion of any Planned Maintenance, Condition-based Maintenance or Corrective Maintenance, provide written certification that the work has been completed in accordance with the Project Requirements, and, if applicable, with the Maintenance Plan and Schedule, and that Project Co has checked the work and is satisfied with the quality of the work ("*Work Completion Certificate*");
- (z) following completion of work completed during a Planned Outage or Forced Outage, provide written certification in the form of a Return to Service Certificate pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*] that attests that any components of the Facility that were taken out of service are ready to be placed safely back in service; and
- (aa) utilize the BC Hydro Labour Pool, for the implementation of Planned Maintenance program to a set maximum quantity of hours in accordance with Section 4.5 [*BC Hydro Labour Pool*] of this Schedule 7.

4.4 BC HYDRO LABOUR POOL RESPONSIBILITIES

BC Hydro will:

- (a) perform the obligations identified as its responsibility in Appendix 7A [*Roles and Responsibilities*];
- (b) mobilize, make available and schedule the BC Hydro Labour Pool, subject to the requirements and conditions in Section 4.5 [*BC Hydro Labour Pool*] of this Schedule, to facilitate the performance of the Services in accordance with the Maintenance Plan and Schedule prepared by Project Co;
- (c) provide SPR training of its personnel;
- (d) provide PPE for its personnel;
- (e) perform the necessary isolations during all Outages in accordance with its Work Protection Practices (WPP);
- (f) pay all employer related costs, including remissions to Government Authorities, for the BC Hydro Labour Pool according to applicable Laws and the Labour Agreements be responsible for supplying all required hand tools and crew transportation but not consumables to perform Planned Outage isolations within allocated annual hours and to carryout initial isolation response requirements for Immediate Callouts including Forced Outages to the maximum hours and times outlined in Section 4.5 [*BC Hydro Labour Pool*] of this Schedule;

- (g) be responsible for ensuring that the BC Hydro Labour Pool personnel possess the appropriate levels of skill, training and experience for the work activities planned for such personnel in the Asset Management Plan having regard to the guidelines set out in Section 4.5 [*BC Hydro Labour Pool*] of this Schedule, the Labour Agreements and the Legal Obligations;
- (h) be responsible for mobilizing and making the BC Hydro Labour Pool personnel available to Project Co in a timely manner for the purposes for the Project Co training activities provided for in Section 4.3[Project Co Responsibilities] of this Schedule;
- (i) be responsible for causing the BC Hydro Labour Pool personnel to attend to the Site in a timely manner having regard to the relevant circumstances to perform the Service activities assigned to such personnel by Project Co in accordance with the Asset Management Plan, the applicable GOOs and LOOs;
- (j) be responsible for the failure of BC Hydro Labour Pool personnel to perform Service work activities properly assigned to them by Project Co to the standards of performance reasonably expected of such personnel having regard to the terms of this Agreement, Good Utility Practices or BC Hydro's general operating experience, including without limitation due to their negligence, refusal or failure to follow Project Co technical directions, or their failure, refusal or inability to follow Good Utility Practices to the extent applicable to such personnel;
- (k) be responsible for any directions or instructions that may be provided to the BC Hydro Labour Pool personnel by a BC Hydro Person that may conflict with or be inconsistent with the Asset Management Plan, GOOs, LOOs and Legal Obligations; and
- (l) applying or exercising in a diligent and professional manner, consistent with Good Utility Practices for employers in the circumstances, and with the Labour Agreements, as applicable, appropriate disciplinary actions or steps in respect of BC Hydro Labour Pool personnel who reasonably require disciplinary or other corrective action in the circumstances when notified and recommended by Project Co or when otherwise identified by BC Hydro.
- (m) direct the relevant members of the BC Hydro Labour Pool to provide reasonably required assistance to Project Co in relation to Project Co reporting obligations to BC Hydro which requires information or data from such individuals and according to appropriate protocols to be adopted by the Services Period Joint Committee.
- (n) to facilitate Project Co performing its Services, BC Hydro will provide Project Co with a restricted licence to use and to access certain specified BC Hydro information and data management systems according to customary protocols and terms generally applied by BC Hydro to contractors, consultants and other third party users.

For greater certainty, BC Hydro's failure to perform any of the foregoing obligations, and the non-compliance, negligence or misconduct of the BC Hydro Labour Pool personnel or BC Hydro Persons, in relation to the Services as provided for in the foregoing subparagraphs of this Section 4.4 [*BC Hydro Labour Pool Responsibilities*] of this Schedule shall constitute a Compensation Event in accordance with subparagraphs (a); (c) or (d) of the definition of Compensation Event.

If Project Co asserts in good faith on prima facie grounds to BC Hydro in writing that BC Hydro should not be entitled to make a Non-Availability Event Deduction, in full or in part, on the grounds that the Non-Availability or Non-Performance Event has been caused, in whole or in part, by any of the foregoing Compensation Events, then BC Hydro shall defer making the Non-Availability Event Deduction or the assignment of the NPE Points until: **(a)** the Parties by agreement resolve whether or not the Compensation Event was the sole or contributing cause; or **(b)** the Referee makes a determination and ruling that the Compensation Event was not the sole or contributing cause or that Project Co has not established a prima facie good faith basis for objecting to the Non-Availability Event Deduction or assignment of NPE Points.

4.5 BC HYDRO LABOUR POOL

- (a) Project Co acknowledges that the BC Hydro Labour Pool personnel that will serve the Facility also serve five other BC Hydro facilities. BC Hydro's Campbell River area manager and its maintenance operations manager are responsible for managing, scheduling and prioritizing the BC Hydro personnel maintaining those stations. The BC Hydro Maintenance Planning Department has the control and discretion within any week to allocate crew time. BC Hydro will meet agreed upon as per Maintenance Plan and Schedule Project Co weekly personnel requirements on a weekly not daily basis.
- (b) As a guideline in scheduling the Services, Project Co shall consider the type, job descriptions and availability of BC Hydro Labour Pool personnel and the hours in a regular BC Hydro workday as per Appendix 7I. All work by BC Hydro Labour Pool personnel will be administered per the Labour Agreements and the job classifications or positions listed in Table 4.5 [BC Hydro Labour Pool] of this Section shall be as described or defined in the applicable Labour Agreements. The type and number of BC Hydro personnel typically available for Planned Maintenance on the Generation System, and the maximum hours of availability for each are set out in the following Table:

Table 4.5 – BC Hydro Labour Pool

Job Classification	Planned Maintenance	Condition Based Maintenance and Corrective Maintenance	Immediate Call Out	Isolation	Job Planning	Total Hours	BC Hydro Labour Pool for Planned Outages	BC Hydro Labour Pool for routine inspections
	Allocated Hours	Allocated Hours	Allocated Hours	Allocated Hours	Allocated Hours		Persons	Persons
Electrician	1540	1100	300	450	200	3590	5	1
Mechanic	700	800	300	180	100	2080	4	1

Job Classification	Planned Maintenance	Condition Based Maintenance and Corrective Maintenance	Immediate Call Out	Isolation	Job Planning	Total Hours	BC Hydro Labour Pool for Planned Outages	BC Hydro Labour Pool for routine inspections
	Allocated Hours	Allocated Hours	Allocated Hours	Allocated Hours	Allocated Hours		Persons	Persons
General Trades	950	300	0	0	50	1300	2	1
CPC Tech	280	100	100	180	75	735	1	
Scheduler	150	100	0	0	75	325	1	
NRS	150	50	0	0	75	275	1	
OSH	150	50	0	0	75	275	1	
TOTAL	3920	2500	700	810	650	8580		

- (c) Hour allocation in the BC Hydro Labour Pool can be utilized across job type categories of Planned Maintenance, Condition Based Maintenance, Corrective Maintenance, Isolation, and Job Planning for a specific discipline, provided however, that adding hours to the allocated Immediate Callout hours is not permitted.
- (d) Without adding additional hours to the foregoing total allotment Project Co may propose or request adjustments to the planned hour allocation across the job classifications to BC Hydro's Representative as part of the annual planning process or at the monthly Services Period Joint Committee meetings and the decision regarding such requested reallocation will be at BC Hydro's sole discretion.
- (e) As part of Asset Management Plan Project Co may plan and utilize hour allocations from Table 4.5 for Planned Maintenance, Condition Based Maintenance, Corrective Maintenance, Isolation, and Job Planning up to maximum of +/-10% of total planned hours for a given year with a 5 year rolling average no greater than the total of Table 4.5 [BC Hydro Labour Pool] of this Section.
- (f) The maintenance requirements profile for the Facility shall meet the requirements of this Schedule 7 with maintenance inspection intervals and BC Hydro Labour Pool utilization optimized based on the following guidelines:
- (1) there would typically be brief weekly routine inspections of the Facility and no more than one, two-day, Planned Outage per Generating Unit per year;
 - (2) minor overhauls using a higher number BC Hydro Labour Pool resources for a condensed period of up to 3 weeks in duration would be required no more than once every two years;
 - (3) major equipment inspections up to 6 weeks in duration per Generating Unit would be required no more than once every 8 years; and

- (4) all maintenance required to be performed between annual Planned Outages can be safely undertaken pursuant to the BC Hydro SPRs with the Generating Units in operation.
- (g) Job descriptions for the job classifications or positions described in the Table 4.5 [BC Hydro Labour Pool] of this Section are set out in the Labour Agreements. Based on operational training on Facility equipment, e.g. cranes and hoists, BC Hydro Labour Pool resources may be used to complete work activities on a planned basis. The qualifications, skills, experience and services or work to be performed, including all work activities and tasks that are necessarily incidental to the individual's performance of this job category, are as set out in the applicable Labour Agreement.
- (h) BC Hydro may have personnel with capabilities other than those indicated previously herein. If a work activity is required, Project Co can enquire and request whether BC Hydro has personnel with the necessary capabilities for the task. If BC Hydro has such staff, and subject to their availability and considering the total maximum hours designated previously herein for all Services, BC Hydro may, at its sole discretion, provide said personnel for the requested maintenance activity.
- (i) In scheduling its maintenance personnel BC Hydro considers operational requirements and will assign first priority to Planned Maintenance, second priority to Condition-based Maintenance, and third priority to Corrective Maintenance.
- (j) In scheduling activities, Project Co must also consider that overtime will be:
 - (1) calculated at 1hr OT=1.5 normal hr for hours allocated to a maximum of 900 hours per year (600 overtime hours); and
 - (2) administered per the Labour Agreements.
- (k) BC Hydro may at all times, without notice, access, audit and inspect the Facility and Project Co's delivery of the Services so as to confirm:
 - (1) the performance by Project Co of its obligations under this Agreement; and
 - (2) that the Facility is being maintained in accordance with the terms of this Agreement, provided that BC Hydro does not unreasonably interfere with the performance by Project Co of its obligations under this Agreement.
- (l) once the annual planned hours provided for in Section 4.5 [BC Hydro Labour Pool] of this Schedule have been utilized, BC Hydro will make available to Project Co additional labour resources from the BC Hydro Labour Pool at the rates set out in Appendix 7I, which shall be adjusted annually in accordance with CPI.
- (m) hours allocation and utilization of the BC Hydro Labour Pool must be consistent with the terms of the Labour Agreements, meaning any applicable break time shall be deemed to

be scheduled in the allocated hours whereas lunch time and travel time to the Site is not included in the allocated and utilized BC Hydro Labour Pool hours.

- (n) any change to either Labour Agreement following the Financial Submission Date shall be treated as a Change pursuant to Section 7.1 of this Project Agreement.

4.6 ASSET MANAGEMENT PLAN

(a) General

- (1) The objective of the Asset Management Plan is to provide BC Hydro with plans and programs that demonstrate Project Co's compliance with Services performance obligations under the Agreement. The Asset Management Plan should clearly describe Project Co's understanding and detailed approach to delivering all aspects of Services relative to the specified Performance Indicators.
- (2) Overall responsibility for the Asset Management Plan resides with Project Co and it is critical that the preparation of the Asset Management Plan be coordinated with all parties engaged with Project Co to deliver Services to the Facility and to ensure that the Asset Management Plan encompass the complete scope of Project Work to be delivered by Project Co under this Schedule 7 [*Services*].

(b) Asset Management Plan Components

- (1) The Asset Management Plan shall include:
 - (i) a detailed narrative description of Project Co's asset management strategy and procedures;
 - (ii) a detailed Maintenance Plan and Schedule (MPS) as set out below in subparagraph (c) for rolling periods of 1 year, 3 years and 15 years;
 - (iii) appropriate policies, procedures, practices, schedules and a self-monitoring inspection and reporting system in respect of the delivery of the Facility Services pursuant to Appendix 7B [*Facility Services*];
 - (iv) specific refurbishment and replacement strategies based on life-cycle analyses, Failure Mode Effect Analysis (FMEA), key assumptions and annual cost provisions for all aspects of the Facility for which Project Co is responsible;
 - (v) requirements for rehabilitation of the Facility after the Expiry Date based on OEM and Designer recommendations for the equipment and other facilities actually provided; said requirements to include the point in its service life at which equipment rehabilitation would be required; and

- (vi) the Energy Management Plan as set out in subparagraph (d);
 - (vii) a draft protocol document that outlines the required form and content of the template documentation to be used, and the protocol steps to be followed for the preparation, submission, review, adoption and implementation of a plan by Project Co to carry out a Response and/or a Rectification when required by the terms of this Project Agreement (the “**Rectification Plan Outline**”). The Rectification Plan Outline will include protocol steps that recognize and facilitate that following the receipt of a NFRS from BC Hydro: (1) Project Co will initially implement a Response to initially assess the situation and if necessary establish appropriate Isolation and to consider whether the identified Defect, failures or deficiencies with the Facility requires the adoption of a Rectification Plan or whether more expedient remedial steps can be taken to rectify the situation by way of the completion of the Response activities; and (2) if an expedient Response will not be sufficient to properly address the situation, that a clear process will be followed to ensure that a Rectification Plan is adopted and implemented in a timely manner.
 - (viii) The Rectification Plan Outline will take into account the requirements of Appendix 7C [*Notification of Failure or Request for Service*] and Appendix 7G [Immediate Call Out Sequence of Events] of this Schedule 7 [*Services*] and will include the requirement for Project Co to summarize the reason for a Response and/or Rectification; the key components of the Project Co plan (including planned Corrective Maintenance); whether a modification or addition is required the Design or components of the Design or the As-Built Drawings (subject to Schedule 5 [Design and Construction Protocols] procedure); the expected timetable to complete the related work; the required resources from the BC Hydro Labour Pool; whether the Response or Rectification Plan in question is to be submitted to BC Hydro for consent or approval, review or information only, the protocols and timelines to be applied depending on the event giving rise to the Response and/or Rectification and the other requirement of this Project Agreement, including this Schedule 7 [*Services*], as applicable to the event or circumstances in question.
- (2) In the Asset Management Plan, Project Co shall break down the Facility as outlined in Appendix 7B [*Facility Services*] into the following systems:
- (i) Generation Systems
 - (ii) Support Systems
 - (iii) Buildings and Lands

- (3) In developing its Asset Management Plan, Project Co shall:
- (i) utilize a life-cycle analysis that demonstrates the methods and practices by which Project Co shall:
 - 1. ensure the long-term integrity and ongoing operational serviceability of the Facility;
 - 2. preserve the Design and performance criteria for all aspects of the Facility subject only to normal degradation;
 - 3. ensure that on the Expiry Date all aspects of the Facility for which Project Co is responsible are functional to the standard specified in the Handback Requirements; and
 - 4. minimize to the extent reasonably possible, disruption to BC Hydro's Activities.
 - (ii) incorporate requirements for maintenance of equipment and other components or parts of the Facility and the Site as expressly provided for pursuant to the requirements of other Schedules of the Agreement.
- (4) The performance of the Asset Management Plan shall at a minimum be monitored monthly; reviewed annually; and updated or modified based on the experience of Responses and Rectifications and other relevant experience arising from the performance of the Services or mutually agreed upon changes.
- (5) Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the Asset Management Plan not less than sixty (60) days prior to the scheduled date for Service Commencement. Updates to the Asset Management Plan shall be submitted annually on the anniversary date of Service Commencement pursuant to the Review Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*].

(c) **Maintenance Plan and Schedule**

Project Co shall establish and implement a Maintenance Plan and Schedule (MPS) for the delivery of the Services in accordance with the terms of this Agreement and Good Utility Practice. The MPS and all updates shall be included in the Asset Management Plan and shall be delivered in accordance with the requirements in Table 1.3.1 [*Schedule of Submittals*] of this Schedule 7 [*Services*]. The MPS shall include the following at a minimum:

(1) General

(i) Details of the activities required to meet the intent and desired objectives of the Asset Management Plan including specific descriptions of the procedures and work methods for all aspects of delivery of the Services as described within this Schedule. Procedures and work methods shall address the following Services delivery requirements:

1. the Project Requirements and all other requirements of this Agreement;
2. work identification and planning;
3. stakeholder communication;
4. environmental compliance;
5. BC Hydro SPR;
6. site safety; and
7. Responses and Rectifications, including to NFRS, Immediate Callouts and Forced Outages.

(ii) Details shall include at a minimum:

1. Objectives of the Services activities and the manner in which they are to be carried out.
2. The relationship of activities to the Asset Management Plan.
3. Work Method Statements which describe Project Co's process of execution for each activity defined in this Schedule. The following information shall be provided for each Work Method Statement:
 - a. output objective including standards;
 - b. fundamental process steps identified and described including requirements for reporting, communications, environmental, site safety, isolation, and quality;
 - c. functional relationships between each process step defined;
 - d. resources required;

- e. references to applicable codes, standards, guides, and manuals;
 - f. documented evidence that all applicable Project Co technical leaders have approved the Work Method Statement signifying a collaborative and coordinated approach to the development of the overall delivery process; and
 - g. issue date.
- (iii) The MPS shall include such procedures for visual, mechanical or instrumental inspection as necessary in order to provide early detection of required adjustments, repairs or replacements so that such adjustments, repairs or replacements can be scheduled with minimum interference to the Operation insofar as possible. Such procedures shall be consistent with applicable manufacturer's recommendations, shall provide for the services of factory representatives and/or outside consultants where appropriate and shall provide for orderly Planned Outages coordinated with BC Hydro. Such procedures shall be reviewed with BC Hydro as necessary, but no less than on an annual basis, and modifications made to the MPS as necessary.
 - (iv) The MPS shall identify all items, provided under the Project Requirements, that require maintenance; the type of maintenance required; the scheduled frequency; the duration; and the timeframe for Planned Outages. The MPS shall also identify any need for specialized services by outside contractors.
 - (v) The MPS shall be a computer-based system, independent from the BC Hydro Work Management System, which also provides the information needed by BC Hydro to input into its Computer Maintenance Management System (CMMS). Information needed by BC Hydro for entry into CMMS is described in the CMMS Work Management System Business Rules for Equipment Hierarchy in the Disclosed Data. The process to generate the data in the necessary format will be iterative and Project Co shall work cooperatively with BC Hydro to link the information from Project Co's MPS to that of the BC Hydro CMMS.
 - (vi) The MPS shall be linked to the Facility Model provided pursuant to the requirements of Schedule 5 [*Design and Construction Protocols*]. The Facility Model shall be updated annually to incorporate any physical modifications to the Facility or changes in operating or maintenance procedures;

(vii) In developing the MPS, Project Co shall consider the time needed by the BC Hydro Labour Pool to perform its preparatory function prior to the initiation of the actual maintenance work included in the BC Hydro Labour Pool annual allocation Table 4.5 [*BC Hydro Labour Pool*] of this Schedule. Preparatory work includes activities such as:

1. implementing requirements of the SPR, particularly the WPP isolation procedures as part of Isolation;
2. dewatering of Power Tunnel and/or Water Conveyances and other water passages as part of Isolation;
3. installation of access means such as Draft Tube platforms, scaffolding or other necessary devices as part of Isolation;
4. installation of safety barriers or fans, air sampling devices and other safety precautions as part of Isolation;
5. preparation of required tools, equipment, spare parts and consumables as part of Job Planning; and
6. pre-job meetings, safety coordination meetings, and safe work procedure reviews as part of Job Planning.

(viii) Project Co shall update the MPS as part of the Annual Asset Management Review.

(ix) The MPS shall include monthly functional testing of the Bypass System and Low Level Outlet to demonstrate reliability Performance Indicators are maintained.

(2) Draft and final versions of the MPS shall include:

- (i) plans and procedures for as-needed repairs and overhauls;
- (ii) plans and procedures as per the Rectification Plan Outline for Responses and Rectifications to an NFRS Report regarding service categories designated as Critical in Appendix 7B [*Facility Services*], including:
 1. contact information for providers of emergency services, said emergency procedures providing for expedited service and repairs;
 2. availability of Project Co management personnel in connection with such services for notification of and expediting the

availability of factory or service personnel when necessary repairs are beyond the capabilities of Project Co's or BC Hydro's on-site personnel; and

3. immediate notification of BC Hydro of any emergency event or condition, of anticipated corrective actions to be taken and of anticipated service and repair times.
- (iii) plans and procedures for maintaining an inventory of all necessary consumables, spare parts, special tools and maintenance equipment; said procedures shall address:
1. preparing an inventory of spare parts, special tools and maintenance equipment provided under Schedule 6 [*Design and Construction Specifications*];
 2. acquisition of additional spare parts, special tools and maintenance equipment when needed; and
 3. maintenance of required spare parts, special tools, and maintenance equipment to a condition whereby they can fulfil their intended purpose when needed.
- (iv) plans and procedures for preparing an inventory of safety and first aid equipment and supplies, and for securely storing and maintaining said equipment, supplies and related facilities including conducting and certifying inspections and tests required by applicable Laws;
- (v) plans and procedures for maintaining facilities, equipment and supplies that were furnished to meet the environmental and sustainability requirements pursuant to Schedule 8 [*Environmental Obligations*];
- (vi) plans and procedures for maintaining records that demonstrate:
1. that the required maintenance activities have been performed;
 2. when and by whom they were performed;
 3. when and by whom from Project Co they were checked and approved;
 4. that Condition-based and Corrective Maintenance needs have been identified;
 5. that requirements for supporting documentation or reporting to NERC and WECC by BC Hydro have been complied with; and

6. through written certification from Project Co, that it is satisfied with the quality of the maintenance work performed, and that any components of the Facility that were taken out of service are ready to be placed safely back in service.

(vii) and documentation beyond that specifically needed by BC Hydro, which is necessary to meet applicable Laws and demonstrate compliance with OEM warranty requirements.

(d) **Energy Management Plan**

(1) Project Co shall establish and implement throughout the Services Period an Energy Management Plan (EMP) for the Facility based on Good Utility Practice. The EMP shall include Project Co's policies and procedures for:

- (i) ensuring full commitment to responsible energy management without comprising the working environment and safety of Facility Users;
- (ii) understanding the energy usage and identifying inefficient practices;
- (iii) setting agreed objectives and targets to reduce energy consumption; and
- (iv) managing the energy usage and reducing the energy operating costs by implementing sound operating and maintenance practices.

5. OUTAGES AND REQUESTS FOR SERVICES

5.1 GENERAL

Project Co shall provide the Services of this Section as described herein and in Appendix 7C [*Notification of Failure or Request for Services*].

5.2 PRINCIPLES

Project Co shall:

- (a) minimize Outage number and length;
- (b) minimize injury to Persons and damage to the Facility or the environment;
- (c) remedy the causes of the Forced Outages and other Relevant Non-Availability Events to meet the Project Requirements.

5.3 OUTAGE PLANNING

- (a) Project Co must ensure that Planned Outages and planned Operating Constraints are coordinated with and agreed to by BC Hydro since BC Hydro must balance these

- 25 -

Outages with those at other local facilities and the overall power system needs. All Outage requests shall be subject to the Consent Procedure. Planned Outages between October 15th of one calendar year and March 15th of the subsequent year are granted at the sole discretion of BC Hydro due to the high demand requirements of customers in this time period.

To qualify as a Planned Outage or Planned Derate, a completed Outages and Constraints Notification Form (Appendix 7H [*Outages and Constraints Notification Form*]) approved by BC Hydro (acting reasonably, based on overall power system needs) shall be in place 5 days before the start of the Planned Outage or Planned Derate. With at least 30 days advance notice from Project Co BC Hydro shall provide the necessary resources from the BC Hydro Labour Pool according to the protocols and within the constraints of this Schedule 7 [*Services*]. BC Hydro will however make commercially reasonable efforts to provide resources from the BC Hydro Labour Pool within less than 30 days after receipt of a written notice from Project Co.

- (b) In developing the Asset Management Plan, Project Co must incorporate the requirement to have its final maintenance Outage requirements submitted to BC Hydro by November 1 of the calendar year preceding the year in which the maintenance is to be initiated. The BC Hydro scheduling system requires that this information be entered into the system by the end of the calendar year preceding the year in which the maintenance is to be initiated.
- (c) In order to support BC Hydro scheduling requirement, Project Co shall comply with the following procedure, unless otherwise agreed upon by BC Hydro.
 - (1) By September 1 of the year prior to when the maintenance is scheduled to be initiated, Project Co shall submit its one-year, three-year and fifteen-year Maintenance Plan and Schedule (MPS) to BC Hydro. The MPS shall be as specified elsewhere in this Schedule, and include the proposed Generating Unit Outage times, the work to be done, and any constraints on when a particular Generating Unit needs to be out-of-service.
 - (2) BC Hydro will review the proposed MPS to balance these Outages with those at other local facilities and optimize overall power system needs. If necessary, BC Hydro will propose modifications to the MPS by October 1.
 - (3) By November 1, Project Co will review any modifications proposed by BC Hydro and propose to BC Hydro any further changes, if any, based on requirements that may have surfaced since September 1.
 - (4) BC Hydro and Project Co shall finalize the MPS by November 1.
- (d) Planned Outages require that all necessary materials, and documentation for the work must be identified and prepared five (5) days prior to the start of the Planned Outage.

- (e) Project Co shall submit to BC Hydro for each Planned Outage, Planned Derate, Forced Outage, Forced Derate and Operating Constraints as outlined in Appendix 7H [*Outages and Constraints Notification Form*].

5.4 IMMEDIATE CALLOUTS AND FORCED OUTAGES

- (a) During an Immediate Callout for BC Hydro Labour Pool to respond to alarms such as a Forced Outage or as identified in the alarms responses outlined in LOOs, including LOOs 3G-JHN-02A and 02B, BC Hydro will provide as part of the annual resource allocation to Project Co, up to 300 hours each for one electrician, one mechanic, and 100 hours for one protection and control technologist for Immediate Callout occurrences to a maximum of 9 Immediate Callout counts per year. Identified on Table 4.5 [*BC Hydro Labour Pool*] of this Schedule as Immediate Callout hour allocation. Additional Immediate Callouts will incur charges starting upon arrival to Site. If additional effort is required to remedy a Forced Outage as a result of an Immediate Callout, Project Co may request BC Hydro to provide the necessary resources within the constraints of this Schedule. If Project Co utilizes BC Hydro personnel beyond the above allocated hours, all additional costs will be billed to Project Co at BC Hydro's external billable rates in effect at the time of the request.

During the first two years of operation from the Service Commencement Date Project Co will be provided 12 Immediate Callout occurrences and may allocate within the allocated aggregate hours set out in Table 4.5 up to 500 hours each for one electrician and one mechanic and up to 150 hours for one protection and control technologist for Immediate Callout occurrences before triggering the Project Co obligation to pay for additional BC Hydro Labour Pool resources at BC Hydro Labour Rates in accordance with the terms of this Schedule 7.

- (b) Following completion of work to remedy the alarms initiating the Immediate Callout or resulting Forced Outage, Project Co must provide written certification in the form of a Return to Service Certificate that attests that any components of the Facility that were taken out of service are ready to be placed safely back in service. Where BC Hydro believes that issues still exist that may adversely impact the safety of BC Hydro or Project Co personnel or the public, the environment, or the integrity of the Facility, BC Hydro reserves the right to decide on the course of action and Project Co shall cooperate in carrying out the directions of BC Hydro. Any disputes arising as a result of the directive shall be resolved in accordance with the dispute resolution provisions of the Agreement.
- (c) Appendix 7G [*Immediate Callout Sequence of Events*] outlines the typical interactions between BC Hydro and Project Co during an Immediate Callout or Forced Outage.
- (d) If Project Co believes that a Supervening Event has occurred, including with respect to the performance by BC Hydro or BC Hydro Persons, it shall follow the procedures in Section 8 [*Supervening Events*].

5.5 PROJECT CO RESPONSIBILITIES

Project Co shall:

- (a) prepare and keep current an Immediate Callout and Forced Outage Response Plan;
- (b) determine the cause for the Immediate Callout alarm or Forced Outage and provide its recommended course of action and an estimate of the time and personnel needed from BC Hydro to remedy the failure, said documentation from Project Co shall be presented to BC Hydro;
- (c) [not used];
- (d) be responsible for costs of its own management, engineering, and other personnel; equipment; vehicles and consumables; and
- (e) make all arrangements for and bear the costs for all rental equipment that may be required for use for the performance of the Services.

5.6 BC HYDRO RESPONSIBILITIES

During a Forced Outage or Immediate Callout, BC Hydro will:

- (a) send a qualified electrician to arrive at Site within two (2) hours of an Immediate Callout alarm to make the plant safe, carry out investigations and support rectifications in a manner consistent with Good Utility Practice and no less or worse of a standard than BC Hydro's normal practices at its own similar facilities having regard to the available resources in question and standard procedures in relation to such resources; and
- (b) upon receipt from Project Co of documentation regarding the cause of the failure, required course of action and resource needs, respond to Project Co's request within 3 hours provided that said documentation and request is received by BC Hydro no later than 2:00 pm PST on any day, in accordance with the process provided in Appendix 7G [*Immediate Callout Sequence of Events*].

5.7 IMMEDIATE CALLOUT AND FORCED OUTAGE RESPONSE PLAN

The Immediate Callout and Forced Outage Response Plan shall include:

- (a) a communications plan identifying all Persons to be contacted; the order in which they are to be contacted; and contact information including telephone numbers and email addresses;
- (b) contact information for OEMs supplying the power generation equipment and auxiliary systems;

- (c) procedures to be followed in assessing the cause for the Immediate Callout alarm and Forced Outage; and
- (d) descriptions of required documentation needed to fulfil regulatory reporting requirements including sample report forms.

Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the Immediate Callout and Forced Outage Response Plan not less than thirty (30) days prior to Service Commencement and updated annually on the anniversary date of Service Commencement.

5.8 RECTIFICATION PLANS

In accordance with the applicable documentation and protocol requirements set out in the Rectification Plan Outline, Project Co shall prepare and submit to BC Hydro a Rectification Plan in response to a NFRS Report and when otherwise expressly required by this Project Agreement.

A Rectification Plan required in response to a Relevant Non-Availability Event may include interim plans that include proposed changes to the design of the Facility, as documented in the applicable As-built Drawings and O&M Manual, in order to facilitate a safe, interim return to service and the issuance of a Return to Service Certificate. For clarification, and as may be further provided for in the Rectification Plan Outline, an interim Response, or a Rectification Plan which does not involve any modification to the equipment or the design of the Facility, shall be submitted to BC Hydro in accordance with the protocols provided for in Appendix 7G [*Immediate Callout Sequence of Events*] for information only.

Any Response or Rectification Plan work which conflicts with or is inconsistent or which otherwise requires modifications to the final Design of the Facility, as documented in the applicable As-built Drawings and O&M Manual shall be remedied by implementing a final Rectification Plan which has been submitted to and accepted by BC Hydro under the applicable procedure set out in the Rectification Plan Outline and in Schedule 5 [Design and Construction Protocols]. Any Rectification Plan that involves changes to the design of the Facility in the areas provided in Section 5.16.1 [*Checking Team*] of Schedule 5 [*Design and Construction Protocols*] shall be independently checked prior to submitting to BC Hydro under the Review Procedure.

All Response and Rectification work shall be performed in accordance with the Project Requirements and other applicable requirements of this Project Agreement.

6. DOCUMENTATION AND REPORTING

6.1 GENERAL

- (a) All records and reports for Services under this Schedule shall be provided pursuant to the requirements of Schedule 20 [*Records and Reports*]. Service Reports shall generally be as described in Section 6.3 [*Report Content*] of this Schedule.

- (b) All certifications shall be maintained and provided attesting that the Facility meets safe and responsible operational and maintenance requirements including SDI, Confined Space, equipment testing, elevator certification, crane inspections, boiler act certifications and WorkSafeBC requirements.
- (c) All Records and Reports obligations relating to MRS shall be complied with in accordance with this Section 6, the TCM and Section 9.2 [General] of Schedule 5 [Design and Construction Protocols].

6.2 MANDATORY RELIABILITY STANDARDS

- (a) Any work required to be performed in compliance with this Section 6.2 shall be considered Planned Maintenance. Project Co shall submit the Mandatory Reliability Standards (MRS) Reports Data ten (10 days) prior to due date in applicable MRS, and shall:
 - (1) cooperate with and provide timely information to BC Hydro so that BC Hydro can fulfil its reporting obligations pursuant to the NERC and WECC Standards adopted by the BCUC as Mandatory Reliability Standards (MRS). The MRS that apply to this Project include the following:
 - (i) EOP-004-1 – Disturbance Reporting;
 - (ii) EOP-009-0 – Documentation of Blackstart Generating Unit Test Results;
 - (iii) PRC-001-1 – System Protection Coordination;
 - (iv) PRC-004-WECC-1 – Protection System and Remedial Action Scheme Misoperation;
 - (v) PRC-005-1 – Transmission and Generation Protection System Maintenance and Testing;
 - (vi) PRC-017-0 – Special Protection System Maintenance and Testing;
 - (vii) WECC VAR-STD-002a-1 – Automatic Voltage Regulators; and
 - (viii) WECC VAR-STD-002b-1 – Power System Stabilizer.
 - (2) incorporate into its MPS all maintenance activities required to ensure that the Facility complies with in all aspects with the requirements of the above MRS. The MRS identified above are included as Disclosed Data.
 - (3) in utilizing the MRS to develop its Asset Management Plan, consider BC Hydro as the Generation Owner (GO), Generator Operator (GOP), Transmission Owner (TO) and Transmission Operator (TOP), as applicable.

- (b) BC Hydro maintains Generation Operating Orders that support the MRS requirements and the following are available in the Disclosed Data:
- (1) 1G-54A v.2 Forced Outage / Forced Derating Reporting and Investigation For Generation;
 - (2) 2G-43 v.1 Blackstart;
 - (3) 2G-40 v.2 Notification of Protective Relay or Equipment Failure Reducing System Reliability;
 - (4) 2G-38 v.1 Generation Protection System Maintenance and Testing;
 - (5) 2G-39 v.1 Special Protection Systems (RAS) Maintenance and Testing;
 - (6) 2G-41 v.1 Automatic Voltage Regulators; and
 - (7) 2G-42 v.1 Power System Stabilizers.

6.3 REPORT CONTENT

- (a) The Weekly Facility Activity Report shall be submitted on the day of the weekly meeting between technical managers, and shall briefly summarize the following for the previous week and be reviewed as part of the agenda for the weekly meeting pursuant to this Schedule 7 [*Services*]:
- (1) Facility performance;
 - (2) safety performance (worker and public);
 - (3) environmental performance;
 - (4) MRS performance;
 - (5) work completed;
 - (6) incidents, investigations, and root cause analyses; and
 - (7) issues and risks.
- (b) The Monthly Facility Performance Scorecard submitted on the seventh workday of the month shall summarize, including quantitative data, the following for the previous month. Review of this report shall be on the agenda for the meeting between technical managers during the week in which it is submitted.
- (1) Facility performance, including power produced, Generating Unit availability and statistics regarding Outages, if any;

- (2) safety performance, including the number of first aid visits, medical aid, lost time accidents, work days lost and near miss incidents, number of corrective action plans prepared and number of corrective action plans implemented for Project Co and BC Hydro personnel;
 - (3) results of audits conducted by BC Hydro to establish compliance with the requirements of Schedule 12 [*Safety and Security*];
 - (4) environmental performance;
 - (5) MRS performance;
 - (6) work completed, including maintenance statistics showing hours expended. BC Hydro will by the fifth workday of the month provide to Project Co the number of hours that BC Hydro maintenance personnel charged for the previous month;
 - (7) Return to Service Certificates for all equipment placed back in service following completion of maintenance during the month;
 - (8) equipment: incidents, investigations, root cause analyses and summary of actions taken and results;
 - (9) issues and risks; and
 - (10) tabulation of Performance Indicators showing target values and actual values; explanation of variances between target and actual values; and description of corrective actions to resolve variances, where necessary.
- (c) The Annual Asset Management Report shall provide a comprehensive summary of the performance of Project Co's Asset Management Plan from September of the previous year. Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the Asset Management Report by October 1 of each year starting one year after submittal of the final Commissioning Test Report. The report shall include the following topics:
- (1) Facility performance statistics, including power produced, Generating Unit availability and duration of Planned and Forced Outages;
 - (2) safety performance, including the number of first aid visits, medical aid, lost time accidents, work days lost and near miss incidents, number of corrective action plans prepared and number of corrective action plans implemented for Project Co and BC Hydro personnel;
 - (3) results of the independent third party audit to establish compliance with and implementation of the Occupational Health and Safety Management Program

pursuant to the requirements of Schedule 12 [*Safety and Security*] and the Safety Regulations;

- (4) environmental performance and summary of activities to address incidents;
 - (5) performance of the EMP (including energy consumption) and proposed changes, if any, to optimize the results;
 - (6) maintenance statistics including hours expended for Planned Condition-based and Corrective Maintenance;
 - (7) significant events related to operations and maintenance;
 - (8) regulatory compliance, including MRS;
 - (9) non-routine and capital projects that were completed or initiated, including description of project, status, and reason for scope and/or schedule change;
 - (10) description of methods and techniques used for managing assets;
 - (11) analysis of maintenance program effectiveness for Generation System assets on a rolling one unit (1,2 & 3) per year basis including air gap analysis, partial discharge analysis, vibration analysis, oil analysis, Turbine cavitation/condition, governor system performance analysis, protection response analysis, excitation system response analysis and Generating Unit temperature trending analysis;
 - (12) analysis of reliability and cost benefit realization;
 - (13) risk management update;
 - (14) proposed changes to optimize the Asset Management Plan, if any; and
 - (15) look ahead for 1-yr, 3-yr and 15-yr Asset Management Plan, including the 1-yr, 3-yr and 15-yr Outage plans pursuant to the requirements of Schedule 7 [*Services*].
- (d) The Commissioning Test Report outlined in Schedule 5 [*Design and Construction Protocols*] shall serve as the basis for all future Condition Assessment Reports and the Handback condition expectations and shall include the following:
- (1) all Commissioning and performance certification data for components of the Facility commissioned to date;
 - (2) all reports and certifications for components of the Facility commissioned to date;
 - (3) all data to be used as the baseline in future hydroAMP Tier 2 evaluations clearly identified in a format acceptable to BC Hydro;

- (4) listing of Defects identified during Commissioning and narrative description of how they impact the Asset Management Plan;
 - (5) initial 1-yr, 3-yr and 15-yr Outage plans pursuant to the requirements of Schedule 7 [*Services*]; and
 - (6) maintenance program strategy, based on the initial 1-yr, 3-yr and 15-yr Outage plans, to meet the Handback Requirements.
- (e) The 4-yr and 8-yr Condition Assessment Reports will provide the condition assessment to be used in monitoring the effectiveness of the Asset Management Plan and for implementing any remedial work to return the Facility to a condition that meets the Handback Requirements. Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the 4-year Condition Assessment Report no later than ten (10) years prior to the Expiry Date, and the 8-year Condition Assessment Report no later than six (6) years prior to the Expiry Date. The reports shall include the following:
- (1) all data from hydroAMP Tier 1 (2) testing and additional required tests and inspections;
 - (2) results of Independent Certifier's hydroAMP rating analysis;
 - (3) narrative description regarding the effectiveness of the Asset Management Plan in maintaining Facility performance and condition;
 - (4) identification of the degradation of each sub-system from original baseline tests;
 - (5) identification of areas where trending indicates that target Condition Indicator Scores or Acceptance Criteria will not be achieved at Handback, and proposed course of action to rectify; and
 - (6) identification of other Defects observed during testing and inspections, and proposed corrective action to remedy such deficiencies.
 - (7) a remedial plan and schedule that addresses the rectification of the identified deficiencies.
- (f) The 12-yr Condition Assessment Report shall determine the estimated costs and actions that need to be taken to bring the Facility to a condition that meets the Handback Requirements. Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the 12-year Condition Assessment Report no later than two (2) years prior to the Expiry Date. The report shall include the following:

- (1) all data from hydroAMP Tier 2 testing and other BC Hydro identified tests and inspections. All component testing and inspection data shall be less than 24 months old as of the first draft of the report;
 - (2) results of Independent Certifier's final hydroAMP rating analysis;
 - (3) trending data identifying degradation of each sub-system from original baseline tests;
 - (4) results of the Handback Survey identifying each of the Facility components that fails to achieve the Remaining Useful Life criteria included in Appendix 7E [*Condition Assessment Evaluation*] to this Schedule; and
 - (5) Independent Certifier's recommended measures and cost estimate to bring each of the assets with a Condition Indicator Score, Acceptance Criteria or Remaining Useful Life less than the target Condition Indicator Score, Acceptance Criteria or Remaining Useful Life to at least the target Condition Indicator Score, Acceptance Criteria or Remaining Useful Life for that component of the Facility.
- (g) The Handback Report shall include the following:
- (1) confirmation that all outstanding condition assessment and Handback Requirements have been addressed in accordance with the Handback Plan and that the Facility is ready for Handback Certification;
 - (2) identification of any remaining issues with the Facility; and
 - (3) a plan that addresses rectification of the remaining issues prior to Handback Certification.

APPENDIX 7A – ROLES AND RESPONSIBILITIES

Roles and Responsibilities

1. Operations			
Topic	Scope Item	Responsibility	Notes
Operations	Plan Facility operations in compliance with Water Use Plan and BC Hydro Transmission System Requirements	BC Hydro	BC Hydro's Operation and Planning Engineer for the Facility will have ongoing responsibility for all water conveyance (and final direction with respect to Outage planning, dispatch and water management requests).
	Operate Spillway gates	BC Hydro	The BC Hydro site crew will operate the Spillway gates
	Dispatch of Generating Units	BC Hydro	BC Hydro (PSOSE and Remote Control Centre) will dispatch the Generating Units in accordance with the plans prepared by the BC Hydro Operation and Planning Engineer.
	Isolation of hazardous energy	BC Hydro	BC Hydro will carry out all equipment isolation for the Facility under SPR WPP requirements.
	Operate Low Level Outlet	BC Hydro	BC Hydro will operate the Low Level Outlet.
	Operate EFRS	BC Hydro	BC Hydro will operate the EFRS.
2. Maintenance			
Topic	Scope Item	Responsibility	Notes
Buildings and Lands	Road maintenance: snow removal, asphalt sealing, maintenance and permits	Project Co	Project Co shall be responsible for all road maintenance.

	Vegetation management of restored lands	Project Co	Project Co shall be responsible for the maintenance of lands restored under the Project until Handback.
	Recreational areas	BC Hydro	Areas are shown in Schedule 10.
Non-Facility Maintenance	Transmission line maintenance	BC Hydro	BC Hydro will be responsible for transmission line maintenance from the high-voltage side of the Unit Transformer disconnect.
	Substation maintenance	BC Hydro	BC Hydro will be responsible for transmission line maintenance from the high-voltage side of the Unit Transformer disconnect.
	Spillway gates	BC Hydro	BC Hydro will be responsible for the maintenance of all existing Spillway gate equipment.
	Telecontrol and communication equipment (PAX, etc.)	BC Hydro	BC Hydro will be responsible for PAX and all telecontrol and communication equipment inside the Substation.
Support Systems	Janitorial (Powerhouse and Existing Site Office Building, if retained) services	Project Co	
	Septic	Project Co	
	HVAC	Project Co	
	Elevator	Project Co	
	Cranes and Hoists	Project Co	
	Fire protection	Project Co	
	Trash and recycling	Project Co	

Spare Parts, Special Tools and Maintenance Equipment	Spare Parts, Special Tools and Maintenance Equipment provided under Schedule 5, and consumables and additional spare parts needed for Planned Maintenance.	Project Co	Project Co shall be responsible for storing and maintaining inventory, including ordering, purchasing and receiving.
Generation Systems	Generation Systems equipment maintenance	Project Co	Development of maintenance plans and schedules per Schedule 7 requirements. Project Co shall plan, scope out, budget, schedule and oversee quality control.
		BC Hydro	BC Hydro crew will execute plan within prescribed limits of hours and job description.

3. Testing			
Topic	Scope Item	Responsibility	Notes
Testing	Services Period maintenance testing, including testing for the condition assessment evaluations.	Project Co	Project Co shall plan and conduct all testing per requirements of Schedule 7. Testing or inspections requiring specialized training or complex testing apparatus may be carried out by Project Co Persons
		BC Hydro	BC Hydro Labour Pool will control the Generating Unit through the test under Project Co instruction. BC Hydro Labour Pool will carry-out routine testing, inspections and checks within the normal roles and qualifications.

4. Dam Safety			
Topic	Scope Item	Responsibility	Notes
Dam Safety	Dam Safety Operation Maintenance and Surveillance (OMS) manual, Emergency Preparedness Plans (EPP), Emergency Planning Guides (EPG)	BC Hydro	Needs to be prepared and submitted to Control of Water Rights for Leave to Commence Operation (needs input from Project Co).
	Instrumentation Readings (Dam Safety Maintenance Manual requirements, monthly, quarterly, annual) for Dams, Powerhouse, Power Intake and Power Tunnel	BC Hydro	
	Analysis and interpretation- tunnel performance	Project Co	
	Analysis and interpretation- dam performance	BC Hydro	BC Hydro has the lead and overall responsibility but Project Co provides technical input regarding the impact from any modified area (e.g. Power Intake)
	4 and 8 yr Power Tunnel inspections	Project Co	Condition inspection, rock trap(s) inspection & rock removal if required
	7yr Major Dam Inspection (per Controller of Water Right needs for Very High Consequence dam)	BC Hydro	Obligation of dam owner. However, if it raises deficiencies associated with Schedule 6 specifications the replacement work, obligations go to Project Co

5. Public Safety			
Topic	Scope Item	Responsibility	Notes
Public Safety	Develop Public Safety Management Plan (risk analysis of entire Reservoir and River)	BC Hydro	The overall facility plan and responsibility is BC Hydro due to reservoir, spillway and other BC Hydro areas (and holistic responsibility as Owner).
	Develop Project Public Safety Management Plans (includes plant signage and fencing) as per Schedule 23	Project Co	Plant public safety management plan for areas impacted by new redevelopment, including infrastructure requirements such as fencing, booms and signage
	Install and maintain safety fencing, river booms and signage	Project Co	Components of the Facility provided under Schedule 6 shall be maintained by Project Co
		BC Hydro	Reservoir and Spillway areas will be maintained by BC Hydro.
	Radio and print ads regarding public safety around the Facility	BC Hydro	
	River Safety	Project Co	Keep Out buoys/booms, bypass risk etc.
	Reservoir Safety	BC Hydro	Existing practice- booms, sirens
	Canyon/spill risk	BC Hydro	
	Monitoring and reporting (and annual Project Public Safety Management Plans) of public safety concerns and incidents	Project Co	BC Hydro staff will do dual reporting in parallel with Project Co to cover entire site. Plan template to be provided

6. Safety			
Topic	Scope Item	Responsibility	Notes
Safety	Prime Contractor	BC Hydro	Transfers from Project Co to BC Hydro once the Powerhouse has met Service Commencement requirements.
	Safety Equipment (Personal Protective Equipment) and Safety Training (WorkSafe BC courses)	BC Hydro	BC Hydro will provide for its own staff. BC Hydro arranges and covers crew WorkSafeBC safety training for Project Co staff.
		Project Co	Project Co shall provide Personal Protective Equipment for its own staff.
	Safe Work Procedures for the Project Work	Project Co	Per requirements of Schedule 12.
	First aid staffing	BC Hydro	BC Hydro will provide Level 1 and Transportation End training, suitable for routine maintenance.
		Project Co	Project Co shall arrange and pay the cost for additional first aid requirements (e.g. Level 3, Emergency Transportation Vehicle) for Project Co work that steps up the WorkSafe BC first aid requirements of the site (i.e. number of personnel on site or nature of work hazard category).
	First Aid Room- initial supplies and restocking	Project Co	Initial stocking is provided under Schedule 6 and Schedule 7 work includes restocking as required.

7. Environment			
Topic	Scope Item	Responsibility	Notes
Environment	Water sampling during operations (e.g. sump discharge, looking for hydrocarbons)	BC Hydro	BC Hydro staff takes the sample (Project Co to ensure sampling bottles are available).
		Project Co	Project Co to see and be responsible for carrying out lab test and reporting the results
	Environmental Incidents (oil spill, fish issue, etc.)	BC Hydro	Per Local Operating Order, BC Hydro staff provides initial response to incident.
		Project Co	Project Co conducts further response as required- covers costs, hires specialists to fully address and remedy incident. Project Co attends, does report and root cause analysis
	Incident Reporting	Project Co	Project Co reports to BC Hydro as per LOO
		BC Hydro	BC Hydro does all external agency reporting
	Environmental monitoring support for maintenance activities (environment aspects of maintenance work plans)	BC Hydro	BC Hydro provide NRS personnel hours to monitor and provide appropriate assistance and guidance
	Oil and SF6 usage tracking	Project Co	Project Co shall provide a system to track and report oil balance entering and exiting the Facility
	Environmental work procedures (fish salvage, oil spill protection)	Project Co	Provides requirements and procedures for the work similar to safety procedure requirements to ensure Project Co design lifecycle requirements based on performance specifications

	Fines from Environmental Incidents (compensation as agreed with Agency)	Project Co	As outlined in Schedule 13
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8. Security			
Topic	Scope Item	Responsibility	Notes
Security	Operations (physical security)	BC Hydro	BC Hydro will respond to security alarms and calls.
	Physical facilities and devices	Project Co	Project Co shall maintain fences, alarms and devices provided under Schedule 6.

9. Administration			
Topic	Scope Item	Responsibility	Notes
Records and Drawings	Drawing Updates and Distribution	Project Co	Project Co shall be the Engineer of Record utilizing a Professional Engineer employed by the Designer for updating Facility Construction Records
			Project Co shall be the Engineer of Record utilizing a Professional Engineer employed by the Designer for updating Facility Construction Records
	Equipment O&M Manuals	Project Co	Project Co shall be responsible for any required updates to manuals and for providing full set(s) of manuals to BC Hydro at Handback.
	Equipment Maintenance Records and Inspection Reports	Project Co	Project Co shall provide periodic updates in form acceptable to BC Hydro.
Reporting	Service Reports	Project Co	Per Schedule 7 requirements.

Permits and Licences	Project Licences	BC Hydro	BC Hydro will be responsible for the BC Hydro Permits and maintain, support or apply for new licences as/when required.
		Project Co	Project Co shall be responsible for all other Permits and maintain and apply for new licences or provide support, information and documentation to support new licence applications.
	Equipment Licences/Permits	Project Co	Project Co shall keep current and apply for permits (e.g. elevator permits, fire extinguishers, relief valve tagging) required for Facility equipment and day to day operation.
Standards Reporting	Mandatory Reliability Standards Reporting	BC Hydro	Per Schedule 7 requirements.
Fees and Taxes (Grants in Lieu)	Water Licence Fees (annual – to Comptroller of Water Rights)	BC Hydro	BC Hydro will determine amount payable for the Facility (annual water fees) and will be responsible for payment.
	Property Tax- Grants In Lieu	BC Hydro	BC Hydro will pay its assessed Grants in Lieu.
Training	Health, Safety and Environment training (WorkSafeBC, BC Hydro)	BC Hydro	BC Hydro will keep its employees up to date for WorkSafe BC and BC Hydro safety training (including Level 1 with Transportation, WHMIS, driving, forklift, fire extinguisher, respirator fit, spill response, Worker Protection Practices etc).
	Facility-based	Project Co	Per Schedule 7 requirements.

Systems and Software	Facility and Geotechnical	Project Co	Project Co shall be responsible for software updates for Facility protection, controls and monitoring, and unsupported software.
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APPENDIX 7B – FACILITY SERVICES

1. General

Project Co shall provide the Facility Services in accordance with this Appendix 7B [*Facility Services*] so that the assets:

- (a) are properly maintained in accordance with the Service Plans;
- (b) remain functional, safe, operationally sound and of good appearance;
- (c) perform in accordance with their respective design criteria as set out in the Project Requirements; and
- (d) achieve the service standards set out in Tables 2, 3 and 4 of this Appendix 7B.

2. Maintenance Times

Subject to the MPS outlined in Section 4 [*Asset Maintenance and Management*] of Schedule 7 [*Services*], Project Co shall perform the maintenance services during the relevant maintenance access times and shall:

- (a) perform Planned Maintenance during the periods agreed in the Asset Management Plan then in effect and give BC Hydro 30 days' notice before commencing any such Planned Maintenance; and
- (b) undertake and complete Corrective Maintenance within the relevant Response Time and Rectification Period set out in this Appendix and Schedule 13 [*Performance and Payment Mechanisms*].

3. Re-Scheduling of Maintenance

Notwithstanding any notice delivered by Project Co pursuant to Section 1 [*General*] of this Appendix, if the BC Hydro Representative, acting reasonably, determines that the times at which Project Co proposes to perform maintenance will cause material disruption to the operations of BC Hydro or other BC Hydro users, BC Hydro may give notice to Project Co not to carry out such maintenance until such time as BC Hydro and Project Co, each acting reasonably, agree on an alternate time and such instruction to delay or defer this work shall be considered a Change pursuant to Schedule 14. Upon such agreement, the Response Time and Rectification Period for such maintenance will be adjusted accordingly.

4. PERFORMANCE INDICATORS

	Indicator	Failure or Request for Services Category	Response Time for providing Response Plan	Rectification Period	Recording Frequency	Monitoring Method
	Table 1 – Reactive Activities					
4.1	Immediate Callout or Corrective Maintenance carried out in accordance with Schedule 7 requirements	Critical Urgent Routine	0.5 hrs during regular business (8am – 4pm) 1.0 hr outside of regular business hours (4pm – 8:00am) 6 to 8 hrs 72 hrs	ASAP 2 days 30 days	Per Occurrence	Monthly Facility Performance Scorecard
	Table 2 – Planned Activities					
4.2	Maintenance performed as part of MPS at the times permitted per Schedule 7	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.3	100% of Planned Maintenance on life safety, emergency systems, and statutory/regulatory requirements completed within the times scheduled in the Annual Asset Management Plan	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard

	Indicator	Failure or Request for Services Category	Response Time for providing Response Plan	Rectification Period	Recording Frequency	Monitoring Method
	Spare parts, special tools, maintenance equipment and tooling as were on hand at Service Commencement	Routine	5 days	90 days	Per Occurrence	Monthly Facility Performance Scorecard
4.4	100% of monthly Low Level Outlet functional testing completed	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.5	100% of monthly Bypass System functional testing completed	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.6	Trashrack cleaned at least every four years	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.7	Project Co plans and schedules are completed for 90% of all Planned Maintenance activities on Generation Systems equipment.	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard

	Indicator	Failure or Request for Services Category	Response Time for providing Response Plan	Rectification Period	Recording Frequency	Monitoring Method
4.8	Project Co carries out 80% of all other Planned Facility Maintenance within the times scheduled in the Annual Asset Management Plan..	High	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.9	External areas of the Facility maintained in accordance with Schedule 7 requirements.	Low for the first week of failure and Medium for each week thereafter until Rectified	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.10	Snow and ice removed from the site circulation routes of the Facility in accordance with the Table 2 in this Appendix	Low until 2 cm accumulation s, Medium until Rectified	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard

	Indicator	Failure or Request for Services Category	Response Time for providing Response Plan	Rectification Period	Recording Frequency	Monitoring Method
4.11	Provide janitorial services for cleaning : <ul style="list-style-type: none"> • High traffic areas • Elevators • Washrooms • Lunchroom • Offices and workshops Including trash removal	Low for: <ul style="list-style-type: none"> • daily during overhaul and major maintenance periods • weekly during other periods of the year • Annually for major cleaning Medium until rectified	N/A	N/A	Per Occurrence	Monthly Facility Performance Scorecard
4.11	Records and information obtained for and accessible to BC Hydro in accordance with Schedule 20 including performance monitoring program, etc.	Medium	N/A	48 hrs	Per Occurrence	Annual Asset Management Report
4.12	All Hazard notices and safety signs are maintained, recorded, located and displayed correctly and fully serviceable.	Medium	N/A	N/A	Per Occurrence	Annual Asset Management Report

	Indicator	Failure or Request for Services Category	Response Time for providing Response Plan	Rectification Period	Recording Frequency	Monitoring Method
4.13	Project Co implementing and adhering to all other elements of the Annual Asset Management Plan related to Facility Services.	Low	N/A	N/A	Per Occurrence	
	Note: N/A means “not applicable” and that the Table does not indicate or specify a Response Time or Rectification Period for the specified Performance Indicator					

TABLE 1: FAILURE OR REQUEST FOR SERVICE CATEGORIES

Service Category	Definition
Critical	<p>“Critical” means any matter threatening to life or personal physical safety or event or incident which will likely cause or has caused an immediate interruption to Operations or have immediate environmental impact. Service is required immediately. Critical matters include:</p> <ul style="list-style-type: none"> • Flow bypass initiation; • Unit Forced Outage; • Safety problems exposing Facility Users to danger; • Emergency repairs to prevent further damage (e.g. burst pipe); • Environmental incidents such as oil spills or fish stranding; and • Equipment failure or operating difficulties which could result in the loss of critical utilities including communications, water, electricity, or emergency power.]

Urgent	<p>“Urgent” means any matter that will or may cause material operational problems, physical or environmental damage or health and safety risks if not diligently, having regard to the circumstances, attended to or remedied. Service is required as soon as possible:</p> <ul style="list-style-type: none"> • to address problems not presenting an immediate danger; and • to address problems having the potential to have a negative impact on operations.
Routine	<p>“Routine” means all other matters that are not immediately detrimental to health or safety and which will not cause material operational problems, physical or environmental damage or health and safety risks if not attended to or Remedied quickly. Maintenance and repairs required for matters not having an immediate impact on Facility operations include items such as leaking taps, pipes, faulty doors and windows damaged walls, furniture or fixture installations.</p>
High	<p>“High” shall mean any matter that is a planned activity or action and shall be considered, planned and executed as the high priority work based on its level of importance in facilitating the timely performance of the Services.</p>
Medium	<p>“Medium” shall mean any matter that is a planned activity or action that is a second priority to High priority activities, with a lower level of importance.</p>
Low	<p>“Low” means any matter that is a planned activity or action that shall be considered the lowest priority compared to High and Medium activities or actions meaning it has the lowest level of importance relative to the High and Medium activities.</p>

TABLE 2: SERVICE STANDARDS – BUILDINGS AND LANDS
Service Standards - Buildings and Lands

Asset	Standard
Buildings External Including:	
<ul style="list-style-type: none"> • External walls • Roof • Fire escapes • Walkways • Safety barriers • Eaves • Rendering 	<ul style="list-style-type: none"> • Sound secure and weatherproof where appropriate. • Free from damp penetration or spalling. • Claddings, copings and parapets are structurally sound and secure. • Chimney stacks/flues are structurally sound and secure and flue is free from blockages/excess soot. • Free from debris, moss growth and animal droppings.
Buildings Internal Including:	
<ul style="list-style-type: none"> • Internal walls • Partitions • Ceilings • Elevators 	<ul style="list-style-type: none"> • Free from structural cracks and/or deflection. • Free from damp and vermin. • Free from undue damage and of reasonable appearance. • Free from asbestos and other hazardous materials.
Fixtures and Fittings Including:	
<ul style="list-style-type: none"> • Doors (external, internal and fire) • Windows and sills • Hatches • Vents • Ironmongery • Millwork • Shelving • Cupboards • Railings • Racking • Notice boards • Mirrors • Balustrades • Magnetic door holders 	<ul style="list-style-type: none"> • Operate safely and as intended, without making undue noise and without including observable stains on hinges, locks, catches and handles, and without binding, rubbing or catching in any way. • Free from all but minor surface blemishes and wear and tear. • Luminescent strips, signs, notices, warning signs are intact, legible and illuminated where appropriate. • Free from corrosion.
Floors and Floor Coverings	
	<ul style="list-style-type: none"> • The floor coverings are complete, according to their specification. • The floor coverings are fully fixed to the floor so as not to cause a health or safety hazard. • The floor/floor covering is reasonably free from tears, scoring, cracks or any other damage that is unsightly and/or could cause a health and safety hazard. • Floor coverings/surfaces are maintained in such a way as to provide a suitable uniform surface (taking into account the pre-

	<p>existing subsurface), with minimal resistance, for wheeled vehicles as applicable.</p> <ul style="list-style-type: none"> • Allow adequate drainage where necessary.
Decorative Finishes Including:	
<ul style="list-style-type: none"> • Paintwork • Fabric • Special finishes applied to walls, ceilings, woodwork, metalwork, pipework and other visible elements) 	<ul style="list-style-type: none"> • Decorative finishes are complete according to their specification. • Free from all but minor surface blemishes or undue wear and tear. • Free from cracks, or any other surface degradation inconsistent with a building maintained in accordance with Good Utility Practice.
Furniture & Equipment Including	
<ul style="list-style-type: none"> • Chairs • Tables, desks • Equipment 	<ul style="list-style-type: none"> • Free from splits, cracks, and other defects (including squeaks) and free from all but minor surface blemishes or undue wear and tear. • Maintained in accordance with Occupational Health and Safety requirements of the WCB.
Site Circulation Routes Including:	
<ul style="list-style-type: none"> • Pavings • Paths • Driveways • Roads • Car Parking Areas • Hardstandings • Facility entrances • External staircases • External fire escapes 	<ul style="list-style-type: none"> • Sound safe and even surface with no potholes or sinkings. • Substantially free from standing water, ice, snow. • Substantially free from fallen leaves, moss algae or interstitial weeds. • Free from fallen trees. • Curbs and edgings are sound. • No loose curbs or paving stones. • Road markings and parking stripings are clear and complete. • Free from graffiti and/or vandalism. • Provides for good disabled access such as the visually impaired and wheelchair users. • Protection of all vehicles from chemical sprays during any applications.
External Furniture and Structures	
<ul style="list-style-type: none"> • Street lights • Guard rails • Copings • Ornamental objects • Bollards • Street lights 	<ul style="list-style-type: none"> • Sound, secure, safe and free from damage. • Operating at their design performance where applicable. • Substantially free from moss algae and/or interstitial weeds. • Free from graffiti and/or vandalism. • Replacement of light elements.

Boundaries	
<ul style="list-style-type: none"> • Fences/walls • Gates 	<ul style="list-style-type: none"> • Intact safe, sound and secure. • Free from graffiti and damage. • Locks are operational.
External Sign Posting (incl. lighting)	
	<ul style="list-style-type: none"> • Compliant with the signage and way finding requirements in Schedule 6 [Design & Construction Specifications]. • Secure and sound. • Does not hinder visibility to car and pedestrians at junctions. • Are in appropriate locations. • Highly visible, both day and night. • Offers clear and concise information. • Free from graffiti and/or vandalism. • Replacement of light elements.
Gutters and Drains	
	<ul style="list-style-type: none"> • Substantially free from litter, leaves, weeds and extraneous material.
Facility General	
	<ul style="list-style-type: none"> • Substantially free from litter, including cigarette ends and chewing gum residue. • Garbage bins less than 75% capacity and free from malodour.

TABLE 3: SERVICE STANDARDS – SUPPORT SYSTEMS

Service Standards - Support Systems

Asset	Standard
General	In general, all assets including those outlined below are at all times functional, operational and satisfy the same performance requirements as required for Service Commencement.
Hot & Cold Water Systems	
All infrastructure for hot and cold water systems, plumbing and sewer systems constructed or supplied by Project Co pursuant to Schedule 6	<ul style="list-style-type: none"> • Deliver water at the temperatures and flow rates as required to serve the Facility needs without undue noise and vibration. • Taps, valves and other related fittings and fixtures function as intended. • Pipework and fittings fastened securely to their intended points of anchorage. • No persistent drips or leaks of water from pipework, taps, valves and/or fittings.
Heating, Ventilation and Air Conditioning Systems	
<ul style="list-style-type: none"> • Heating plant, including boilers • Heat exchanger systems • Fume hoods • Humidifiers • Heaters • Ductwork 	<ul style="list-style-type: none"> • All ventilation systems function as intended without undue noise or vibration. • Air changes and ventilation levels are as required to achieve CSA and ASHRAE Standards. • Ductwork, fittings and pipework securely fastened to their intended points of anchorage. • No persistent or unreasonable leakages of water (or other heating/cooling medium) or air from ventilation systems. • Free from corrosion, erosion and organic growth
Sanitary and Other Drainage Systems	
Including all sanitary ware and associated fittings	<ul style="list-style-type: none"> • Function as intended, without undue noise and vibration. • Provide a safe and comfortable environment. • All pipework and fittings fastened securely to their intended points of anchorage. • No leakage of waste and/or foul water and/or rain water.
Fire Fighting Equipment	
	<ul style="list-style-type: none"> • Fire extinguishers and other fire fighting equipment maintained in accordance with relevant codes and standards (e.g., CSA Standards). • Sound, secure and fixed to their intended point of anchorage. • Fully operational within manufacturer's recommendations. • Hydrants, sprinklers and hoses at correct operating pressure and

	<p>capacity.</p> <ul style="list-style-type: none"> • Pipework free from corrosion, leaks and drips. • Are of suitable type and quantity for the Hazards present within their vicinity.
Fire Systems	
<p>Air sampling systems, duct detectors, analysers</p> <p>Cerberus Addressable system & associated detectors, relays, monitors</p> <p>Cerberus system 3 non addressable</p> <p>Detector testers/removal devices</p> <p>Dry pilot deluge systems</p> <p>Generator deluge systems</p> <p>Inergen discharge systems</p> <p>Lockout stations (Inergen and unit deluge)</p> <p>Pre action deluge systems</p> <p>Programmer/Testers for intelligent initiating devices</p> <p>Scattered beam detectors</p> <p>Station alarm interface</p> <p>Wet pipe deluge systems</p>	<p>Fire Systems equipment maintained in accordance with relevant codes and standards (e.g., CSA Standards, BC Building Code).</p> <ul style="list-style-type: none"> • Fully operational within manufacturer's recommendations. • Pipework free from corrosion, leaks and drips. • Are of suitable type and quantity for the Hazards present within their vicinity.

Heat and Ventilation Systems	
<p>Air conditioning</p> <p>Air handling systems</p> <p>Computer based controls</p> <p>Duct detectors - smoke, over temp, under temp</p> <p>Duct heaters</p> <p>Louver motors & feed back circuits</p> <p>Flow switches</p> <p>Valve motors</p>	<ul style="list-style-type: none"> • HVAC systems maintained in accordance with manufacturer's requirements with air quality throughout the Facility at or above WorkSafeBC requirements.

Security Systems	
Cameras	Security Systems equipment maintained in accordance with relevant codes and standards <ul style="list-style-type: none">• Fully operational within manufacturer's recommendations.
Alarm panels	
Sensors	

Cranes and Hoists	
Bridge cranes & operation	Meet WorkSafeBC requirements
Electric crane rails/pickups	Safely meet full operational range as commissioned and rated
Gantry Cranes & operation	
Intake/draft tube cranes, fill schemes, load cells	
Jib cranes & operation	
Monorail cranes & operation	
P&H wound rotor motor/saturable reactor speed control	
Pendant operator	
Radio operator	

TABLE 4: SERVICE STANDARDS – GENERATION SYSTEMS

Service Standards - Generation Systems	
Asset	Standard
Communication Systems	<ul style="list-style-type: none"> • Communications system maintained in accordance with all relevant codes and standards. • All electrical communications and data transmission installations to all other communication and information technology equipment provided by Project Co pursuant to Project Requirements. • Comply with relevant codes and standards (e.g., CSA Standards). • Fully operational within manufacturer's recommendations.
Low Level Outlet Testing	<p><u>Monthly:</u> Wet test of each valve in the system, valve shall be cracked to minimum 10% travel. Power sources used for the monthly test shall be alternated. Test is will be deemed successful if valves can open regardless of which power source they use. If a BC Hydro diesel generator causes the valve to not be operable, it shall not cause a failure of the test/fine.</p> <p><u>Yearly</u> Full open and closed of each valve in the system whilst isolated.</p>
Bypass System Testing	<p><u>Monthly:</u> A functional test shall be done triggering the primary monitoring or feedback device initiating a bypass response. The bypass system response will be limited to one valve. The one valve used and the magnitude of the trigger will be rotated every month such the bypass system is evenly tested.</p> <p><u>4/8/12 year</u> Full plant rejection tests shall be done proving the full response of the bypass system.</p>

Power Intake Power Tunnel Penstocks Bypass System Generating Units AC Station Service DC Station Service Generator Systems Turbine Systems Excitation Systems Governor Systems Protection and Control Systems Geotechnical Instrumentation Tailrace Low Level Outlet Debris Boom Surge Towers Draft Tube Gates and Valves Discharge devices for the LLO, EFRS, Bypass System and active HTMS Unit Control Generating Unit Water Systems Generating Unit Air Systems Sump System Transformers Circuit Breakers Generator Output Systems	<ul style="list-style-type: none"> • All equipment maintained according to manufacturer's requirements unless signed off by Engineer of Record with supporting technical and economic evidence. • All Generation System assets have Failure Mode Effect Analysis completed. • All Generation System assets have Reliability Centered Maintenance analysis completed to minimize Outage cost and intervention costs. • All Generation System assets maintained to meet WPP/SPR. • All Generation System assets maintained to meet WorkSafeBC requirements. • All equipment in good safe working order. • All Generation System assets maintained to meet MRS/WECC and NERC requirements.
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APPENDIX 7C - NOTIFICATION OF FAILURE OR REQUEST FOR SERVICE

1. SERVICES

1.1 General Requirements

Project Co shall maintain throughout the Services Period a system that facilitates Notification of Failure or Request for Service (NFRS) in respect of any Failure Category described in Appendix 7B [Facility Services]:

- (a) 24 hours per day, 365(6) days per year, with provision of back-up plans to ensure continuity of service;
- (b) such that the NFRS notification or report (the “**NFRS Report**”) functions as the central communications means for NFRS including:
 - (1) receiving, logging and responding appropriately to telephone, facsimile, e-mail and other communications and liaising with all Facility Users on the progress and status of Project Work;
 - (2) providing seamless redirection of calls and information to BC Hydro’s existing CMMS systems; and
 - (3) in a comprehensive, effective, flexible and efficient manner facilitates the smooth operation of the Facility.

1.2 NFRS

In connection with the carrying out the operation of NFRS system, Project Co shall:

- (a) designate an NFRS Contact and alternate who can be reached 24 hours per day, 365(6) days per year. Contact information shall include name, telephone number, facsimile number and electronic mail address.
- (b) provide for Facility Users to submit NFRS Reports by telephone, electronic mail and other electronic means;
- (c) respond initially to confirm receipt and category to all NFRS Reports:
 - (1) if made by telephone, within 15 minutes of the NFRS Report; and
 - (2) if made by electronic mail or by other electronic means, within 15 minutes of receipt at the NFRS Report.
- (d) follow up to an initial Response shall be within the timelines outlined in Appendix 7B [*Facility Services*]. A response plan to all NFRS Reports, which shall be

provide by telephone or email to the Facility User or other source that directed the NFRS Report with Project Co's initial Rectification Plan for the NFRS in accordance with the requirements of the Rectification Plan Outline.

- (e) keep records of telephone and electronic Response times;
- (f) immediately redirect, in accordance with the contact information provided by BC Hydro from time to time, all NFRS Reports and notify BC Hydro of:
 - (1) all NFRS Reports, notifications of Non-Availability Events and all further consultations and communications required by Schedule 11 [*Communication and Consultation*] promptly if the Response or Rectification will have a material impact on the use of the Facility by Facility Users and otherwise in accordance with Section 5 [*Outages and Requests for Services*] of Schedule 7 [*Services*];
 - (2) accidents or emergencies promptly after occurrence; and
 - (3) complaints or compliments and other comments received from Facility Users in connection with the Services promptly following receipt.
- (g) provide NFRS system user training to BC Hydro and other Facility Users as and when required;
- (h) maintain a daily electronic log of all NFRS Reports including:
 - (1) the name of the NFRS Contact to whom the enquiry was made or the automated electronic system which generated the report;
 - (2) the name of the Facility User;
 - (3) date and time of the NFRS Report;
 - (4) location of the Failure or Service need;
 - (5) nature of the NFRS Report;
 - (6) Services required;
 - (7) to whom, the time and means by which the NFRS Report redirected BC Hydro related calls and requests;
 - (8) Service or Failure Category per Appendix 7B [*Facility Services*];
 - (9) unique request reference identifier;

- (10) date and time request passed to the appropriate person for response;
 - (11) action taken and by whom;
 - (12) the actual Response Time and Rectification Period the subject matter of the NFRS Report; and
 - (13) any required follow-up actions.
- (i) not amend, delete or alter any details recorded on the electronic log unless approved by BC Hydro and the following information is recorded and maintained:
- (1) the exact nature and impact of the amendment;
 - (2) the reason for the amendment; and
 - (3) by whom the amendment was authorized.
- (j) ensure that in the event of emergencies the NFRS Report will raise the alarm, reporting the incident to internal and external authorities and log the details;
- (k) maintain confidentiality consistent with BC Hydro's Policies.

APPENDIX 7D - CONDITION ASSESSMENT

1. GENERAL

- (a) The condition assessment initiates with Commissioning and will be a continuous process during the Services Period to:
 - (1) evaluate Project Co's asset management performance over the Services Period;
 - (2) assess the condition of the assets after 4, 8 and 12 years of operation and implement remedial work to return the assets to a condition that meets or exceeds the acceptable Condition Indicator Scores or Remaining Useful Life criteria, as applicable. Requirements for Condition Indicator Scores and Remaining Useful Life criteria are included in Appendix 7E [*Condition Assessment Evaluation*] to this Schedule; and
 - (3) establish conditions for Handback and final acceptance by BC Hydro.
- (b) The condition assessment shall be comprised of the following principal components, the requirements for which are included in this Schedule and other Schedules referenced herein:
 - (1) Facility Condition Assessment Plan;
 - (2) Commissioning Test Report;
 - (3) 4-year Condition Assessment Report;
 - (4) 8-year Condition Assessment Report; and
 - (5) 12-year Condition Assessment Report.

2. PRINCIPLES

Project Co shall, at the end of the Services Period, handback to BC Hydro a Facility:

- (a) that meets the Condition Indicator Scores or Remaining Useful Life requirements, as applicable, of Appendix 7E [*Condition Assessment Evaluation*];
- (b) that has no fundamental design or construction quality issues such as cracked runners or stator core waves; and
- (c) for which all Handback Requirements, as specified in Appendix 7F [*Handback Requirements*], have been fulfilled.

3. FACILITY CONDITION ASSESSMENT PLAN

- (a) Project Co shall prepare and submit to BC Hydro a Facility Condition Assessment Plan (FCAP) which:
- (1) identifies the Lead Test Engineer (LTE) for Project Co. The LTE shall be designated as a Key Individual pursuant to the requirements of Schedule 3 [*Roles and Representatives*].
 - (2) as a minimum includes the following:
 - (i) Commissioning and baseline tests, inspections and procedures conducted pursuant to the requirements of Schedule 5 [Design and Construction Protocols] and 6 [Design and Construction Specifications];
 - (ii) tests and inspections to be performed for the 4-yr, 8-yr, and 12-yr condition assessments, identifying proposed modifications, if any, to above tests, inspection and procedures, and a detailed written justification for each;
 - (iii) a schedule identifying when the tests and inspections are to be conducted and the duration of each;
 - (iv) identification of the parties responsible for performing the tests and inspections;
 - (v) labour hours needed for each test and inspection;
 - (vi) specialized equipment and other resources needed;
 - (vii) the manner in which results of the tests and inspections will be documented and stored;
 - (viii) the time frame for submittal of required reports; and
 - (ix) general outline of the content of each report.

Pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver the Facility Condition Assessment Plan not less than two (2) months prior to the scheduled submittal of the Commissioning Test Report.

- (b) All testing shall be performed by Project Co and coordinated with BC Hydro. All engineering required to support the testing and inspections shall be provided by Project Co.

- (c) Project Co shall furnish the required instrumentation for performing the tests and shall be responsible for its proper calibration, along with all required fixtures, cables, piping, connections, and equipment for performing the tests, and shall be responsible for the documentation of the testing and inspection results. Provide copies of results to BC Hydro as raw data at the time they are collected.

4. CONDITION ASSESSMENT EVALUATION

- (a) The condition assessment evaluation of Generation Systems will be made based on hydroAMP methodology, except as otherwise specified in Appendix 7E [*Condition Assessment Evaluation*], with adaptations by BC Hydro specific to the Facility. The Corps of Engineers hydroAMP Guidebook is available as Disclosed Data.
- (b) The condition assessment evaluations of Generation Systems will be performed by an Independent Certifier who shall have qualifications and demonstrated experience in performing evaluations using the hydroAMP methodology. Project Co shall cooperate with the Independent Certifier and provide complete access to the Facilities and to all Project Co's condition and performance data, records and reports. The Independent Certifier will be acceptable to both Project Co and BC Hydro, and the cost for the Independent Certifier will be shared equally by Project Co and BC Hydro.
- (c) A condition assessment evaluation of Generation Systems shall be included in each of the following:
 - (1) 4-year Condition Assessment Report;
 - (2) 8-year Condition Assessment Report; and
 - (3) 12-year Condition Assessment Report.
- (d) (d) In addition to the condition assessment evaluation of Generation Systems, the 12-year Condition Assessment Report shall also include a condition assessment evaluation based on a Handback Survey of the entire Facility and said Handback Survey as further described in Section 5 [*Handback Survey*] of this Appendix 7D [*Condition Assessment*].
- (e) Prior to preparation of each of the above reports, Project Co shall prepare a detailed outline of the report identifying tests to be conducted and measurements to be taken; test procedures and standards to be followed; data to be included in the report; and the manner in which evaluations and recommendations will be summarized.

- (f) The Independent Certifier will verify that the data obtained from the tests and inspections for each condition assessment is complete, compile the data, and perform the evaluation.
- (g) The Independent Certifier will identify those items where the Condition Indicator Scores are less than the target value for that item.

5. HANDBACK SURVEY

- (a) Except as otherwise specified in Appendix 7E [*Condition Assessment Evaluation*], the condition assessment evaluation of Buildings and Lands, and Support Systems, shall be based on a joint inspection and survey of the Facility by Project Co and BC Hydro.
- (b) The Handback Survey will be conducted:
 - (1) no later than 3 months prior to completion of the 12-yr Condition Assessment Report; or
 - (2) promptly following delivery of any notice of an event or circumstance which would give either party a right to terminate the Agreement, prior to the Expiry Date in accordance of the Project Agreement.
- (c) The results of the Handback Survey will be used to identify the Remaining Useful Life of the components of the Facility and to evaluate the results in comparison to the Minimum Remaining Useful Life criteria included in Appendix 7E [*Condition Assessment Evaluation*].

6. 12-YR CONDITION ASSESSMENT REPORT

- (a) The results of the condition assessment evaluations and Handback Survey will be used to prepare the 12-yr Condition Assessment Report which will
 - (1) identify those components of the Generation Systems, Support Systems and Buildings and Lands that fail to meet the target Condition Indicator Scores, Acceptance Criteria or Minimum Remaining Useful Service Life requirements, as applicable; and
 - (2) include the recommended measures and associated estimated cost including materials, labour, and Outage costs calculated in accordance with Schedule 13 [*Performance and Payment Mechanisms*] to correct all Defects.

- (b) The costs associated with rectifying the outstanding issues will be held as a Condition Assessment Retention per Schedule 13 [*Performance and Payment Mechanisms*].
- (c) The content of the 12-yr Condition Assessment Report is as further described in Section 6.3(f) [*12-Year Condition Assessment Report*] of Schedule 7 [*Services*].

APPENDIX 7E - CONDITION ASSESSMENT EVALUATION

1. HYDROAMP EVALUATIONS

1.1 General

(a) **Overview**

- (1) The asset condition evaluation of the majority of Generation Systems will be made based on the hydroAMP (hydropower Asset Management) system methodology with modifications and additions by BC Hydro specific to the Facility.
- (2) In general, the hydroAMP Tier 1 tests are called out for the 4-year and 8-year condition assessments, with the final Handback inspections in year 12 requiring that several of the Tier 2 tests/additional tests also be carried out. It should be noted that the Condition Indicator Scores are representative of Section II of the hydroAMP system and refer specifically to the relevant sections of the Equipment Condition Assessment Guides (Appendix E of the hydroAMP guide). In the event that the Tier 1 Condition Indicator Scores are not met, more detailed Tier 2 tests under the supervision of the Independent Certifier are required.
- (3) For each assessment, the inspections are required at the specified frequency, so a data quality indicator per the Hydro Plant Risk Assessment Guide (Guide) is not required.

(b) **System Interfaces**

- (1) The key systems that will be evaluated using the hydroAMP methodology are:
 - (i) Turbines
 - (ii) Generators
 - (iii) Governor System

- (iv) Excitation Systems
 - (v) Unit Transformers
 - (vi) Generator Circuit Breakers
 - (vii) Gates and Valves
 - (viii) Cranes
- (2) As the Guides do not define or provide detailed procedures for performing inspections, tests, or measurements, any specific procedures are identified in each Section under the Inspection/Test Requirements column. If no specific procedure is identified, Project Co shall use inspection and test procedures that are in accordance with industry accepted standards and Good Utility Practices.
- (3) The overall Generation System is expected to be able to meet its functional requirements. This requires that any critical safety systems (e.g. emergency closure valves such as Turbine Inlet Valves, Protection & Control schemes or equipment such as maintenance gates/stop logs that are required for worker safety) are maintained in good working order and retain certification with WorkSafeBC requirements in order to safely operate the system or allow the inspections and maintenance of the system.

1.2 Turbines

(a) **General**

- (1) The expectation is that a well designed and manufactured Turbine, will not exhibit vibration, pressure pulsations or resonance issues. The condition assessments are based on ensuring that the failure modes associated with these phenomena (e.g. cracked blades, cavitation) are limited or not active on these Turbines and the Turbines are operated and maintained to eliminate premature aging.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide - Appendix E6: Turbine Condition Assessment
- (2) IEC 60609-1 - Hydraulic turbines, storage pumps and pump-turbines - Cavitation pitting evaluation
- (3) 01.11.MTCE.01 - BC Hydro Maintenance Standard - Francis Turbines
- (4) Coated Structure Assessment - Powertech Example Report

(c) **Documentation**

- (1) The documentation as defined in section E6.8 of Appendix E6 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Indicator 2	Physical Condition - Cracks	2	No Cracking ^[1]	Visually inspect each blade and the adjacent crown and band. NDT of high stress areas.	Inspection report documenting condition of each blade as per 01.11.MTCE.01

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Indicator 2	Physical Condition - Cavitation and Surface Damage	2	Minimal cavitation damage, as per lower boundaries of Figures A-1 and A-2 of IEC 60609-1 ^[2]	Visual inspection of each blade.	Inspection report documenting condition of each blade as per 01.11.MTCE.01
Turbine Condition Indicator 3	Operations	1.5	No operating restraints	N/A	Summary table of hours of usage, time in rough load zone, number of start and stops
Turbine Condition Indicator 4	Maintenance	1.0	Small amounts of corrective maintenance (e.g., less than 3 staff days per Turbine per year)	N/A	Record of maintenance carried out, including quantity of consumables and spares used.

[1] Minimum repair requires that all cracks are repaired prior to return to service, unless a fitness for service assessment is performed by an expert materials engineer, hired by Project Co, who determines the maximum number of cycles that the Turbine is safe to undertake before critical crack length for failure is achieved.

[2] Cavitation repairs shall be carried out at the next available Outage once the threshold limit per IEC 60609-1 has been reached.

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Test T2.1	Efficiency	Add 0.5	Measured efficiency is $\geq 93\%$ or $< 2\%$ less than original efficiency	In accordance with Commissioning/baseline efficiency test procedure	As per Commissioning Test Report. Comparison to baseline test results with identification of degradation.
Turbine Condition Test T2.2	Capacity	Add 0.5	No degradation. Lost $< 2\%$ of original capacity.	In accordance with Commissioning/baseline capacity test procedure	As per Commissioning Test Report. Comparison to baseline test results with identification of degradation.
Turbine Condition Test T2.3	Off-Design	No Change	No significant changes in flow rate or head from original design condition.	N/A	N/A
Turbine Condition Test T2.4	Paint Film Quality	No Change	The paint film is mostly absent but the steel surfaces have not yet suffered serious corrosion or erosion damage	Section 1.1(b)(2) of Appendix 7E	Inspection report as per Powertech report example.
Turbine Condition Test T2.5	Surface Roughness of Runner and Discharge Ring	Add 0.5	Good	Section 1.1(b)(2) of Appendix 7E	Inspection report as per Powertech report example.

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Test T2.6	Cracking of Runner and Discharge Ring	Add 1.0	Minimal (i.e., none, or not active in non-critical areas and < 1” long)	NDT inspection	Inspection report documenting condition as per 01.11.MTCE.01
Turbine Condition Test T2.7	Cavitation of Runner and Discharge Ring Test	No Change	Minimal cavitation damage, as per lower boundaries of Figures A-1 and A-2 of IEC 60609- 1	NDT inspection.	Inspection report documenting condition as per 01.11.MTCE.01
Turbine Condition Test T2.8	Condition of Remaining Parts and Systems Test	No Change	All sub-systems normal and no major issues	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Turbine Condition Test T2.8	Gate mechanism (servo, shift ring, wicket gate locking mechanism, bushings)	No Change	Servo differential test to be performed as per servo differential maintenance instruction. Less than 10% degradation from baseline test performed during Commissioning.	Test performed in accordance with 01.11.MTCE.01	Documentation and records in accordance with 01.11.MTCE.01

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Test T2.8	Guide bearings	No Change	<p>Inspection indicates minor wear, acceptable for continued operation.</p> <p>Bearing clearances within design tolerances.</p> <p>Oil clean and at correct volume level.</p>	Inspection in accordance with 01.11.MTCE.01	Condition report including photos of new vs. current condition, bearing clearances measured vs. installed vs. design value.
Turbine Condition Test T2.8	Seals	No Change	Inspected with no signs of damage or wear.	Visual inspection	Inspection report including photographs.

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Turbine Condition Test T2.8	Environmental Conditions	No Change	<p>There are no perceived environmental issues and rehabilitation of the Turbine would have minimal positive effect on the environment.</p> <p>Little or no oil or grease is released into the environment and no dissolved oxygen (DO) improvements can be gained by a Turbine replacement.</p>	General inspection of Turbine	Report including findings of visual inspection and record of all environmental releases/spills from Turbine.

1.3 Generators

(a) *General*

The expectation is that a well designed, manufactured and maintained Generator will not have any issue with partial discharge (PD), hot spots, air gap, core bolt loosening or lamination movement and not experience degradation or deterioration of the

winding insulation with respect to its in-service life as compared to the factor acceptance tests (FAT) and Commissioning tests results.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide - Appendix E1: Generator Condition Assessment
- (2) MI 01.20.STN.01 - BC Hydro Generic Generator Inspection Maintenance Instruction
- (3) 01.20.MTCE.02 Generators and Synchronous Condensers – General
- (4) 01.20.MTCE.02 Generators and Synchronous Condensers – General Appendices C1; C2; C3; C4 & C5
- (5) 01.20.Owner.02 Requirements for Partial Discharge Monitoring
- (6) 01.20.SPEC.02 Generator Partial Discharge Monitoring System (PDMS)
- (7) 01.20.TEST.01.A Insulation Resistance and Polarizing Index (Stator Winding)
- (8) 01.20.TEST.01.B Insulation Resistance and Polarizing Index (Rotor Winding)
- (9) 01.20.TEST.02 DC High Pot Step Test
- (10) 01.20.TEST.03 Partial Discharge Test
- (11) 01.20.TEST.03.A Partial Discharge Test Appendix A (PDA)
- (12) 01.20.TEST.03.B Partial Discharge Test Appendix A (PDA)
- (13) 01.20.TEST.03.C Partial Discharge Test Appendix A (PDA)
- (14) 01.20.TEST.05 Pole Drop Test - Salient Pole Field Winding

- 9 -

- (15) 01.20.TEST.06 Embedded Winding RTD Test
- (16) 01.20.TEST.06.A Embedded Winding RTD Test Form
- (17) 01.20.TEST.07 ELCID Testing
- (18) 01.20.TEST.08 Stator Wedge Tightness Testing
- (19) Draft IEEE standard #1799

(c) ***Documentation***

- (1) The documentation as defined in section E1.8 of Appendix E1 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) ***Condition Assessments (4-year & 8-year)***

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Stator Condition Indicator 1	O&M History	3	Operation and maintenance (O&M) normal	N/A	Summary table of hours of usage, time in rough load zone, number of start and stops, time operated outside of voltage rating and all system disturbances.

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Stator Condition Indicator 2	Physical Inspection	3	Inspection results are normal	Per 01.20.MTCE.02.B 01.20.MTCE.03	Per 01.20.STN.01
Stator Condition Indicator 3	Insulation Resistance and Polarization Index	3	Results are normal and similar to previous test	Per 01.20.TEST.01	Per 01.20.TEST.01.A
Rotor Condition Indicator 1	O&M History	3	Operation and maintenance normal	N/A	Summary table of hours of usage, time in rough load zone, number of start and stops, time operated outside of voltage rating and all system disturbances.
Rotor Condition Indicator 2	Physical Inspection	3	Inspection results are normal.	Per 01.20.MTCE.02.B 01.20.MTCE.03	Per 01.20.STN.01
Rotor Condition Indicator 3	Insulation Resistance and Polarization Index	3	Results are normal and similar to previous test	Per 01.20.TEST.01	Per 01.20.TEST.01.B 01.20.TEST.01.C

Note - HiPot testing is required during Commissioning and after any repair work carried out on the Generator.

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Stator Condition Indicator 1	O&M History	3	Operation and maintenance normal	N/A	Summary table of hours of usage, time in rough load zone, number of start and stops, time operated outside of voltage rating and all system disturbances.
Stator Condition Indicator 2	Physical Inspection	3	Inspection results are normal	Per 01.20.MTCE.02.B 01.20.MTCE.03	Per 01.20.STN.01
Stator Condition Indicator 3	Insulation Resistance and Polarization Index	3	Results are normal and similar to previous test	Per 01.20.TEST.01	Per 01.20.TEST.01.A
Stator Condition Indicator 4	Winding Age	3	Less than 20 years	N/A	N/A
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Table 11 Test T2.S1	Ramped Voltage Test	Add 0.5	Smooth, linear curve	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

Table 12 Test T2.S2	Partial Discharge (PD) Measurements	Add 0.5	Low PD readings throughout the generator <i>Qm < 300 mV with 10 pps rate</i>	Per 01.20.TEST.03	Per 01.20.TEST.03.A
Table 14 Test T2.S4	Ozone Monitoring	Add 0.5	Ozone level < 0.05 ppm.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Table 15 Test T2.S5	Black Out Test	Add 0.5	Negligible corona	Per draft IEEE standard #1799	Section 1.1(b)(2) of Appendix 7E
Table 17 Test T2.S7	Stator Core Inspection	Add 0.5	Core and support condition appears very good.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Table 18 Test T2.S8	Wedge Tightness Evaluation	No Change	No indication of loose wedges	Per 01.20.TEST.08	Per 01.20.TEST.08.A
Table 19 Test T2.S9	Core Loop Test	Add 0.5	No visible hot spots	Per 01.20.TEST.09	Per 01.20.TEST.09.B
Table 20 Test T2.S10	ELCID Test	Add 0.5	No readings >100 mA	Per 01.20.TEST.07	Per 01.20.TEST.07.A
Test T2.S11	Core Bolt Insulation Resistance (IR)	Add 0.5	IR shall be > 1 MΩ	Per 01.20.TEST.01	Per 01.20.TEST.01.A

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Rotor Condition Indicator 1	O&M History	3	Operation and maintenance normal	N/A	Summary table of hours of usage, time in rough load zone, number of start and stops, time operated outside of voltage rating and all system disturbances.
Rotor Condition Indicator 2	Physical Inspection	3	Inspection results are normal	Per 01.20.MTCE.02.B 01.20.MTCE.03	Per 01.20.STN.01
Rotor Condition Indicator 3	Insulation Resistance and Polarization Index	3	Results are normal and similar to previous tests	Per 01.20.TEST.01	Per 1.20.TEST.01.B 01.20.TEST.01.C
Rotor Condition Indicator 4	Winding Age	3	Less than 20 years	N/A	N/A
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Table 23 Test T2.R3	Field Winding AC Impedance	Add 0.5	Difference between readings taken at rated speed and standstill is <5%.No abrupt changes	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

1.4 Governor Systems

(a) **General**

The expectation is that the governor systems will not degrade and should be capable of stabilising the Generation System, allowing for Black Start capability, remote start, auto-synchronizing, and shall have the accuracy and repeatability per Project Requirements in response to load changes and system disturbances. If a governor system is well maintained there should not be issues with the governor hunting or response speed. Response testing and mandatory testing required in accordance with the WECC should be coordinated for the governor and excitation systems.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide- Appendix E3: Governor Condition Assessment.
- (2) ASME PTC29-2005

(c) **Documentation**

- (1) The documentation as defined in section E3.8 of Appendix E3 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
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Governor System Condition Indicator 1	Age	2	Assuming this is a digital control system, per Table 1C	N/A	Bill of Material summary, with serial number of parts, date of manufacture and date when part entered service.
Governor System Condition Indicator 2	O & M History	3	Normal Planned and Corrective Maintenance	N/A	Summary of all Planned, Condition-based and Corrective Maintenance performed, including identification of parts replaced complete with number of cycles in service/late of replacement.
Governor System Condition Indicator 3	Availability of Spare Parts	2	For mechanical components threshold score = 2, For PLC threshold score =1	N/A	Current listing of spares on-hand
Governor System Condition Indicator 4	Performance	3	Off-line and on-line response and stability normal, governor free from hunting, accuracy of frequency within < 0.2 Hz, synchronization time within the norm, and able to remote start.	Testing in accordance with ASME PTC29-2005	Data file

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Governor System Condition Indicator 1	Age	2	Assuming this is a digital control system, per Table 1C	N/A	Bill of Material summary, with serial number of parts, date of manufacture and date when part entered service.
Governor System Condition Indicator 2	O & M History	3	Normal Planned and Corrective Maintenance	N/A	Summary of all Planned, Condition-based and Corrective Maintenance performed, including identification of parts replaced complete with number of cycles in service/late of replacement.
Governor System Condition Indicator 3	Availability of Spare Parts	2	For mechanical components threshold score = 2, For PLC threshold score =1	N/A	Current listing of spares on-hand
Governor System Condition Indicator 4	Performance	3	Off-line and on-line response and stability normal, governor free from hunting, accuracy of frequency within < 0.2 Hz, synchronization time within the	Testing in accordance with ASME PTC29-2005	Data file and plots of response in comparison to baseline test

			norm, and able to remote start.		
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Table 6 Test T2.1	Leakage Test	Subtract 1	Small increase (<25%) in the leakage rate	Testing in accordance with ASME PTC29-2005	Section 1.1(b)(2) of Appendix 7E
Table 7 Test T2.2	Step Response Test	No Change	No degradation (within accuracy of testing) permitted	Testing in accordance with ASME PTC29-2005	Section 1.1(b)(2) of Appendix 7E
Table 8 Test T2.3	Physical Inspection	No Change	All parts should still be in good condition.	Visual inspection	Inspection report including photographs of critical components.
Test T2.4	Speed dead band	N/A	Meets ASME PTC29-2005 requirements	Testing in accordance with ASME PTC29-2005	Section 1.1(b)(2) of Appendix 7E
Test T2.4	Position dead band	N/A	Meets ASME PTC29-2005 requirements	Testing in accordance with ASME PTC29-2005	Section 1.1(b)(2) of Appendix 7E

Test T2.4	Resolution	N/A	Meets ASME PTC29-2005 requirements	Testing in accordance with ASME PTC29-2005	Section 1.1(b)(2) of Appendix 7E
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1.5 Excitation Systems

(a) **General**

The expectation is that a well designed, manufactured and maintained excitation system will have high availability and reliability performance. Excitation systems should provide steady state and transient control response similar to the as commissioned performance. All controls, protections and limiters should be operating to the original design performance specifications. There should be no component thermal degradation and the excitation transformers should not show any signs of premature thermal aging. Transformer operating temperatures should not have exceeded design limits.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide - Appendix E4: Excitation System Condition Assessment
- (2) BC Hydro WECC Testing - Field Work Guide
- (3) E964 - Sample WECC Report- WECC Tests for rotating machines.

(c) **Documentation**

The documentation as defined in section E4.8 of Appendix E4 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Excitation System Condition Indicator 2	O & M History	3	Operation & Maintenance are normal	N/A	Summary of all Planned, Condition-based and Corrective Maintenance performed, including identification of parts replaced complete with number of cycles in service/late of replacement.
Excitation System Condition Indicator 3	Availability of Spare Parts	1	Some spare parts are not readily available or In production but can be obtained on a limited basis or reproduced	N/A	Current listing of spares on-hand
Excitation System Condition Indicator 4	Power Circuitry Tests	3	Elements are normal	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Excitation System Condition Indicator 5	Control Circuitry Tests	3	Circuitry is functioning normally, stability requirements met	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.2	Additional test- Model validation	N/A	Meets Mandatory WECC requirements.	In accordance with BC Hydro WECC testing- Field work guide	In accordance with sample BC Hydro WECC report

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Excitation System Condition Indicator 1	Age	3	10 to 20 years old	N/A	N/A
Excitation System Condition Indicator 2	O & M History	3	Operation & Maintenance are normal	N/A	Summary of all Planned, Condition-based and Corrective Maintenance performed, including identification of parts replaced complete with number of cycles in service/late of replacement.
Excitation System Condition Indicator 3	Availability of Spare Parts	1	Some spare parts are not readily available or In production but can be obtained on a limited basis or reproduced.	N/A	Current listing of spares on-hand

Excitation System Condition Indicator 4	Power Circuitry Tests	3	Elements are normal	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Excitation System Condition Indicator 5	Control Circuitry Tests	3	Circuitry is functioning normally, stability requirements met	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Table 7 Test T2.1	Detailed Control Circuitry Test	No Change	Excitation system is fully operational with no significant functional abnormalities. Some readjustment may be necessary	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.2	Additional test - Model validation	N/A	Meets mandatory WECC requirements.	In accordance with BC Hydro WECC testing-Field work guide	In accordance with sample BC Hydro WECC report

1.6 Unit Transformers

(a) **General**

The expectation is that a well designed, manufactured and maintained Unit Transformer will not exhibit any oil leaks or hot spots, partial discharge, not be operated above its nameplate, and that its components (all) will exhibit normal condition with respect to the units in-service time as compared to the factory acceptance tests and Commissioning tests result.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide- Appendix E5: Transformer Condition Assessment

(c) **Documentation**

- (1) The documentation as defined in section E5.8 of Appendix E5 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

HydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
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Transformer Condition Indicator 1	Oil Analysis	3	<p>Condition 1 or better of dissolved gas analysis (DGA) determined by IEEE C57.104-2008.</p> <p>Condition 1 or better of oil quality (OQ) determined by BCH MS 02.17.Test.02, CSA C50-08 for oil quality indicators not specified in the BCH standard.</p> <p>2-Furaldehyde ≤ 0.01ppm, Furyl Alcohol ≤ 0.01ppm, Phenols ≤ 0.5ppm of Furanic Compounds Analysis.</p>	<p>In accordance with: IEEE C57.104-2008 BCH MS02.17.Test.02 CSA C50-08</p>	Section 1.1(b)(2) of Appendix 7E
Transformer Condition Indicator 2	Power Factor and Excitation Current Tests	3	Rated "Good" as per BCH MS 12.39.Test.01.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

Transformer Condition Indicator 3	Operation and Maintenance History	3	Operation and Maintenance are normal.	N/A	Report including load and temperature profiles, forced Outages and fault recording data, trending of dissolved gases in oil. Maintenance records or reports including major repairs or interventions.
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.1	Turns Ratio Tests	No Change	$\pm \leq 0.5\%$ difference from nameplate turns ratios for all tap positions	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.3	Core & Clamp Insulation Resistance (Megger) Tests	No Change	$\geq 1,000\text{M}\Omega$ (Results normal)	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.10	Other Specialized Diagnostic Tests Tank, cooling system, and oil preservation	N/A	No oil leak. CITI =100 as per BCH MS. 02.00.SYS.01 No hot spots from thermograph tests.	In accordance with BCH MS 02.00.SYS.01	Section 1.1(b)(2) of Appendix 7E

Test T2.10	Other Specialized Diagnostic Tests Bushings Inspection	N/A	<p>$Cl_{Ti} = 100$ as per BCH MS 02.00.SYS.01 for bushing inspection.</p> <p>Rated "Good" of Double Tests, BCH MS 12.39.Test.01.</p> <p>No indication of faulty conditions of oil DGA if applicable.</p> <p>No hot spots from thermograph tests.</p>	In accordance with BCH MS 02.00.SYS.01 and 12.39.Test.01	Section 1.1(b)(2) of Appendix 7E
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(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Transformer Condition Indicator 1	Oil Analysis	3	<p>Condition 1 or better of dissolved gas analysis (DGA) determined by IEEE C57.104-2008.</p> <p>Condition 1 or better of oil quality (OQ) determined by BCH MS 02.17.Test.02, CSA C50-08 for oil quality indicators not specified in the BCH standard.</p> <p>2-Furaldehyde ≤ 0.01ppm, Furyl Alcohol ≤ 0.01ppm, Phenols ≤ 0.5ppm of Furanic Compounds Analysis.</p>	<p>In accordance with:</p> <p>IEEE C57.104-2008</p> <p>BCH MS02.17.Test.02</p> <p>CSA C50-08</p>	Section 1.1(b)(2) of Appendix 7E
Transformer Condition Indicator 2	Power Factor and Excitation Current Tests	3	Rated "Good"	In accordance with BCH MS 12.39.Test.01.	Section 1.1(b)(2) of Appendix 7E

Transformer Condition Indicator 3	Operation and Maintenance History	3	Operation and Maintenance are normal.	N/A	Report including load & temperature profiles, forced Outages and fault recording data, trending of dissolved gases in oil. Maintenance records or reports including major repairs or interventions.
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.1	Turns Ratio Tests	No Change	$\pm \leq 0.5\%$ difference from nameplate turns ratios for all tap positions	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.2	Short Circuit Impedance Test	No Change	$\pm 1\%$ difference from nameplate impedance.	In accordance with BCH MS 02.00.SYS.01	Section 1.1(b)(2) of Appendix 7E
Test T2.3	Core & Clamp Insulation Resistance (Megger) Tests	No Change	$\geq 1,000\text{M}\Omega$ (Results normal)	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.4	Winding DC Resistance Measurement	No Change	$< 5\%$ difference between phases or from factory test.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.5	Partial discharge tests using acoustic or	No Change	Results normal.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

	electrical sensor technologies				
Test T2.6	Vibration Analysis	No Change	Results normal.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.7	Sweep Frequency Response Analysis (SFRA)	No Change	No deviation compared to FAT and prior tests	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.8	Internal Inspection	No Change	Conditions normal as per BCH MS 02.00.SYS.01 and 02.00.Test.04	In accordance with BCH MS 02.00.SYS.01 and 02.00.Test.04	Section 1.1(b)(2) of Appendix 7E
Test T2.10	Other Specialized Diagnostic Tests Tank, cooling system, and oil preservation	N/A	CI _{TI} =100 as per BCH MS 02.00.SYS.01. No hot spots from thermograph tests.	In accordance with BCH MS 02.00.SYS.01	Section 1.1(b)(2) of Appendix 7E
Test T2.10	Other Specialized Diagnostic Tests Bushing Inspection	N/A	CI _{TI} =100 as per BCH MS 02.00.SYS.01 for bushing inspection. Rated "Good" of Doble Tests, BCH MS 12.39.Test.01.	In accordance with BCH MS 02.00.SYS.01 and 12.39.Test.01	Section 1.1(b)(2) of Appendix 7E

			No indication of faulty conditions of oil DGA if applicable. No hot spots from thermograph tests.		
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1.7 Generator Circuit Breakers

(a) **General**

The expectation is that the Generator circuit breakers (CB) will be capable of meeting the specified manufacturer timing tests throughout their life.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide- Appendix E2: Circuit Breaker Condition Assessment.

(c) **Documentation**

The documentation as defined in section E2.8 of Appendix E2 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/ Test Requirements	Documentation Requirements
Circuit Breaker Condition Indicator 1	Dielectric Condition of Breaker	3	Test results are normal (Good-G)	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Circuit Breaker Condition Indicator 2	O & M History	3	Operation and Maintenance are normal	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Circuit Breaker Condition Indicator 3	Contact Resistance	3	< 25 % increase since last test AND below manufacturer recommended maximum resistance	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Circuit Breaker Condition Indicator 4	Number of Operations	3	Number of operations not to exceed manufacturers' specification	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Circuit Breaker Condition Indicator 1	Dielectric Condition of Breaker	3	Test results are normal (Good-G)	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

Circuit Breaker Condition Indicator 2	O & M History	3	Operation and Maintenance are normal	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Circuit Breaker Condition Indicator 3	Contact Resistance	3	< 25 % increase since last test AND below manufacturer recommended maximum resistance	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Circuit Breaker Condition Indicator 4	Number of Operations	3	Number of operations not to exceed manufacturers' specification	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Table 15 Test T2.1	Interrupter Inspection	No Change	Interrupter component wear and condition are normal	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Table 16 Test T2.2	Current Interrupting Rating vs. Short Circuit Current Analysis	No Change	Ratio of CB interrupting rating to available system fault current ≥ 1.1	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.3	Other Specialized Diagnostic Tests Timing test	N/A	No degradation in timing from FAT/Commissioning Baseline Test.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

1.8 Gates and Valves

(a) *General*

The requirements of this Section pertain to the valves and gates specified in Part 5 [*Other Major Equipment and Systems*] of Schedule 6 [*Design and Construction Specifications*]. The expectation is that the gates and valves will be designed and maintained so that there will be no degradation of functional and structural capabilities from the original design.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide- Appendix E11: Emergency Closure Gate and Valve Condition Assessment.

(c) **Documentation**

The documentation as defined in section E11.8 of Appendix E11 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Ref	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/ Test Requirements	Documentation Requirements
Condition Indicator 2	Physical Condition - Gates or Valves	3	<u>Gates</u> Limited corrosion on gates, wheels, or rollers; wheels/rollers turn; coating is in good condition; anodes are in good condition; no cracked welds in structure or loose bolts/rivets; gate guides are in good condition; sill is in good condition; leakage past seals is minimal (< 25 gpm or < 1.6 liters/s). <u>Valves</u> Limited corrosion on leaf/plug and water passage; coating is in good condition; seals and seats are in good condition and properly adjusted with no or minimal leakage, bearing/pivot point lubrication is in good	Visual inspection	Inspection report

hydroAMP Ref	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/ Test Requirements	Documentation Requirements
			condition; the bypass is in good condition; valve is regularly exercised.		
Condition Indicator 3	Physical Condition – Operators	3	<p><u>Hydraulic Hoists</u> Seals, stems, cylinders, hydraulic piping/valves/controls, and gate position indicators are updated or in good condition with replacement parts available; coating is in good condition; hydraulic oil is in good condition; hydraulic system has been tested and exercised regularly; no gate drift while suspended from the cylinder. No external oil leaks.</p> <p><u>Electric Hoists</u> Hoist surfaces and coatings are free of corrosion; no structural damage or cracks; couplings are tight and properly aligned; moving parts are lubricated; gearbox oil is free from contaminants and moisture and tested regularly; no groove wear on drums or sheaves; bearings are checked for wear and lubrication; oil seals do not leak; gears are properly aligned and have no wear; the hoist ropes are inspected for broken strands, hoist chain is free of cracked, deformed, or severely</p>	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

hydroAMP Ref	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/ Test Requirements	Documentation Requirements
			corroded links; the rope/chain is laying properly on the drum; limit switches are properly set and functioning properly; hoist brakes have no wear and operate properly; no unusual noises or binding of the mechanism during operation; electrical components are clean and function; the hoist system has been tested and exercised regularly.		
Condition Indicator 4	Operations History	3	Meets original operational criteria, tested as required, no known design and operational deficiencies.	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Condition Indicator 5	Maintenance History	1	Normal levels of maintenance including some Corrective Maintenance.	Section 1.1(b)(2) of Appendix 7E	Maintenance records or reports including major repairs or interventions

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Condition Indicator 2, Table 2	Physical Condition - Gates	3	Limited corrosion on gates, wheels, or rollers; wheels/rollers turn; coating is in good condition; anodes are in good condition; no cracked welds in structure or loose bolts/rivets; gate guides are in good condition; sill is in good condition; leakage past seals is minimal (< 25 gpm or < 1.6 liters/s).	Visual inspection and NDT of welds/critical features	Inspection report
Condition Indicator 2, Table 3	Physical Condition - Valves	3	Limited corrosion on leaf/plug and water passage; coating is in good condition; seals and seats are in good condition and properly adjusted with no or minimal leakage; bearing/pivot point lubrication is in good condition; the bypass is in good condition; valve is capable of meeting full functional requirements.	Visual inspection and NDT of welds/critical features	Inspection report
Condition Indicator 2, Table 4	Physical Condition – Operators (Hydraulic Hoist)	2	Seals, stems, cylinders, hydraulic piping/valves/controls, and gate position indicators are in good condition; protective coating is in adequate condition; hydraulic oil condition is adequate; hydraulic system has been tested and exercised regularly; no gate drift while suspended from the cylinder.	Function test and visual inspection	Inspection report

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Condition Indicator 3, Table 5	Physical Condition – Operators (Electric Hoist)	2	Hoist surfaces and coatings have minor defects or corrosion; no structural damage or cracks; couplings are tight and properly aligned; moving parts are lubricated; gearbox oil is not tested regularly or minor contaminates noted; no groove wear on drums or sheaves; oil seals do not leak; gears are properly aligned and have no wear; hoist ropes have no broken strands or evidence of corrosion; hoist chain has some corrosion but no cracks or deformed links; the rope/chain is laying properly on the drum; limit switches are properly set and functioning properly; hoist brake pads have $\geq 50\%$ of the lining left and operate properly; no unusual noises or binding of the mechanism during operation; the electrical components are not very clean; the hoist system has been tested and meets functional requirements.	Function test and visual inspection	Inspection report
Condition Indicator 3, Table 6	Intake Valve Operator (Hydraulic or Electric) Physical Condition	3	Seals, stems, cylinders, hydraulic system, gate position indicators, and controls are in good condition with replacement parts available; backup power is available and tested; slow-down mode has been tested and verified; pressure differential indicators up/downstream are operational and tested; operational testing performed and system capable of meeting functional requirements	Function test and visual inspection	Inspection report

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Condition Indicator 4, Table 7	Operations History	2	Meets original operational criteria, tested as required, no known design and operational deficiencies.	N/A	Section 1.1(b)(2) of Appendix 7E
Condition Indicator 5, Table 8	Maintenance History	1	Normal levels of maintenance including some Corrective Maintenance	N/A	Maintenance records or reports including major repairs or interventions

1.9 Cranes

(a) **General**

The expectation is that the cranes will be designed, manufactured and maintained to meet the functional requirements with no loss of rated capacity or performance.

(b) **References**

- (1) Hydro Plant Risk Assessment Guide- Appendix E9: Crane Condition Assessment

(c) **Documentation**

The documentation as defined in section E9.8 of Appendix E9 of the Guide shall be the minimum requirements for documentation. Additional documentation requirements are identified in the Documentation Requirements column of the following Condition Assessments and Handback Assessment Tables.

(d) **Condition Assessments (4-year & 8-year)**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection/ Test Requirements	Documentation Requirements
Condition Indicator 1, Table 1	Crane Physical Condition	3	Excellent Condition	Visual Inspection	Section 1.1(b)(2) of Appendix 7E
Condition Indicator 2, Table 2	Design Criteria	3	<p>Heaviest lift < 100% of rated capacity.</p> <p>Crane usage is appropriate for its duty classification.</p> <p>Crane configuration is adequate for handling intended loads.</p> <p>Crane has no regulation and code violations.</p>	Load test	Load test record. Record of usage and details of any modifications or de-ratings.
Condition Indicator 3, Table 3	Maintenance Requirements	3	Small	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

(e) **12-year Condition Assessment**

hydroAMP Reference	Condition Indicator	Condition Indicator Score	Acceptance Criteria	Inspection Test Requirements	Documentation Requirements
Condition Indicator 1, Table 1	Crane Physical Condition	2	Good condition	Visual Inspection	Section 1.1(b)(2) of Appendix 7E
Condition Indicator 2, Table 2	Design Criteria	2	<p>Heaviest lift < 100% of rated capacity.</p> <p>Crane usage is slightly higher than appropriate for its duty Classification.</p> <p>Crane configuration is adequate for handling intended loads.</p> <p>Crane has no regulation and code violations; however, may not have features required in new regulations and codes that are not required for older cranes.</p>	Load test	Load test record. Record of usage and details of any modifications or de-ratings.
Condition Indicator 3, Table 3	Maintenance Requirements	2	Moderate	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.1	Structural Integrity	Add 1	Good for corrosion, yielding & field modification	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
hydroAMP Reference	Condition Indicator	Adjustment to Condition Index	Acceptance Criteria	Inspection/Test Requirements	Documentation Requirements
Test T2.2	Mechanical Integrity	No Change	All in Good condition	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.3	Electrical Integrity	Add 0.5	All in Good condition	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E
Test T2.4	Operation	No Change	Acceptable	Section 1.1(b)(2) of Appendix 7E	Section 1.1(b)(2) of Appendix 7E

2. NON-HYDROAMP EVALUATIONS

Project Co shall perform the Services in such a manner that on the Expiry Date, the Remaining Useful Life of the following components of the Facility will be at least:

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
Debris Boom					Minimum Remaining Useful Life - 15 Years
	Boom Sticks		Visual from boat	Loss of section, wear, holes worn/oversize	Only localized wear has occurred and no repairs are needed.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Boom Sticks		Visual from boat	Log too low in water	No noticeable loss of floatation
	Cable		Visual from boat/on shore	Corrosion, loss of section, fraying	No significant loss of strength - occasional isolated strand breakage
	Connections		Visual from boat	Crosby clips, splices, links etc	All clips, splices and links are in good condition
	Anchors		Visual from boat	Damage to hardware, loss of cover, loss of restraint/weight, corrosion damage	Hardware is in good condition with no loss of load carrying capacity.
	Signage		Visual from boat	Unreadable, missing, damaged	All signs are in good condition and fully serviceable.
Low Level Outlet					Minimum Remaining Useful Life - 35 Years
	Trashrack	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel
	Gate slots	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel
	Concrete	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Steel Liner	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel	Similar to Power Intake & Power Tunnel
Power Intake					Minimum Remaining Useful Life - 85 Years except as indicated herein
	Trashrack	Rack - vertical bars	Diver/ROV inspection	Details of damage, head loss history (energy or overload)	Occasional minor damage to isolated bars is acceptable but other damage, all cracking or missing bars are to be repaired. If evidence of ongoing issues exists, the issue is to be resolved prior to Handback
	Trashrack	Rack - lateral bars	Diver/ROV inspection		As above
	Trashrack	Concrete supporting structure	Diver inspection		Free of cracking, sound and solid surfaces.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Trashrack	Embedded parts	Diver inspection	Inspect concrete surrounding trashrack	Concrete should be free of any signs of distress - no cracking, spalling or other failures or indications.
	Trashrack	Bolts/anchors	ROV inspection		No loss of strength can be accepted
	Trashrack	Protective coating	Diver inspection		To ensure a 30 year life of protective coating there is to be effectively no significant ongoing corrosion.(< 0.001% of surface corroding)
	Gate Slots	Embedded parts	Level check of concrete around embedded parts.	Measurement of pit depth and area. Photographs of key elements. Video survey data.	Steel parts should be properly aligned for smooth operation of INOG and INMG and good seal. Max seal leakage is < 0.12L/s/m length of gate seal.
	Gate Slots	Concrete	Diver/ROV inspection	Sketch, showing location of defects. Text on observations	
	Adjacent Ground Conditions		Survey points.	Survey data points	Comparison of new to old points. No movement allowed.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Foundation	Rock			
		Concrete	Diver/ROV inspection	Sketch, showing location of defects. Text on observations	
	Between Power Intake and Power Intake shaft	Slope stability and rock fall.	Visual inspection and photographs of slopes and pipe. Survey of problem areas.	Locations and photographs of problem areas	Engineering report including evaluation of reason(s) for slope instability or rock falls. Report must conclude that slope has been stabilized and/or pipe has been repaired and the area will be stable for the Design Service Life of the Facility.
Power Tunnel					Minimum Remaining Useful Life - 85 Years
	Tunnel and shaft steel liners	Steel	Visual inspection. NDT if coating damage or cracks found.	Mark up of drawing, with note of any abnormalities found	Damage is repaired or damaged sections of steel lining are removed and replaced. Corrosion protection is completely re-instated.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Tunnel and shaft steel liners	Steel liner	Visual inspection. Hammer test or dragging chains. Detailed survey of collapse area.	Mark up of drawing, with note of any abnormalities found	Collapsed, buckled or damaged sections of steel lining are repaired, removed and replaced as to meet Design Requirements. Additional drainage and pressure monitoring installed to prevent re-occurrence. If buckling is minor and damage is minor, calculations are required to verify that existing liner is adequate.
	Tunnel and shaft steel liners	Protective coating	Visual inspection	Inspection report	To ensure a 30 year life of protective coating there is to be effectively no significant ongoing corrosion.($< 0.001\%$ of surface corroding)
	Tunnel and shaft steel liners	Drains	Monitor for decrease of seepage flows from drains. Visual inspection of build-up of precipitate material at outlet of drains. Rod or	Flows from drains, build-up of precipitate and/or sediment/silt.	Drains not blocked, and have been cleaned out or re-drilled. Seepage flow is clear and flow is constant or consistent with expected flow for

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
			borehole camera inspection of drain holes.		precipitation.
	Tunnel and shaft concrete-lined sections	Concrete	Visual inspection - check for cracking, spalling, leakage, rebar exposed, rebar staining. Paint or ink mark the end of cracks with corresponding date, to evaluate whether cracking is increasing. Photograph cracked area.	Mark up of drawing, with note of any abnormalities found/inspection report. Mark up concrete surface at end of cracks with corresponding dates. Record crack width if necessary. Photographs of cracking.	Engineering report including evaluation of reason(s) for cracking and effect of cracking on function of structure. Report must conclude that problem has been solved, the structure has been repaired and structure will not crack further.
	Tunnel and shaft concrete-lined sections	Concrete	Visual inspection, sounding with hammer and core drilling if necessary to evaluate whether seepage may indicate poor concrete or unusual movement. Install crack width monitors or gauges if necessary. Measure seepage flows as	Location of leakage, estimated leakage rate, pressure as observed through jet of water/distance jet sprays. Photographs of condition concrete and seepage flows.	Engineering Report including evaluation of reason(s) for increased seepage flows and concrete cracking. Report must conclude that problem has been solved, the structure has been repaired, the necessary grouting and drainage have been

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
			necessary.		completed and the problem corrected.
	Unlined sections of shafts and tunnel	Rock trap(s)	Visual inspection or ROV survey	Quantity, size, type and locations of debris In rock trap(s)	At 12-year inspection, rock trap(s) to be cleaned out to Design capacity. Engineering report must conclude that rock trap(s) will not fill again in the Design Service Life of the Facility.
	Unlined sections of shafts and tunnel	Rock bolts	Visual inspection or ROV survey. At physical inspections, test a representative number of rock bolts heads. If corrosion, loss of section, loss of pull out strength are noted, then appropriate sampling and laboratory testing are required.	Location and nature of rock falls. Nature and location of rock bolt.	Engineering report including evaluation of reason(s) for rock falls and/or rock bolt deterioration problems. Report must conclude that adequate additional or replacement rock bolts have been installed, and the tunnel has been stabilized so that there

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					will be no further rock falls and the rock bolts are suitable for the Design Service Life of the Facility.
	Unlined sections of shafts and tunnel	Shotcrete	Visual inspection or ROV survey. At physical inspections, test a representative area of shotcrete by sounding with a hammer or coring, if necessary. If shotcrete spalling, disbonding or degradation is seen, then appropriate sampling and laboratory testing are required.	Location and nature of rock falls and shotcrete falls. Survey and photographs of areas of shotcrete fall out and degradation.	Engineering report including evaluation of reason(s) for shotcrete falls and/or shotcrete degradation. Report must identify reason for shotcrete degradation; and conclude that adequate supplemental shotcrete or rock bolts have been applied; the tunnel has been stabilized so that there will be no further rock falls; and the shotcrete is adequate for the Design Service Life of the Facility.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Unlined sections of shafts and tunnel	Rock surfaces	Project Co shall perform laser scan surveys of the tunnel and shafts. The laser scan survey shall be to an accuracy of 5 millimetres or less. The surveys shall be performed at 10 m maximum spacing along the tunnels and shafts, and shall have 100 mm maximum point spacing around each section.	Output from the laser scan survey shall include, at a minimum, contour and profile plots (excavation profile, shotcrete profile), orthophotos and face images for documentation of the tunnel profile and geology. Output shall also support further data processing to allow a geotechnical engineer to identify, measure and model rock structures such as discontinuities, joints, fractures, faults and other structural features.	Engineering report including evaluation of reason(s) for rock falls. Report must identify reason for rock falls; and conclude that adequate supplemental shotcrete and rock bolts have been applied; the tunnel has been stabilized so that there will be no further rock falls; and the shotcrete is adequate for the Design Service Life of the Facility.
	Unlined section of tunnel	Invert slab	Visual or ROV inspection - check for cracking, spalling, rebar exposed, rebar staining. Paint or ink mark the end of cracks with corresponding date, to evaluate whether cracking is increasing. Photograph cracked	Mark up of drawing, with note of any abnormalities found/inspection report. Mark up concrete surface at end of and cracks or limits of area of damage with corresponding dates. Record crack width if necessary. Photographs of cracking.	Engineering report including evaluation of reason(s) for damage and effect that damage will have on function of invert slab. Report must conclude that problem has been solved, the invert slab has been repaired and slab will not

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
			area.		crack further.
	Tunnel Portal	Slope stability	Visual inspection and photographs of slopes and pipe. Review of instrumentation. Survey of problem areas	Locations and photographs of problem areas. Instrumentation and survey readings - comparison with measurements at Total Completion.	Engineering report including evaluation of reason(s) for slope instability or rock falls. Report must conclude that slope has been stabilized and/or Penstock has been repaired and the portal will be stable for the Design Service Life of the Facility.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Tunnel Plug - if applicable	Condition of concrete and instrumentation	Visual inspection of concrete plug. Measure leakage through and around plug. Measure piezometric pressures in vicinity of plug. Compare with Commissioning Report and conditions at First Filling.	Location and width of cracking. Leakage flow rates. Piezometric pressures. Photographs of problem areas.	Engineering report including evaluation of reason(s) for concrete cracking and/or deterioration, and the reasons for change in plug leakage and groundwater pressures. Report must conclude that problems have been solved and tunnel plug will not deteriorate further during the Design Service Life of the Facility.
	Penstock tunnel (section of tunnel downstream of tunnel plug - if steel not fully encased in concrete) - if applicable.	Rock/shotcrete surfaces	Visual inspection of tunnel downstream of plug. Check for cracking of shotcrete, corrosion of rock bolts, loosening of rock surrounding tunnel and other potential instability issues of the tunnel. Mark areas of distress with paint or ink and photograph problem	Location and nature of distressed areas. Survey and photograph problems, cracks in shotcrete, rock displacement, rock bolt corrosion, etc.	Engineering report including evaluation of reason(s) for distress, instability or degradation in penstock tunnel. Report must conclude that adequate stabilization measures have been made and the tunnel will remain stable for the Design Service Life of the Facility.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
			areas.		
	Penstock tunnel (section of tunnel downstream of tunnel plug - if steel not fully encased in concrete) - if applicable.	Free-standing penstock pipe in tunnel	Visual inspection	Photo record with note of any abnormalities found/inspection report.	
	Penstock tunnel (section of tunnel downstream of tunnel plug - if steel not fully encased in concrete) - if applicable.	Drains in shotcrete	Monitor for decrease of seepage flows from drains. Visual inspection of build-up of precipitate material at outlet of drains. Rod or borehole camera inspection of drain holes.	Flows from drains, build-up of precipitate and/or sediment/silt.	Drains not blocked, and have been cleaned out or re-drilled. Seepage flow is clear and flow is constant or consistent with expected flow for precipitation.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
Tunnel Portal					Minimum Remaining Useful Life - 85 Years
	Portal Slopes	Slope instability	Visual inspection and photographs of slopes and pipe. Review of instrumentation. Survey of problem areas.	Locations and photographs of problem areas. Instrumentation and survey readings - comparison with measurements at Total Completion.	Engineering report including evaluation of reason(s) for slope instability or rock falls. Report must conclude that slope has been stabilized and/or penstock has been repaired and the portal will be stable for the Design Service Life of the Facility.
Penstocks					Minimum Remaining Useful Life - 85 Years
	Above Grade Steel	Cans - interior	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					Facility.
	Above Grade Steel	Supports - steel	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Above Grade Steel	Supports - concrete	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Above Grade Steel	Couplings	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Buried section near Powerhouse	Cans - interior	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					conclude the Penstocks will meet the Design Service Life of the Facility
	Buried section near Powerhouse	Cans- Exterior	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Coupling and Penstock drain system	Exterior surfaces	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Coupling and Penstock drain system	Exterior surfaces	Function test and observations when Penstock in service.	Test report. Leakage rate. Observed deficiencies.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Coupling and Penstock drain	Exterior surfaces	Measurement of leakage rate	Leakage rate	Engineering report including evaluation of

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	system				penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Spiral case	Interior surfaces	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Spiral case	Exterior surfaces	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of penstock and must conclude the Penstocks will meet the Design Service Life of the Facility
	Spiral case	Drains	Boroscope or camera "on a stick". pH check.	Condition of drains and amount of leakage.	Drains not blocked. Leakage is clear.
Surge Towers/Tanks					Minimum Remaining Useful Life - 85 Years if new; 35 Years if existing re-used

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Surge Tanks and/or Refurbished Existing Surge Towers	Interior steel	Visual inspection	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service Life of the Facility
	Surge Tanks and/or Refurbished Existing Surge Towers	Exterior Steel	Visual inspection NDT if cracks found.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service Life of the Facility
	Surge Tanks and/or Refurbished Existing Surge Towers	Members	Visual observation and measurement of deflection/deformation. NDT if cracks found.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service Life of the Facility
	Surge Tanks and/or Refurbished Existing Surge Towers	Connections	Visual inspection/NDT.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					Life of the Facility
	Surge Tanks and/or Refurbished Existing Surge Towers	Concrete works	Visual inspection - check for cracking, spalling, leakage, rebar exposed, rebar staining.	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service Life of the Facility
	Surge Tanks and/or Refurbished Existing Surge Towers	Rock	Visual inspection by geotechnical engineer.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Surge Towers/Tanks and must conclude the Surge Towers/Tanks will meet the Design Service Life of the Facility
Bypass System					Minimum Remaining Useful Life - 85 Years
	Concrete works	Concrete	Visual inspection - check for cracking, spalling, leakage, rebar exposed, rebar staining.	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Bypass System and must conclude the Bypass System will meet

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					the Design Service Life of the Facility
	Energy dissipation	Steel	Visual inspection. NDT if coating damage or cracks found.	Mark up of drawing, with note of any abnormalities found	Engineering report including evaluation of the Bypass System and must conclude the Bypass System will meet the Design Service Life of the Facility
	Energy dissipation	Steel coating	Visual inspection	Steel and protective coating thickness. Depth of any corrosion.	Engineering report including evaluation of the Bypass System and must conclude the Bypass System will meet the Design Service Life of the Facility
	Energy dissipation	PRV	Function test and observations when Penstock in service.	Test report. Leakage rate. Observed deficiencies.	Engineering report including evaluation of the Bypass System and must conclude the Bypass System will meet the Design Service Life of the Facility
	Steel conduits	Steel	Visual inspection	Photo record with note of any abnormalities found/Inspection report.	Engineering report including evaluation of the Bypass System and

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					must conclude the Bypass System will meet the Design Service Life of the Facility
Powerhouse and Bypass System Facility					Minimum Remaining Useful Life - 85 Years except as noted below
	Concrete substructure	Significant cracking, spalling, erosion, abrasion. Inadequate finish or poor initial placement.	Visual inspection. Measurements of cracks. NDT as required.	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility
	Concrete substructure	Drainage and water ingress	Visual inspection. Measurements of cracks. NDT as required. All drains flow freely	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Steel superstructure		Visual inspection. Measurements of cracks. NDT as required.	Mark up of drawing, with note of any abnormalities found	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility
	Interior building walls	Block work, acoustic tiles, non-loadbearing walls	Noise readings. Visual inspection	Photo record with note of any abnormalities found/Inspection report.	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility
	Cladding and roof		Visual inspection.	Photo record with note of any abnormalities found/Inspection report.	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility – 15 years

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Retaining walls at Penstock entry		Visual inspection. Measurements of cracks. NDT as required.	Photo record with note of any abnormalities found/Inspection report.	Engineering report including evaluation of the Powerhouse and Bypass System Facility and must conclude the Powerhouse and Bypass System Facility will meet the Design Service Life of the Facility
Draft tubes					Minimum Remaining Useful Life - 85 Years
	Draft tube	Concrete	Visual inspection - check for cracking, spalling, leakage, rebar exposed, rebar staining, erosion.	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Draft tubes and must conclude the Draft tubes will meet the Design Service Life of the Facility
	Draft tube	Embedded metal nosings, miscellaneous metal	Visual inspection	Mark up of drawing, with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Draft tubes and must conclude the Draft tubes will meet the Design Service Life of the Facility

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Draft tube	Drains	Function check	Record of time to dewater draft tube	Engineering report including evaluation of the Draft tubes and must conclude the Draft tubes will meet the Design Service Life of the Facility
	Draft tube	Gate slots	Level check of concrete around embedded parts.	Measurement of pit depth and area. Photographs of key elements. Video survey data.	Engineering report including evaluation of the Draft tubes and must conclude the Draft tubes will meet the Design Service Life of the Facility
Tailrace					Minimum Remaining Useful Life - 85 Years
	Retaining walls	Concrete	Visual inspection. Measurements of cracks. NDT as required.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Tailrace and must conclude the Tailrace will meet the Design Service Life of the Facility
	Rip-rap slopes and channels		Visual inspection. Survey if cracks or movement noticed.	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Tailrace and must

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
					conclude the Tailrace will meet the Design Service Life of the Facility
	Hydraulic structures/weirs	Structure	Diver/ROV/Sonar inspection. Visual if possible	Photo record with note of any abnormalities found/inspection report.	Engineering report including evaluation of the Tailrace and must conclude the Tailrace will meet the Design Service Life of the Facility
	Rock Trap		Diver/ROV/Sonar inspection. Visual if possible	Photo record with note of any abnormalities found/inspection report.	Clear rock trap of debris and return to design capacity
Instrumentation					Minimum Remaining Useful Life - 15 Years
	Geotechnical instrumentation	Monitoring wells	Carry out response tests	Response time	Engineering report including evaluation of the Geotechnical instrumentation and must conclude the Geotechnical instrumentation will meet the Design Service Life of the Facility Non-responsive wells to be rehabilitated.

System	Sub-System	Component	Level of Inspection Required	Data to be recorded	Acceptance criteria
	Geotechnical instrumentation	All	Check and confirm correct functioning of all instruments	Geotechnical instrumentation note of any abnormalities found/inspection report	Engineering report including evaluation of the Geotechnical instrumentation and must conclude the Geotechnical instrumentation will meet the Design Service Life of the Facility

Facility Component	Component Description	Minimum Remaining Useful Life (DSL = Design Service Life)
Site Circulation Routes	pavings, paths, driveways, roads, car parking areas, Facility entrances, external staircases, external fire escapes	Greater of 50% of DSL or 35 years
Buildings External	external walls, fire escapes, walkways, safety barriers, eaves, rendering, gutters and drains	Greater of 50% of DSL or 35 years
Buildings Internal	internal walls, partitions, ceilings, elevators	Greater of 50% of DSL or 20 years
AC and DC Station Service Equipment	transfer switches, panelboards, feeders, etc.	Greater of 50% of DSL or 15 years
Electronic Control System	electric, electronic, motor and metering	Greater of 50% of DSL 10 years
Cooling System	air conditioners, cooling coils, package chillers and condensers	Greater of 50% of DSL or 5 years
Ancillary mechanical and	pneumatic/electric, electronic and	Greater of 50% of DSL or 10 years

Facility Component	Component Description	Minimum Remaining Useful Life (DSL = Design Service Life)
electrical systems	hydraulic controls, small control valves, fans, dampers, diffusers, registers, condensate, sump and dewatering pumps, compressors, motors, monitoring equipment and instrumentation	
Floors and Floor Coverings	tiles, sealant, paints	Greater of 50% of DSL or 10 years
Heating System	heat pumps, boilers, furnaces, unit heaters and heat exchangers	Greater of 50% of DSL or 10 years
Fixtures and Fittings	doors (external, internal and fire), windows and sills, hatches, vents, millwork, shelving, cupboards, railings, racking, notice boards, mirrors, lockers, washroom fixtures, balustrades, magnetic door holders	Greater of 50% of DSL or 10 years
Decorative Finishes	paintwork, fabric, special finishes applied to walls, ceilings, woodwork, metalwork, pipework and other visible elements	Greater of 50% of DSL or 10 years
Perimeter Fencing	fence posts and gates	Greater of 50% of DSL or 10 years
Electronic Security Control	non-processor based technology	Greater of 50% of DSL or 10 years
Electronic Security Control	processor based technology	Greater of 50% of DSL or 5 years
Furniture & Equipment	chairs, tables, desks, equipment	Greater of 50% of DSL or 5 years
Other readily accessible components not otherwise described above		Greater of 50% of DSL or 5 years

APPENDIX 7F – HANDBACK REQUIREMENTS

1. GENERAL

- (a) On the Expiry Date, the Facility and each element comprising the Facility shall be in a condition demonstrating that:
 - (1) the Design and Construction of each element of the Facility has been completed to achieve the applicable Design Service Life requirements set out in Schedule 6 [*Design and Construction Specifications*];
 - (2) Project Co has performed the Services in accordance with the requirements of Schedule 7 [*Services*];
 - (3) Project Co has fulfilled the requirements of Schedule 8 [*Environmental Obligations*];
 - (4) all replacement, rehabilitation and repair work, identified as Project Co's responsibility in the 12-yr Condition Assessment Report, has been completed in accordance with the recommendations of the Independent Certifier; and
 - (5) all Handback Requirements identified herein have been satisfactorily fulfilled.
- (b) The results from the 12-year Condition Assessment Report shall be used to develop the Handback Plan and subsequent Handback Report.
- (c) Acceptable Handback requires that:
 - (1) all Condition Indicator Scores be within the acceptable limits based on the results of the 12-Year Condition Assessment Report without equipment failures or changes to the Asset Management Plan that adversely affect the asset condition prior to Handback;
 - (2) the Minimum Remaining Useful Life of all components of the Facility, must meet the criteria included in Appendix 7E [*Condition Assessment Evaluation*]; and.
 - (3) all other Handback Requirements identified herein be fulfilled.
- (d) The Condition Assessment Retention will not be released until Handback acceptance.

2. HANDBACK PLAN

- (a) Within 60 days of the completion of the final 12-Year Condition Assessment Report, pursuant to the Review Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*], Project Co shall deliver to the BC Hydro Representative a Handback Plan. The Handback Plan shall contain a detailed proposal of the Handback Work planned by Project Co to deliver the Facility back to BC Hydro in acceptable condition based on the results of the 12-Year Condition Assessment Report. The Handback Plan shall include:
- (1) Project Co's proposal for the Handback Work (if any) required to be carried out in respect of the Facility to satisfy the Handback Requirements at the Expiry Date; and
 - (2) Project Co's proposal for implementing the Handback Plan over the remainder of the Services Period as part of the Asset Management Plan in effect and describing the total work to be carried out as well as the method and schedule for carrying out such work.

3. HANDBACK REPORT

Project Co shall deliver, no later than eight months prior to the Expiry Date, pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*] for BC Hydro's review, a Handback Report that confirms that all outstanding condition assessment and Handback Requirements have been addressed in accordance with the Handback Plan and that the Facility is ready for Handback Certification. The Handback Report shall identify any remaining issues with the Facility and include a rectification plan that addresses the issues prior to Handback Certification.

4. HANDBACK CERTIFICATION

- (a) Further Inspection

Not later than six months prior to the Expiry Date, Project Co and BC Hydro will conduct a joint inspection of the Facility. Such inspection will confirm whether or not the condition of the Facility meets the Handback Requirements. Project Co shall provide a Handback Certificate pursuant on the Expiry Date to BC Hydro, pursuant to the Consent Procedure outlined in Schedule 2 [*Review Procedure, Consent Procedure and Other Submittals*] certifying that all Handback Requirements have been fulfilled. BC Hydro reserves the right to access, test, isolate, inspect or carry out further investigations to confirm that Handback Requirements have been satisfactorily fulfilled prior to accepting the Handback Certificate.

(b) Notice from BC Hydro

On, or within 15 Business Days after the Expiry Date, the BC Hydro Representative will either:

- (1) issue to Project Co a confirmation of acceptance of the Handback Certificate confirming completion of the Handback Requirements and return the Condition Assessment Retention; or
- (2) notify Project Co of its decision not to issue the Handback acceptance:
 - (i) stating the reasons for such decision;
 - (ii) setting out each respect in which the Handback Plan has not been completed or the Facility does not comply with the Handback Requirements; and
 - (iii) stating the BC Hydro Representative's estimate of the cost of completing all Handback Work required to comply in all respects with the Handback Requirements.

(c) Response from Project Co

Project Co may, within 30 days after receipt of the notice given in accordance with Section 4(b) [*Handback Certification*] of this Appendix 7F [*Handback Requirements*], by written notice to the BC Hydro Representative, object to any matter set out in the BC Hydro Representative's notice by:

- (1) giving details of the grounds of each such objection; and
- (2) setting out Project Co's proposals in respect of such matters.

(d) Dispute

If it is agreed, or determined in accordance with the Dispute Resolution Procedure, that the Facility did not, at the Expiry Date, comply in all respects with the Handback Requirements, Project Co shall:

- (1) satisfactorily complete any outstanding Handback Work within 60 days of the Expiry Date; and
- (2) pay to BC Hydro no later than 60 days after the Expiry Date an amount, if any, equal to the estimated cost of completing any outstanding Handback Work, so that the Facility is in a condition which complies with the Handback Requirements. Upon payment being received in full by the BC Hydro Representative, BC Hydro will issue the Handback acceptance

- 3 -

and return the Condition Assessment Retention to Project Co. If such payment is not received from Project Co when due, BC Hydro may draw any unpaid amounts against the Condition Assessment Retention and release the balance of the Condition Assessment Retention to Project Co.

5. SPARE PARTS, SPECIAL TOOLS AND MAINTENANCE EQUIPMENT

- (a) Not less than six (6) months prior to End of Term, Project Co shall prepare an inventory of the on-hand spare parts, special tools and maintenance equipment, and generate from the historical documentation in its Asset Management Plan the usage of spare parts and consumables during the Services Period. All equipment and tooling required for maintenance and major disassembly / reassembly, including erection and transportation devices, shall be included in the inventory. An Independent Certifier will compare the inventory against the requirements for spare parts, special tools and maintenance equipment specified in Schedule 5 [*Design and Construction Protocols*], and assess the condition of all items. Spare parts, special tools, maintenance equipment and tooling that are missing, worn, broken or otherwise damaged making them unusable to fulfil their intended function shall be replaced by Project Co at its expense.
- (b) Project Co shall also develop a list of recommended optional spare parts, including quantities and prices, based on repair history during the Services Period and anticipated future needs. *The* list shall include contact information, current at the time of preparation of the list, for the various suppliers of the parts. The list of recommended optional spare parts shall be provided at the same time as the inventories specified previously herein.
- (c) At Handback, Project Co must hand over to BC Hydro in satisfactory condition all required spare parts, special tools, maintenance equipment and tooling as were on hand at Service Commencement, and any optional spare parts provided by Project Co. Written certification must be provided by the Independent Certifier that the requirements for spare parts, special tools and maintenance equipment have been satisfactorily fulfilled.

6. HANDBACK TRAINING

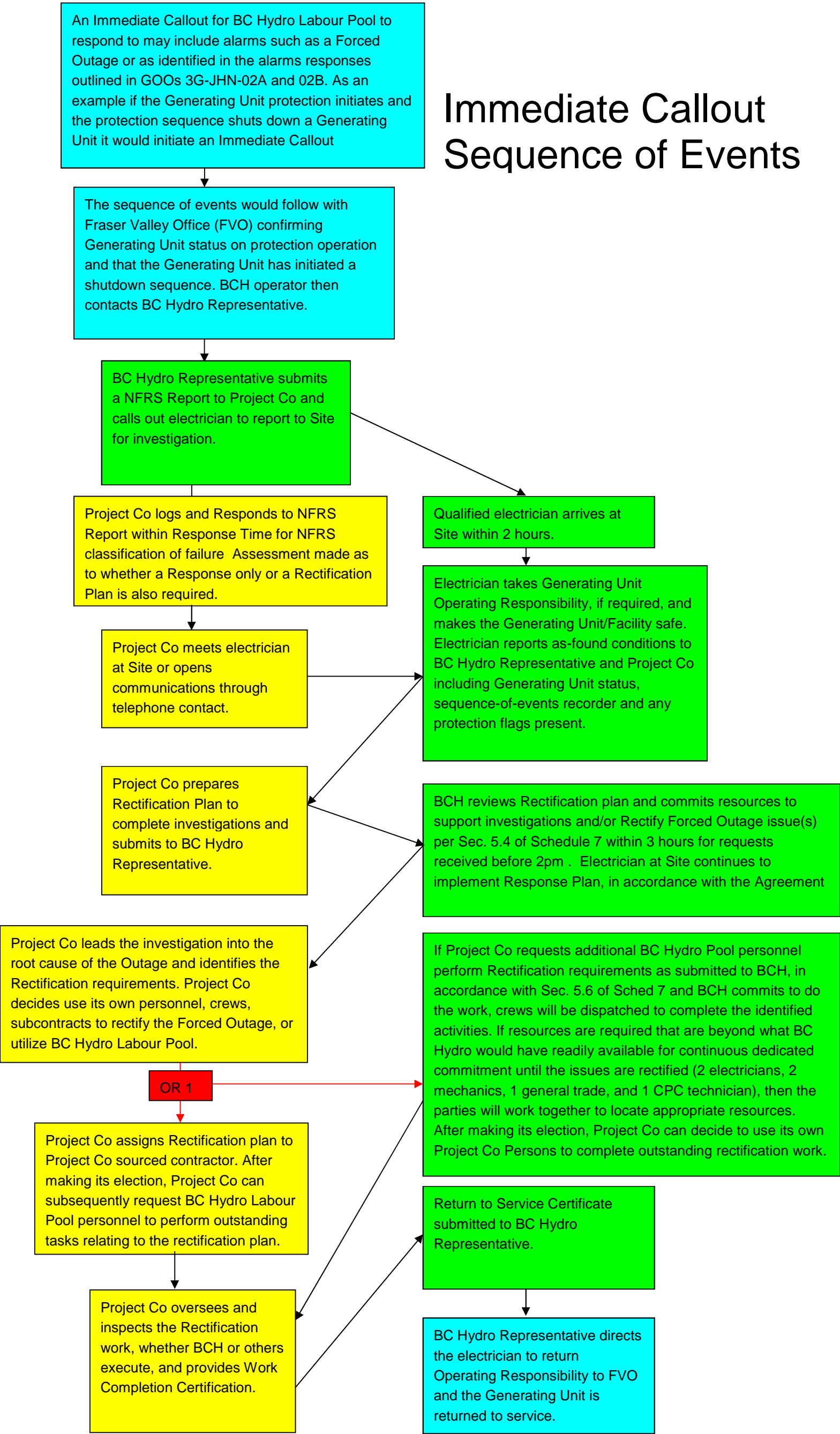
- (a) Project Co shall develop and implement a detailed and comprehensive handback training program for BC Hydro's Generation Engineering Maintenance Services (GEMS) personnel, which shall provide sufficient and adequate training and instruction for GEMS personnel to provide the engineering support that BC Hydro O&M personnel will need to operate and maintain the Facility following Substantial Completion.

- (b) Not less than 6 months prior to the scheduled date for Handback, Project Co shall review the handback training program with the BC Hydro Representative and GEMS staff to identify any gaps that may restrict GEMS staff from providing the engineering support for BC Hydro personnel in their obligation to operate and maintain the Facility. Project Co shall revise the handback training program to the satisfaction of the BC Hydro Representative within 60 days of the review meeting.
- (c) The handback training program shall:
 - (1) commence no later than 90 days prior to the scheduled date for Handback;
 - (2) include input from the OEMs regarding any changes they recommend based on their experience during the Services Period with their specific equipment at the Facility and other facilities using their equipment; and
 - (3) incorporate lessons learned by Project Co and BC Hydro based on their experience with the Facility during the Services Period.

7. RECORDS AND REPORTS

- (a) Project Co must, pursuant to the requirements of Schedule 20 [*Records and Reports*], deliver to BC Hydro all records and reports identified in the approved Records Management Protocol as needing to be turned over to BC Hydro at Handback.
- (b) Required Service Reports are described in Section 6 [*Documentation and Reporting*] of this Schedule 7 [*Services*].
- (c) Project Co shall update Construction Records and O&M Manuals to incorporate maintenance procedures that were revised or modifications of equipment or other components of the Facility components during the Services Period. Revisions to Construction Records and O&M Manuals shall be made following the protocols and procedures specified in Schedule 5 [*Design and Construction Protocols*].

Immediate Callout Sequence of Events



APPENDIX 7H - OUTAGES AND CONSTRAINTS NOTIFICATION FORM

Plant / Unit(s) :		Revision :	No
Start (yy/mm/dd)		Finish (yy/mm/dd)	
Recall Time :		Return on Weekend :	

Purpose / Generation and Operating Constraints :

Planned Outage

Project Co Contact

Name :

Phone :

Routing Instructions

Day Ahead and Beyond (except weekend and holiday submissions)

- | | | |
|----------------------------|--|------|
| 1. BCH VIG Maint. Planner | e-mail: | fax: |
| 2. BCH Operations Planner | e-mail: | fax: |
| 3. BCH PS Next-Day Planner | e-mail: XXXXXXXXXX | fax: |

Same Day (including all weekend and holiday submissions)

- | | | |
|------------------------|--|------|
| 4. BCH PS Shift Office | e-mail: XXXXXXXXXX | fax: |
|------------------------|--|------|

Generation Constraints Scheduling Protocol

1. Project Co shall coordinate its annual MPS with BC Hydro in accordance with Schedule 7.
2. Project Co shall submit an Outages and Constraints Notification Form to BC Hydro for each Planned Outage, Derate and Project Co Operating Constraint. For Planned Outages, Derates and Project Co Operating Constraints, an Outages and Constraints Notification Form shall be submitted when such outages, derates or constraints have been scheduled by Project Co, and in any event, not less than two Business Days prior to such outages, derates or constraints coming into effect. For unplanned outages, derates or constraints, an Outages and Constraints Notification Form shall be submitted when a determination of the probable return to normal service date is available.
3. Project Co shall submit a revised Outages and Constraints Notification Form whenever there is a material change to any previously submitted Outages and

Constraints Notification Form including any revisions to the expected return to normal service date.

Real-time Generation Constraints Coordination Protocol

1. Project Co shall confirm with the designated BC Hydro Person, by telephone, all changes to Outages, Derates and Project Co Operating Constraints as they occur and the designated BC Hydro person will record all such changes in the generation log.

APPENDIX 71 - STANDARD SCHEDULE OF RATES FOR THE BC HYDRO LABOUR POOL

Description		Electrician	Mechanic	CPC Tech	General Trades	NRS/OHS				
Service	Regular time									
	Overtime									
Immediate Call-out	Regular time									
	Overtime									
Planning work & follow-up (when required) performed at BC Hydro offices										
Other Charges										
Daily allowance										
Travel and living expenses										
Standby										
Charges for kilometers										
Consumable materials										

Service Delivery

BC Hydro crews will be managed to the Labour Agreements which take precedence over the following reference summary in the event a conflict:

Regular time:

- Monday to Friday from 8:00 a.m. to 4:00 p.m. Changes to shifts must be scheduled at least 72 hours in advance or be charged at Overtime Rates for all work.
- Travel time, job planning and Environmental Health & Safety preparation times are considered working time.
- In the event of cancellation less than 72 hours prior to travel, an 8 hour cancellation fee will be charged at the regular rate per hour.
- The maximum number of hours for daily work will be determined according to the Labour Agreements in effect at the time the work is executed, subject to Section 4.5(n) of this Schedule 7 [Services].

Overtime: All weekend and holidays will be charged at Overtime rates. Work hours beyond Regular time will be charge at Overtime rates.

Immediate Call-out: Immediate attention and dispatch of service personnel to site for urgent unplanned services.

Minimum Charge: A minimum charge of 4 hours is applicable for all field services.

Notes:

1. BC Hydro Labour Pool will work within the Labour Agreements with BC Hydro regarding hours of work.
2. All of the above prices are in Canadian currency and do not include federal, provincial, local or any other taxes (where applicable) and are subject to changes at the rate of CPI yearly.
3. Services requiring additional or different job classifications and required skills sourced from the BC Hydro Labour Pool personnel; or third party contractor personnel will be quoted separately.

APPENDIX 7J - RETURN TO SERVICE CERTIFICATE

Note: *this is a framework document only. The Services Period Joint Committee will finalize this form within 30 days from the Effective Date and periodically review and update based on experience with its use.*

Outage Title:	[Enter Outage Title]
CM Outage #:	[enter #] Services Director: [Enter Services Director]

Outage Plan and Scope [Enter text]	Date and Length [Enter text]	Sheet [Enter text]
Work Packages [Enter text]		Work Package Nos. [Enter text]
Equipment Designation [Enter text]	Equipment Details [Enter text]	
Associated outstanding items / restrictions / notes / deficiencies, including MRS requirements (attach sheets as necessary) [Enter text]		
I give notice that the work program has been completed, except as noted, on the equipment described above which is now available for operation. <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> [yyyy-mm-dd] _____ Date </div> <div style="text-align: center;"> Services Director (or delegate) </div> </div>		I acknowledge that the equipment described above is available for operation except as noted. <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> [yyyy-mm-dd] _____ Date </div> <div style="text-align: center;"> BC Hydro Representative (or delegate) </div> </div>

Distribution - Services Director
 BC Hydro Representative
 Services Joint Committee

APPENDIX 7K – NOT USED