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[Status of Packages CH0030 and CH0032 Rev 1.pptx](#)

As requested



Status of Packages CH0030 and CH0032 Rev 1.pptx

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Lower Churchill Project

Status of CH0030 and CH0032 Packages

11-January-2017

Boundless Energy



Take a
MOMENT
for Safety

Current Status CH0030 T/G Supply & Install

Engineering

- 99.8 % Complete vs 100% Planned
- Remaining design work is related to changes to the switchyard protection panels

Fabrication

- 84% complete vs 100% Planned
- Stator bar manufacturing has been suspended as a result of the failure of two bars during production testing. Investigations have been completed. Andritz to advise on way forward.
- Manufacturing has been completed in China, India and Europe. The remaining work is within Canada and includes the stator bars, P&C panels and deluge piping.

Construction

- Notice of revised interface milestone dates – mobilization – (Astaldi Completion Contract).
- Installation of draft tube embedment anchors is underway.
- The spiral case door was installed in Unit 1.

Current Status CH0030 T/G Supply & Install

Commercial Strategy

- Delays in the civil construction has resulted in a delay in the execution of the T&G installation phase by approximately 2 years. This along with changing site conditions versus the original contract (i.e. powerhouse staged erection, wash cars, etc.) will result in additional costs.
- Discussions have been held with Andritz to identify the primary issues around the changing installation conditions in order to determine if mitigating measures could be taken. Andritz provided an analysis which was feed into the civil planning. The result was an adjustment to the plans in the areas of crane capacity during the embedment phase, enclosure of the powerhouse and measures to minimize congestion.
- Change Orders have been put in place to cover storage, inspections and increased preservation. Storage and preservation is an area which will require continued focus.
- Set strategy for resolution of al outstanding commercial matters including CH0032 interfaces.

Current Status CH0030 T/G Supply & Install

Outstanding Commercial Issues

- Schedule/Extension of Time
- Exhibit 12 Update – revised site conditions including supply of wash cars and powerhouse staged erection, lighting, hoarding.
- Apprentice Ratio
- Change Requests related to offloading and the hold placed on the P&C panels are under negotiation with an exchange of information. Target for resolution with Q1 2017.

LCP Management Effort to Date to Progress Scope

- Discussions were held with Andritz last fall regarding the schedule and staged erection of the powerhouse. Feed the milestones and revised civil plans back to Andritz as per Astaldi Completion Contract.

Current Status CH0030 T/G Supply & Install

Issues

- **Apprentice Ratio**
 - The claim is for loss of productivity due to the addition of the apprentice ratio to the contract.
 - The disagreement has been around the magnitude of the productivity impact.
 - The initial claim was \$6.2M. LCP countered with \$1.8M and Andritz replied by reducing their claim to \$5M.
 - If settlement is not agreed by Q1 2017 end, then issue unilateral CO.

CH0032 Status - General

Majority of Spillway Hydro-Mechanical construction activities were completed in 2016 and most of Andritz workforce has demobilized , Remaining activities include:

- Commissioning of controls and back up power
- Corrective work on gate guide heating system
- Completion of telecoms scopes
- Remedial work to address long list of Punch List items
- Training

Gate operations by Andritz, using local controls, have and still are ongoing during the construction and commissioning phases.

Gates have been under LCP operational control since water-up of the upstream channel this past summer. Actual gate operation is by Andritz under LCP direction.

Gate Body heaters are all operational and are currently set to maintain 15°C during initial operation. Design set-point is 5°C. Significant re-work required to the duct work instalation

Gate Guide heaters status – As of 11-January 2017, there are 3 of 6 total Guide heaters not installed on Bay 2 Gate and 4 of 6 not installed on Bay 4 Gate. No commissioning completed on this system do date

CH0032 Status - Commercial

Commercial Strategy

Change Order 10 is for the acceleration of the spillway installation work

Change Order 10 was unilaterally issued for \$3.4M.

Andritz has taken the position that the work should be cost reimbursable and have submitted invoices totaling \$21M but with a total claim cost in excess of \$45 million..

Settlement of Change Order 10

- Set internal meeting with LCP cost and schedule consultants for status up-date (meeting to be scheduled in January 2017).
- Current status of analysis / findings
- Agree strategy for settlement
- Agree LCP settlement position – schedule / cost
- Set timetable for settlement meetings with Andritz in Q1 2017
- Possible audit of Andritz if settlement is not achieved?
- Possible unilateral Change Order # 10

- Set timetable for bi-weekly joint commercial meetings on site / STJ / Montreal
- Recent settlement of small value CHR's at approximately \$1.50 million

CH0032 Status - Engineering

- More detailed and exhaustive LCP design and field reviews required due to incomplete design submissions by Andritz and its sub contractors (ISO 9000) – see examples below:
 - Andritz changes made to the gate control design has impacted control philosophy. Some of the changes impacted other systems and no updates have been made by Andritz to-date.
 - Installation in field without Code 1 Drawings.
 - No drawings available for some work scope installed until after installation completed.
 - Issue of Equipment Data Sheets for review and acceptance long after equipment has been installed
Ex.: TT for Gate Body Heating rec'd 26-Oct-2016 A1
 - As Builts and Design changes to approved drawings without engineering review/approval
 - Completions and Commissioning documentation not issued for review in a timely manner, though Contractor was continually coached on timing requirements by LCP
 - Shipping of Equipment without FATs and field rework as a result

Status Engineering Documents as of 05-January-2017

Spillway	TCM	Intake
Code 01: 1171	Code 01: 176	Code 01: 341
Code 02: 222	Code 02: 20	Code 02: 53
Code 03: 7	Code 03: 2	Code 03: 7
Reserved: 330	Reserved: 136	Reserved: 261

CH0032 Status – Construction

Roller Gates Body Heating Status

- Bays 1 to 5 Gate Body Heating Systems operational, there are some Performance Issues, Commissioning Ongoing
- Results from Air Flow Tests do not meet spec
- SRG's Body Heating Ducts field Installation not as per approved design and industry standards, thus poor airflow distribution.
- Blower not installed as per drawings – Risk of fatigue failure with installation
- Hi Temp Cut Outs Switches defective

Roller Gates Guides Heating Status

- Bays 1 to 5 Gate Guide Heating Systems 75% complete, Operational issues, Commissioning Ongoing
- Bay 1: 6 of 6 Guide Heaters Operating
- Bay 2: 3 of 6 Guide Heaters Operating, Installation issues with blockages in pipework
- Bay 3: 6 of 6 Guide Heaters Operating, Installation issues with blockages in pipework
- Bay 4: 2 of 6 Guide Heaters Operating, Installation issues with blockages in pipework and electrical
- Bay 5: 6 of 6 Guide Heaters Operating

Remaining Completed Scope Status

- Emergency D/G Set – Fuel System Delivery Issues, Code 1 DWGs outstanding,
- Spillway Control System – Commissioning not Completed , Issues with Software alignment with issued design documents

CH0032 Status - Construction

Outstanding Scopes

Architectural (Cable Penetrations, Safety Rails around Hoist Drums, Handrails Stair Tower Pinch Points)

Lighting & Small Power and Emergency Lighting requires completion and commissioning

Operator Warning System (HORN) not connected

Fire Detection System Commissioning not witnessed by LCP (Not Invited)

CCTV and Building Access Systems not Installed

Load Tests on TRCM not completed

HVAC System - Many Code 2 documents with significant comments returned to Andritz

General Deficiencies

- Hoist Motor coupling not to Specification – All Bays affected
- Hoist 5 Motor to be replaced
- Hoist House and Stair Towers weather tight outstanding – cable entries, doors , windows etc.

Outstanding Field Work Orders

- Installation of Telecoms Panels to Support River Instrumentation
- Fiber Optic Feed to Spillway Ehouse

Other

- Spare Parts Turnover
- O&M Manuals
- Training Formal Schedule and Syllabus to be determined

CH0032 Status - Completions

SEB Equipment Completion Update

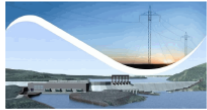
- 125VDC Battery System
 - Fully Commissioned
- UPS System
 - Fully Commissioned awaiting the Eaton Vendor commissioning report
- Fire System
 - Off at this time and not commissioned outstanding hardware to complete
- Diesel & Fuel System
 - Diesel has been load tested
 - Outstanding Exhaust leak
 - Start command latching
 - Fuel system has been tested but no commissioning dossiers shown for proven levels or shutdowns in the Storage Tank
- Qualitrol Transformer Temp Trip
 - Unit has been replaced this week but needs to be wired and commissioned
- LMS/ATS/Switchgear
 - Full list of outstanding commissioning to be completed as well as several design deficiencies to be reviewed with Engineering
 - Failed spring charge motor on Generator Feeder Breaker

CH0032 Status - Completions

- Premature equipment failure without sufficient cause and no follow-up root cause
- Andritz continually do a lot of the Completions type activities independently of LCP and consider work done (i.e. TCM installation and energization without LCP review, battery load test on UPS system which was done twice so LCP could attend
- As-Builts being submitted to engineering with unapproved new equipment allocated

CH0032 Status – PCS System

Completion Certificate Status



Lower Churchill Project

Andritz Hydro CH0032 Certificate Completions Summary

Mechanical Completion and Static and Dynamic Commissioning



	LCP DCC			MCC			SCC			Total		
Systemization	14	0	0.0%	124	76	61.3%	53	24	45.3%	191	100	52.4%
C1 - Muskrat Falls Power Generation	14	0	0.0%	124	76	61.3%	53	24	45.3%	191	100	52.4%
2000 - Reservoir, Diversion, Dam and	14	0	0.0%	124	76	61.3%	53	24	45.3%	191	100	52.4%
2410 - Spillway Structure	0	0	0.0%	6	6	100.0%	0	0	0.0%	6	6	100.0%
2420 - Gates Guides Stop Logs and	3	0	0.0%	0	0	0.0%	0	0	0.0%	3	0	0.0%
2421 - Gates Guides Stop Logs and	2	0	0.0%	18	10	55.6%	6	4	66.7%	26	14	53.8%
2422 - Gates Guides Stop Logs and	2	0	0.0%	18	11	61.1%	6	5	83.3%	26	16	61.5%
2423 - Gates Guides Stop Logs and	2	0	0.0%	18	11	61.1%	6	5	83.3%	26	16	61.5%
2424 - Gates Guides Stop Logs and	2	0	0.0%	18	11	61.1%	6	5	83.3%	26	16	61.5%
2425 - Gates Guides Stop Logs and	2	0	0.0%	18	10	55.6%	6	4	66.7%	26	14	53.8%
2441 - Spillway Auxilliary Services	1	0	0.0%	28	17	60.7%	23	1	4.3%	52	18	34.6%

Status of Check Sheets

Mechanical Completion 89 % Completed <https://lcp.ceccms.com/reporting/ReportViewer.aspx?Mode=SavedReport&ID=62&requestID=1481566721127>

Static Commissioning 55 % Completed <https://lcp.ceccms.com/reporting/ReportViewer.aspx?Mode=SavedReport&ID=63&requestID=1481566747602>

Dynamic Commissioning 0 % Completed <https://lcp.ceccms.com/reporting/ReportViewer.aspx?Mode=SavedReport&ID=66&requestID=1481566769421>

Punch List Status: 926 Reported to Date with 169 or 18% closed

<https://lcp.ceccms.com/reporting/ReportViewer.aspx?Mode=SavedReport&ID=66&requestID=1481566769421>

CH0032 Issues – Site Management

Andritz continue to have inadequate site staff to complete the remaining work including but not limited to:

Site Management

Labor Relations

Technical Engineering

Construction Management

Quality Control

Completions and Commissioning

PCS System Administration.

CH0032 Issues - General

1. Gate Openings required by LCP to progress river management. Andritz operation of gates is currently reimbursable as a Change Order.
2. Engineering Deliverables
 - Quality of Design and LCP Effort to Code 1 Status
 - Timing of Issue
 - Outstanding non Code 1 Drawings
3. Quality
4. Construction
 - Poor Planning, Productivity, Installation docs, Re-work, Adequate Resources
5. Completions and Commissioning
 - Quality of PCS documentation, LCP assistance required to progress work, substandard documentation of testing, planning, use of systems w/o commissioning,
6. Site Management
 - Poor Schedule planning and updating , no base line, reporting of progress, ready for installation, Hoarding, craneage, productivity of subs, sequence of work, site coverage for key positions, etc.
7. Preservation / Maintenance Requirements

CH0032 Issues - Completions

- PCS System Coaching and Work Done by LCP to progress work including population of system databases to allow completions to begin however the following items are still of concern:
 - Lack of notice for Quality inspections
 - Lack of inspections in timely manner
 - Quality of documentation for Completions and commissioning
 - Subsystem definitions not thoughtfully administered by Andritz to Mechanical Completion systems and Check Sheets
 - Andritz have routinely energized equipment without LCP approval
 - Andritz have not been keeping progress up to date in PCS

Sharing our ideas in an open and supportive manner to achieve excellence.

Teamwork

Open Communication

Fostering an environment where information moves freely in a timely manner.

Honesty and Trust

Being sincere in everything we say and do.

Relentless commitment to protecting ourselves, our colleagues, and our community.

Safety

Respect and Dignity

Appreciating the individuality of others by our words and actions.

Leadership

Empowering individuals to help, guide and inspire others.

Holding ourselves responsible for our actions and performance.

Accountability